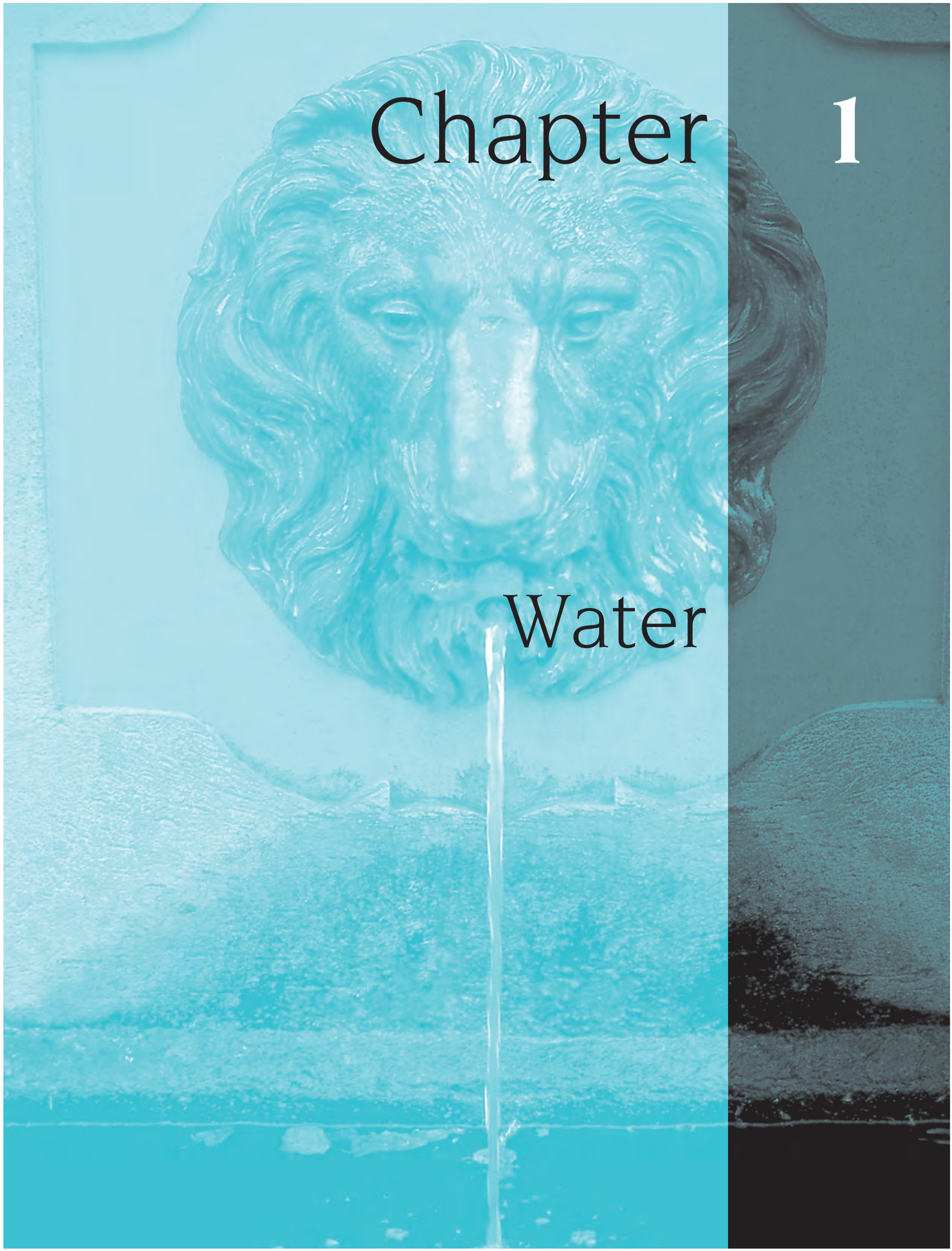
Part 2

Six Sustainability Issues



Chapter 1

Water

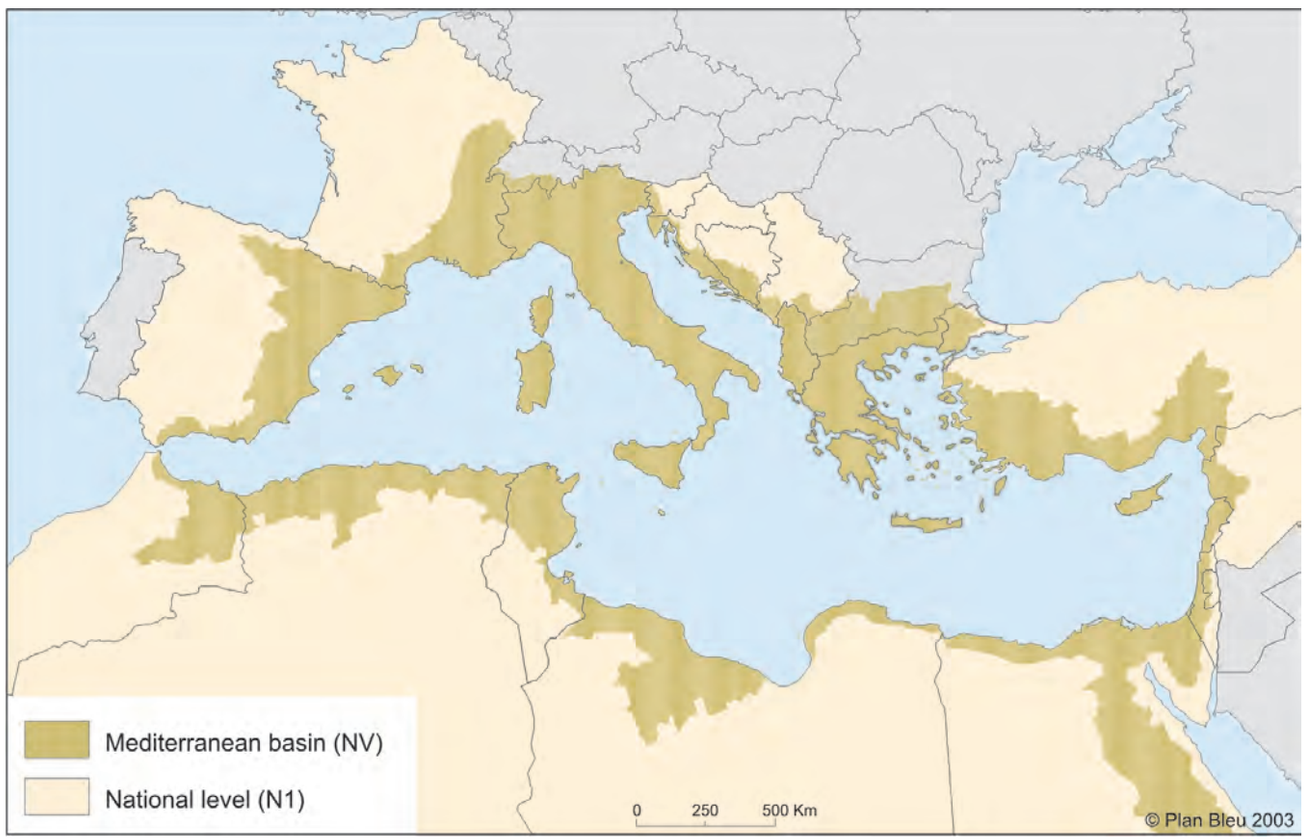
From the beginning of time, water has shaped the Mediterranean environment and its economies and societies. At the dawn of the 21st century it is taking on a new importance. With just 3 per cent of the world's freshwater resources and more than half of the world's 'water poor' population,[1] the Mediterranean countries are faced with the vital issue of access to this source of wealth for their populations and ecosystems.

This chapter deals with continental freshwater; coastal seawater will be discussed in Chapter 6, Coastal areas. It contains an additional geographic level to N1 (the Mediterranean coastal countries and territories): the Mediterranean Catchment Basin (NV level); this level is particularly relevant for studying water resources. Its area is defined as the entire catchment areas of the small and large rivers that empty into the Mediterranean that are included in the territorial limits of the Mediterranean countries (Figure 1.1). So as to avoid covering too large an area that is not part of the Mediterranean eco-region, the watersheds that are outside the Mediterranean countries have been excluded from the conventional Mediterranean catchment area. In particular, the designation excludes Egypt's upstream Nile watershed, which stretches into Tanzania and covers a total of 2,726,000km^2. The surface area of the catchment area included (restricted to the Mediterranean countries) is 1,753,850km^2.To avoid confusion in the statistics used in this chapter, the illustrations will refer to the geographical level concerned by coding titles (i.e. N1 or NV).

The countries that have similar hydrological profiles are grouped by continent:

- Northern Mediterranean countries (NMC or northern shore): Spain, France, Italy, Greece, Monaco, Slovenia, Croatia, Bosnia-Herzegovina, Serbia-Montenegro, Albania, Cyprus and Malta
- Southern and eastern Mediterranean countries (SEMC):
  - the Eastern shore: Turkey, Syria, Lebanon, Israel and the Palestinian Territories:
  - the Southern shore: Egypt, Libya, Tunisia, Algeria and Morocco.

Figure 1.1 Mediterranean catchment area, NV



Note: This definition of the NV level excludes the part of the Nile upstream of Aswan, and Andorra, Bulgaria, Macedonia and Switzerland.

In the southern and eastern shore areas of the Mediterranean, withdrawals from aquifers and surface waters, and the disposal of effluents, both resulting from economic and demographic growth, are threatening the quantitative and qualitative regenerative capacities of freshwater. In the north, withdrawals are stable or even falling. However, decision-makers and public opinion are deeply concerned about degradation of the quality of freshwater and ecosystems and the growing costs of water supply.On both shores, urbanization and population concentrations on the coasts are continuing to increase local pressures on resources.

These developments, and the associated economic, strategic and environmental risk factors, will be analysed in the first part of this chapter in the context of the *Plan Bleu* baseline scenario. However, this increased demand could be dealt with by limiting the impact on the environment through a significant improvement in water management. This is the preferred way forward and will be considered in the second part of the chapter in the context of an alternative scenario where the possibilities, problems and ways of achieving 'sustainable' water management on the basis of experience accumulated in the Mediterranean region are analysed.

Continuing growth in pressures on vulnerable water resources

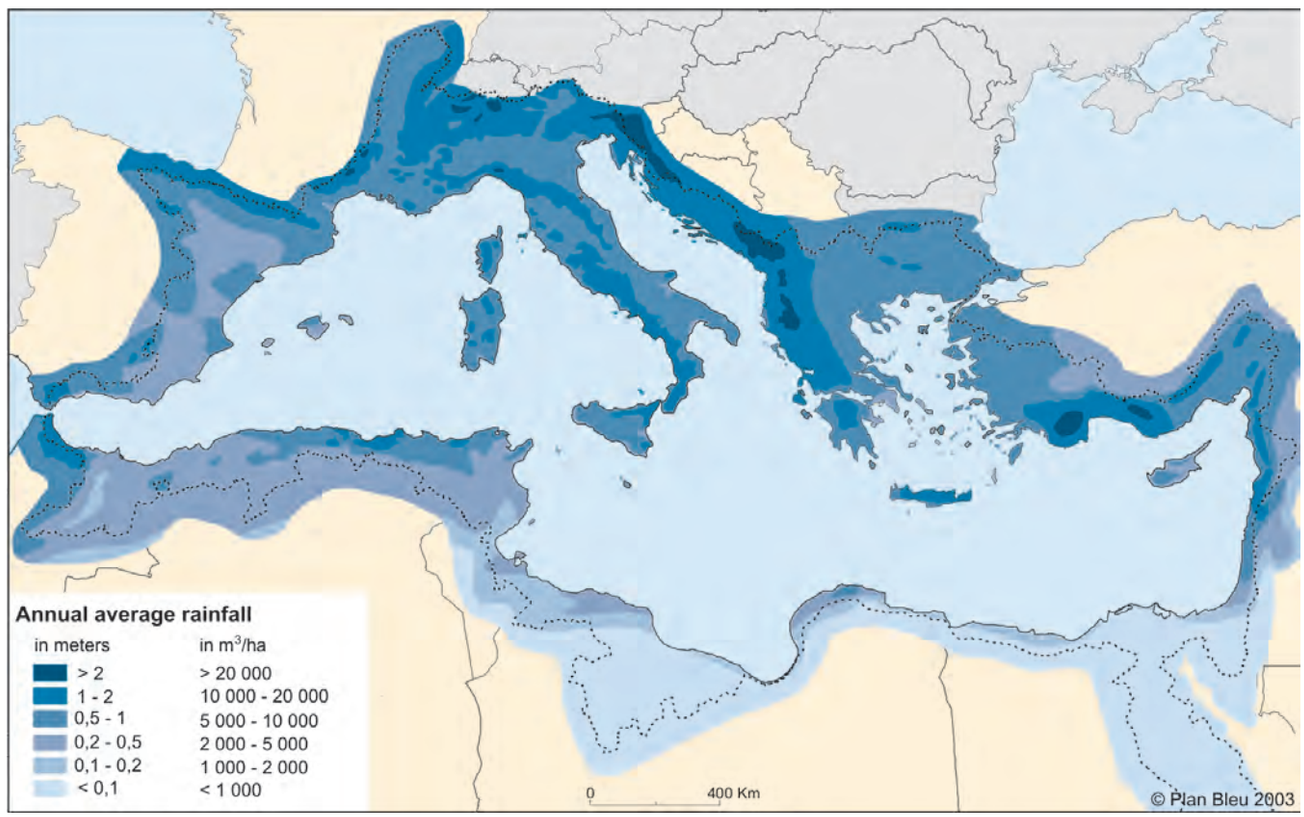
It is important to keep in mind the extreme diversity of the situations in different Mediterranean countries and the large disparity in terms of space and time in the distribution of water resources, which may well become more pronounced.

Water in the Mediterranean area is an irregular, rare and fragile resource

The Mediterranean climate is typified by an enormous irregularity in the distribution of rainfall in space and time (Figure 1.2).

Although the entire Mediterranean catchment area (NV) receives a total average volume of precipitation estimated at 1100km^3 (1000 million cubic metres) per year, nearly two-thirds of this volume is concentrated in one-

Figure 1.2 Average rainfall distribution in the Mediterranean basin



Source: Plan Bleu; Margat, 2004

fifth of the Basin's surface area. While three countries, France, Italy and Turkey, receive half of the total precipitation, the southern countries receive only 13 per cent.

Part of this precipitation is used directly by vegetation; the other part produces surface or underground flow, which constitutes an 'internal inflow' of precipitation to freshwater resources. Adding this interior inflow to the Basin's external inflow[2] gives the total of 'natural, renewable freshwater resources' (underground and surface) of the Mediterranean catchment area, which amounts, on a yearly average, to about 600km^3 per year (NV see Table A.33 in Statistical Annex). These resources are the maximum potential of water resources 'given by nature' on average every year. This potential can be exploited more or less intensively without affecting the rights of future generations since it is renewed every year by rain, at least insofar as this is not altered by climate change.

This potential is very unevenly distributed in the Mediterranean since it is concentrated (more than 85 per cent) in the NMC and Turkey, which also supply 90 per cent of the total water flow into the Mediterranean, estimated at about 475km^3 per year.

These average renewable natural freshwater resource values, calculated over long periods, are characteristic of the Basin's hydrology and should be considered as relatively constant in time over the period in which we are interested (to 2025) (Box 1.1), even if they mask a wide variability of input from one year to another.

Box 1.1 What is the outlook for renewable natural resources?

For the sake of simplicity, we assume that the average annual volume of **renewable natural resources** will remain constant between now and 2025. This is probably optimistic given two important risk factors: climate change and modifications in the hydrological regime in the catchment areas (not to mention increased pollution, which affects the quality of the resource).

Climate change could increase still further the occurrence of droughts and, in the southern and eastern Mediterranean, diminish average precipitation, but there are very serious uncertainties. Indeed available research on the possible effects of global warming on water resources in the Mediterranean are very sketchy and often contradictory. Although temperature rise appears to be more and more likely, the scenarios for the evolution of precipitation and, even more, run-off, in the various available models do not allow any conclusions to be drawn. Experts, however, seem to agree that there will be a risk of greater contrasts between different seasons and regions and an increase in the occurrence of random droughts, although they cannot specify their severity or when and for how long they might occur.

Changes in hydrological regime and desertification in the catchment areas attributable to human activities are more immediate and likely risks than global warming. Water resources are and will be affected by changes in land use in the catchment areas, mainly the sealing of soils, as a result of increasing urban development and transport infrastructures, which increases surface run-off (amplifying the irregularity of input) and make control of this problem even more necessary. Deforestation (fires and logging) and the drying of wetlands also change the water regime. Erosion due to some agricultural practices (abandoning terraced cultivation, overgrazing) amplify the phenomenon even more. In contrast, tree replanting, particularly that related to the abandonment of farmland in the northern rim Mediterranean countries, could control the temporal patterns of the flows, even if it contributes to reducing average run-off.

Source: Margat, 2004

Although the average renewable natural water resources may be considered as unchanging for the 2000–2025 period, the inequality in natural water availability per inhabitant between the north and the south and east of the Mediterranean will grow as a result of demographic factors alone. Although the average 'share' of natural renewable water resources per capita in the Mediterranean's southern countries was on average 2.5 times lower than that of people in the north in 1950, it was about 6 times lower in 2000 and is expected to be 8 times lower by 2025.

In absolute terms, the *water poor* Mediterranean population (NV), those with less than 1000m^3 per capita per year, was 108 million in 2000 and could reach 165 million by 2025 in nine SEMC. Of these, 63 million people would be 'in shortage', that is, with less than 500m^3 per capita per year (compared with 45 million in 2000). These already troubling figures mask local or temporary shortages in many catchment areas.

Most of the renewable natural resources in the Mediterranean Basin are from surface run-off (about three-quarters of the water that runs off within the basin and 90 per cent of the run-off that leaves the basin). Six major rivers have an average natural flow greater than 10km^3 per year: the Nile in Egypt, the Rhone in France, the Po in Italy, the Drin in Albania–Serbia-Montenegro, the Ebre in Spain and the Neretva in Bosnia-Herzegovina and Croatia. The hydrographical structures are highly scattered since only 21 basins have areas of more than 10,000km^2 and cover only 42 per cent of the entire Mediterranean catchment area.

The total of underground flows in the Mediterranean Basin would be about 150km^3 per year out of the 600km^3 per year of total inflow. Underground waters have an essential function in regulating flows. In the northern countries, they contribute to most of the river-creating

run-off and are the main factor in their permanence. In contrast in the south, they are fed by the often temporary flooding of rivers, and many flow into evaporation fields (if they are not already harnessed), particularly in enclosed low-lying areas. Where aquifer reservoirs are sufficiently developed, they improve resistance to drought.

There are three types of aquifers prevalent in the Mediterranean Basin:

1 karstic carbonate aquifers, consisting of water 'towers' with mainly perennial run-off;
2 localized alluvial aquifers in the valleys and deltas of major rivers, strongly linked and with high rates of interchange with their respective rivers;
3 aquifers formed mainly of detrital sedimentation on coastal plains in contact with the sea or extensive basins, especially in the south (Egypt and Libya) in the Sahara, largely beyond the Mediterranean Basin. They contain deep-lying water tables with considerable reserves but are currently seeing very little renewal ('fossil' water), and are practically independent of surface water.

In addition to this uneven spatial distribution of the water resources, there is a very great irregularity in time, both within and between years.

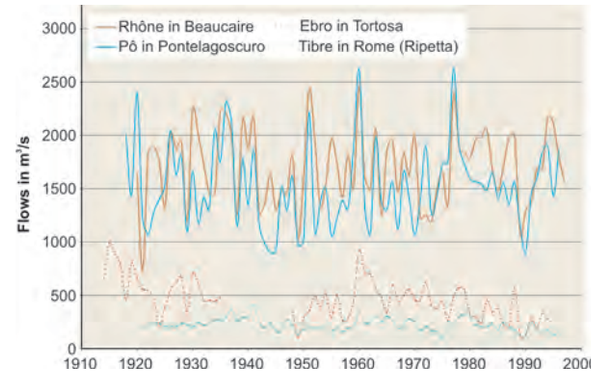
The intra-annual variability between seasons of the same year is characterized by a concentration of rain into relatively few days (an average of 50–100 days per year) and by summer droughts that correspond with the highest peaks of water demand (for irrigation and tourism). To measure this variability, the *regular* resource is defined as the run-off assured for 90 per cent of the time during an average year, in practice the 'basic' effective run-off for 11 months out of 12. Of the total volume of renewable resources in the Mediterranean Basin in an average year, only a small proportion, about 30 per cent, is regular in this sense.

Added to this variability within the year is a very strong inter-annual variability between succeeding years. Droughts[3] are very frequent and may get worse with climate change. This irregularity considerably limits the exploitation of renewable surface water resources in the basin and justifies the construction of many projects designed to regulate intra- or inter-annual flows (Figure 1.3).

To this irregularity, which confers a certain 'quantitative' vulnerability to freshwater supplies, one has to add a 'qualitative' vulnerability.

Freshwater resources in the Mediterranean Basin often have a natural quality (for example natural salinity or high hardness levels) that limits their use. For example, in Tunisia 26 per cent of the surface water, 90 per cent of the underground waters drawn from water tables and 80 per cent of the water pumped from deep water tables has a salinity of more than 1.5g per litre.

Figure 1.3 Inter-annual variation in river discharge



Source: Med-Hycos Project (www.medhycos.com or http://medhycos.mpl.ird.fr)

The resources are also particularly vulnerable to human activity. This is the case with many shallow alluvial water tables. Mediterranean river beds are often dry in summer and, unlike rivers in more temperate zones, are therefore unable to cleanse themselves. High summer temperatures diminish this ability even more in river beds and perennial waters. Coastal water tables are in fragile balance and can easily be contaminated by sea water intrusion when too much water is taken from them.

Climate change may contribute to increasing this natural irregularity and vulnerability of water resources by increasing the frequency and magnitude of droughts and reducing precipitation in the southern region of the Mediterranean (Box 1.1).

Water shortages and frequent droughts have a particular effect on the SEMC, which are expected to experience the greatest water needs in coming years.

Growing demands in the south and east

Between now and 2025 water demands in the south and east are expected to increase by 25 per cent

Water is 'used' by people for vital functions (drinking and hygiene), and many economic activities (irrigation, industry, energy, shipping and leisure). *Water demand* is defined here as the total volume of water needed to satisfy the different water users, including volumes 'lost' during transport, for example leaks from pipes and evaporation between the withdrawal point (or production site) and the point of final consumption. Demand thus includes withdrawals from natural resources, water imports and the unconventional production of water such as desalination and re-use. It differs from final

consumption of water by users, in that it includes all related losses and non-use, for example water transport (see below).

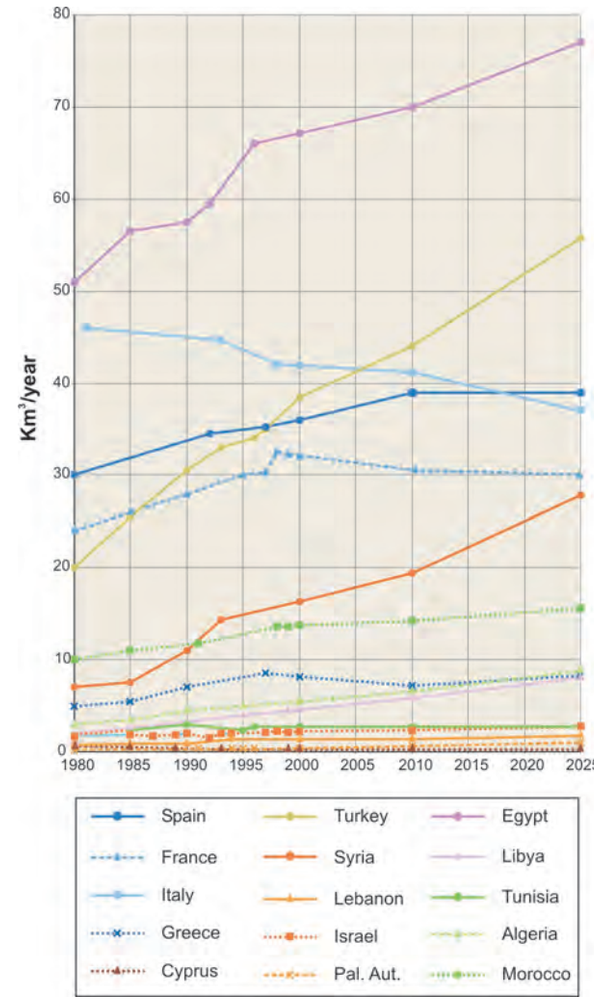
The main forces that drive Mediterranean water demand are irrigation (to make up for the deficit in precipitation and a growing supply or export demand in the SEMC), domestic requirements (which increase with urbanization) and rapidly expanding tourism. It is difficult to obtain reliable data about water demands that are comparable over time and between countries. The following data are therefore valid only to an order of magnitude. Retrospective data sets over long periods are only available at the whole country level and show that during the second half of the 20th century, the total water demand of the Mediterranean countries doubled, and has now reached about 290km^3 per year for all the Mediterranean countries (N1). The countries experiencing the greatest growth (more than 2 per cent per year) are Turkey, Syria and France. Over the past decade only a few countries either stabilized (Israel) or even reduced their total water demand (Italy, Malta and Cyprus, Figure 1.4). On the smaller scale of the various Mediterranean catchment basins (NV), the available time series are less extensive. The total demand for water was 190km^3 per year in 2000 (see Table A.34 in Statistical Annex), or about a third of the 600km^3 per year of renewable natural resources.

Projections of these demands by country and sector up to 2025 have been made[4] on the basis of analyses of available national strategy and planning documents, reviewed in the light of major prospective regional and worldwide projections[5] and certain consistency tests. These projections form the 'baseline scenario' for water by *Plan Bleu*. The projections, carried out country by country at the two N1 and NV scales, are summarized in Figure 1.4 (and Table A.34 in the Statistical Annex). In relation to *Plan Bleu* previous scenario exercises[6] for water, the future demands for 2025 have been significantly downgraded. The national projections have been readjusted from their previous levels, which generally had a tendency to overestimate the projected growth in water demand. According to this baseline scenario, the total water demand in the basin (NV) would increase by 20km^3 between 2000 and 2025, or 0.4 per cent per year. Most of this growth would be due to the southern rim countries (0.7 per cent per year and 25 per cent for the whole period) and above all the eastern rim countries (1.5 per cent per year, mainly in Turkey and Syria). The demand may stabilize or even drop in certain northern rim countries such as Italy.

Irrigation, the main consumer, is growing rapidly

Analysis of demand by sectors shows that the main user in volume terms in most countries remains agriculture

Figure 1.4 Total demand per country, baseline scenario, N1, 1980–2025



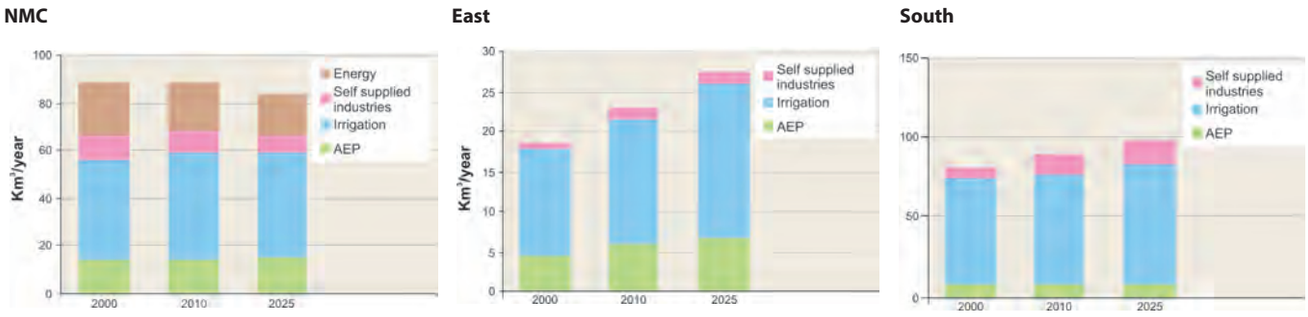
Source: Plan Bleu

for irrigation (except in the eastern Adriatic countries and France), followed by drinking water supply and, in third place, use by industry and the energy sector.[7]

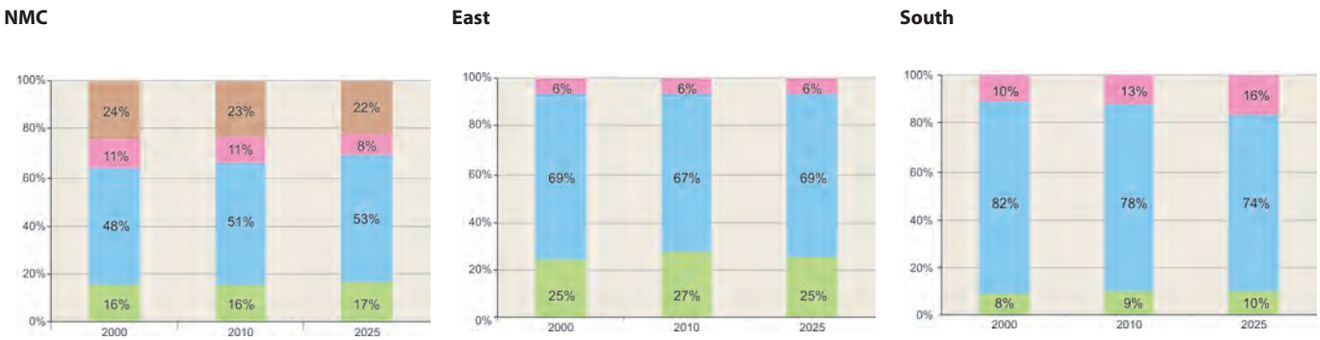
Agricultural water demand includes the quantities of irrigation water brought 'artificially' to plants. It also includes losses in distribution networks through infiltration and evaporation but excludes the rainwater directly captured by plants, known as 'green water'. It is the largest item in water demand, representing 65 per cent of total demand in the Mediterranean Basin, 48 per cent in the north and 82 per cent in the south. In the *north* the area under irrigation is becoming more or less constant (reducing in Italy) and is expected to lead to a more or less constant demand for agricultural water, in both absolute and relative terms. On the other hand,

Figure 1.5 The structure of the water demand per sector and per country groups, NV, 2000–2025

In absolute terms (km³)



As a percentage of the total



Source: Plan Bleu, J. Margat

AEP: domestic water supply

forecasts project a large increase in agricultural water demand in the *south and especially in the eastern* part of the Basin. Agricultural development policies in most of the SEMC (Turkey, Syria, Egypt, Algeria and Morocco) are planning both to extend the areas under irrigation and to increase farming intensity[8]. According to a FAO study[9], the irrigated area could increase by 38 per cent in the south to reach 9.1 million ha and 58 per cent in the east to reach 7.7 million ha by 2030. However, some hoped-for efficiency gains in water-use for irrigation and a relatively larger increase in demand for drinking water could result in the share of agriculture in total demand in the eastern countries remaining more or less constant. The share may even drop in the south, from 82 to 74 per cent of total demand by 2025, to the benefit of the supply of drinking water.

Under the combined effect of the rise in living standards and, most importantly, population changes, the baseline scenario projects a continuing large increase in *drinking water* demand in the SEMC and a stabilization in the NMC. The drinking water demand includes the water required to supply the tourism sector, which can lead to large seasonal spikes, although it has, generally speaking, no significant effect on average annual water demands countrywide. Locally, tourist demand can lead (on coastlines and islands) to over-sizing of water works or serious supply difficulties, even if these are usually quite easy to overcome by the capacity of the sector. In the baseline scenario the share of drinking water in total demand will continue to increase at the expense of the shares of the energy and industrial sectors in the north and the agricultural sector in the south and east. By 2025 it will reach an average of 15 per cent of total demand in the Mediterranean Basin (NV). In certain water-poor countries, given its priority in allocations, it may constitute more than a third of total demand (Cyprus 34 per cent, Israel and Algeria 45 per cent, the Palestinian Territories 58 per cent and Malta 87 per cent). In the water-rich countries, as in most of the eastern Adriatic countries, domestic water represents most of the demand, as irrigation is useless or marginal.

Water demand by the *energy and industrial* sectors (which consume small quantities but are often polluting) is expected to fall in absolute terms (efficiency gains and energy transition) in the NMC. In the SEMC, on the other hand, the industrial sector is expected to

increase its water demand significantly in absolute terms, reaching up to 16 per cent of total demand in the southern countries by 2025.

As the limits set for preserving natural ecosystems are approached, the need for an '*environmental* water demand' is becoming increasingly accepted; this would include the water required for the operations of these ecosystems. Some countries have included in their legislative arsenal the respect of a minimum flow in their rivers, set for the survival of species (France), or have included, even more explicitly, an environmental demand (Spain); others are considering such measures (Italy), but this demand is usually not yet quantified in supply and demand balance sheets and is seen more as an attempt to limit resource exploitation.

Pressures on natural water resources

Water supply strategies to meet these demands vary according to the different situations in the different Mediterranean countries. The forecasts of demand growth are highest in the generally water-poor SEMC. On the other hand, demand seems to have stabilized in most of the water-richer NMC, where efforts are directed more at reducing some disparities between regions or ensuring the quantity and quality of water supplies. According to the baseline scenario, there would be across the whole region a continuation of large construction programmes for securing supply, the extraction of a larger share of renewable natural resources or, in countries with more limited natural resources, 'producing' water from so-called 'unconventional' sources such as sea-water desalination and the re-use of wastewater.

Increasing withdrawals and waterworks

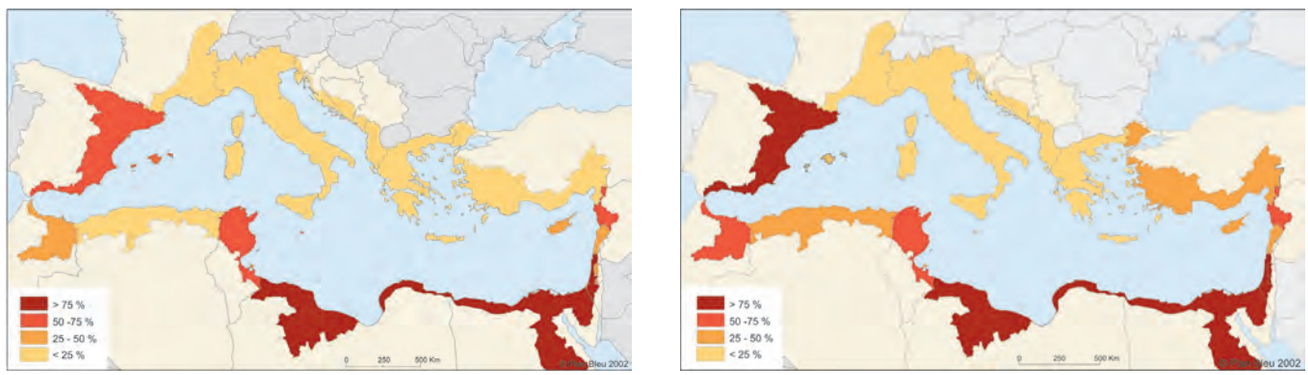
The level of pressures on resources can be gauged in a very approximate but indicative way by the *exploitation index* of renewable natural resources. This is defined as the ratio of 'withdrawals from renewable natural water resources to average renewable natural water resources', expressed as a percentage. Calculation of this index for the Mediterranean catchment basin (NV) for 2000 and 2025 highlights the variety of situations, as shown in Figure 1.6.

- A first group of countries, where water withdrawals are close to or exceed the average annual volume of renewable natural resources (exploitation index equal to or greater than 75 per cent): Egypt, Israel and Libya, to be joined by 2025 by the Palestinian Territories and Spain's Mediterranean basins. The natural resources in all these countries are already very highly stressed and they will have to meet a growing part of their demand from other 'unconventional' sources.
- A second group of countries, where total demand represents a growing share of the average annual volume of renewable natural resources, but where the exploitation index will stay between 50 and 75 per cent until 2025: Malta, Syria and Tunisia.
- A third group of countries, where the exploitation index lies between 25 and 50 per cent, may nevertheless experience local or exceptional stress: Lebanon, Cyprus and Morocco, joined by Turkey and Algeria by 2025.
- A fourth group of countries, where the exploitation index is less than 25 per cent: Greece and the eastern Adriatic, France and Italy, where total demand is dropping.

The countries in the first group are drastically limited by the *availability* of their renewable natural freshwater resources and they must either re-use it several times or consider other sources. For the other countries, the

Figure 1.6 Exploitation indices per basin, NV, 2000–2025

2000 **2025**



Note: Exploitation index: ratio of annual volume extracted from natural resources/annual average volume of renewable natural resources, expressed as a percentage

limitations on water supply are due less to the resource's *availability* than to the *capacity* to exploit it, that is to carry out and manage the exploitation and the transport infrastructures for the water from its source to its end use.

The exploitation index is increasing in all the SEMC and in Spain's Mediterranean basins, indicating a growing pressure on the already scarce resources, whereas it is decreasing in the northern-rim countries, essentially for demographic reasons. The overall index can mask stronger pressures locally or in dry years.

Withdrawal is mostly from surface waters (80 per cent of total withdrawals of average renewable natural resources in the Mediterranean, 87 per cent in the southern-rim countries) and only 20 per cent from underground waters.

This stress on resources appears even greater when it is realized that not all renewable natural resources are necessarily '*exploitable*' by mankind (Box 1.2). According to the assessments available in the various countries,[10] only about 60 per cent of the renewable natural water resource of the entire Mediterranean catchment area (NV, 360km^3 per year[11]) would be 'exploitable' – 56 per cent in the north, 60 per cent in the east and 79 per cent in the south. Thus, only a little over half of the Mediterranean's natural resources (between 50 per cent in Algeria and 93 per cent in Libya) were considered 'exploitable' in 2000. The exploitation indices given above would be even higher if calculated on the basis of exploitable (and not total) resources.

Box 1.2 What is the 'exploitable part' of renewable natural resources?

Not all renewable natural water resources are directly **exploitable**. A first limitation is **technical-economic** factors. Beyond a cost so high as to be considered prohibitive, the resources are considered to be non-exploitable. A second limitation is **environmental** and aims at preserving the proper functioning of water-related ecosystems and the self-cleansing capacity of rivers and landscapes. A third limitation is **geopolitical** and takes account of the right of access to other people's water where resources are shared.

These limitations vary according to the country and they change over time, thus changing the proportion of resources considered as 'exploitable'.

By reducing exploitation costs, progress (both technological and organizational) in exploiting resources increases the exploitable proportion of natural resources, for example through improvements in exploitation yields (deep drilling techniques, harnessing tapped water from undersea sources, reducing losses from evaporation or the silting up of dams). The most striking example in the Basin is the possible development upstream on the Nile in Sudan, which would contribute to reducing losses by evaporation, to the joint benefit of Sudan and Egypt, and would increase the exploitable external renewable resources in Egypt by 9km^3 per year.

In contrast, there are many factors that reduce the exploitable proportion of natural resources, for example the increasing distances between the sources of supply and the points of use, increasing environmental considerations in developing new infrastructures, and the silting-up of dam reservoirs, not to mention the growing pollution of resources that further increases the price of exploitation. Reducing the costs of alternative water supply solutions (such as sea water desalination, recycling of wastewater, improving demand management) lowers the threshold that defines the acceptable cost of 'exploiting' natural resources and contributes to reducing the 'exploitable' proportion.

Source: Margat, 2004

Three-quarters of these 'exploitable' renewable natural resources are *irregular* and require the construction of control structures to enable a year's water to be stored, either for use in the summer (for irrigation and tourism) or from one year to the next. Water demand in the Mediterranean catchment basins of very many countries is already more than twice the regular natural renewable resource and could not be met without such structures. This is the case for Spain, France, Syria, Israel, Egypt, Libya, Tunisia, Algeria and Morocco. The investments required for infrastructures are generally out of the reach of individual users and have long justified collective action. The Mediterranean peoples have always developed a high degree of know-how in managing the scarcity of water and much ingenuity in building such structures. The last century was typified by growing activity in countries in contracting such work, which became increasingly larger in scale. More than 500 large-scale dams were built during the last century in the Mediterranean catchment basin (NV), providing a total of more than 230km^3 of storage.

In the baseline scenario, national strategies are still largely dominated by efforts to increase water *supply* through the building of large *infrastructures* intended to exploit a growing proportion of renewable resources, and no value is given to the large potential for saving water. The policy of building new dams will probably slow in the north, given the exhaustion of possible construction sites, but will be pursued in the SEMC to take greater advantage of surface waters. Underground waters will increasingly have to be extracted, including water from massive overuse for irrigation (Egypt) or even water from non-renewed aquifers (fossil water). Such reinforcing of water infrastructures will be linked to the development of water transfers between basins of the same country (e.g. Spain, Greece, Egypt) or between countries (e.g. France–Spain, Albania–Italy). Box 1.3 lists some of the major projects contained in the hydrological planning documents of the Mediterranean countries.

Box 1.3 Supply policies, still dominated by major project programming

In **Spain** the new national hydrological plan, adopted in 2002, sets out a programme of 119 new dams, storing 2.5km³, linked to the project of transferring water from the northern rivers, mainly the Ebre (1km³ per year at first, then 3.35km³ per year in the long term) to the Mediterranean coastal basins. Catalonia is also studying the feasibility of transferring water from the Rhone River in France to Barcelona. This project has launched a major debate about questions of water demand management as opposed to supply management. One of the main criticisms of the project concerns the lack of studies dealing with evaluation of future water demand by Barcelona and socio-economic and environmental analysis of the different possible options for meeting or changing demand. These criticisms have lead to the cancellation of the transfer project from the Ebre.

In **Greece** the project to develop the Acheloos River to enable the transfer of 1.1 to 1.3km³ of water per year to Thessaly includes 4 dams.

In **Turkey** the 'GAP' (SE Anatolia Project) in the upper basins of the Tigris and the Euphrates will contain 22 dams in its final stage, storing 60km³ of water (including 48km³ by the already-completed Ataturk Dam).

In **Cyprus** ten additional dams are planned (1999) for storing 85hm³ (hectometer) and regulating 25hm³ per year.

In **Syria** several dams are under construction or are planned in the Mediterranean Basin (Oronte and coastal basins) and the Steppe Basin in the master plans.

In **Egypt** the extension of the use of Nile water outside its basin, already begun by the Peace Canal (towards the northern Sinai) and the Tuska Canal (towards the Kharga oasis and the 'New Valley'), will be continued and completed by increasing the use of the Nubian aquifer (non-renewable resources). From an optimistic point of view, this extension relies on the discharge gains that would result from loss-reducing improvements in the Nile Basin in Southern Sudan (the Jonglei Canal, already begun), with a predicted proportional share for Egypt of about 4km³ per year in the initial phase, and from 9 to 10km³ in the long term.

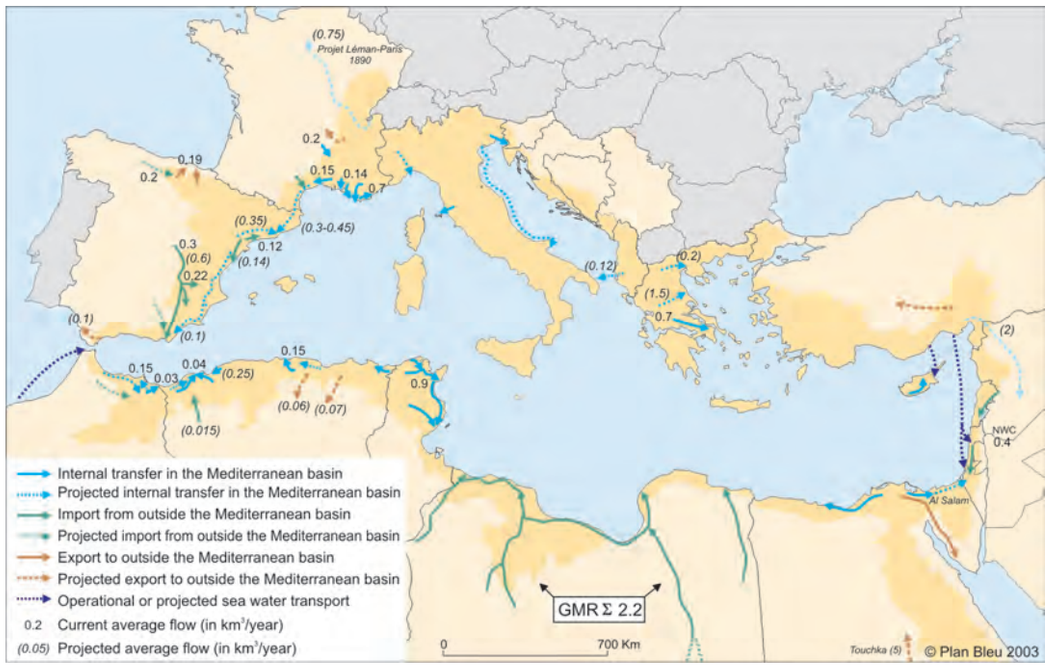
In **Libya** the already advanced project of transferring water taken from the Saharan fossil aquifers ('GMR') will carry 2.2km³ of water per year to the coastal areas in its final phase by 2007.

In **Tunisia**, it is planned to fully use by 2010 the exploitable water resources (4.03km³ per year on average) by exploiting 0.835km³ per year more than in 1995, of which 0.67km³ will be of surface water, by increasing the storage capacity of dams to 1.9km³ (from 1.48 in 2000).

In **Algeria** the national water plan projects to exploit an additional 5.4km³ between now and 2020, of which 3.1km³ will be from surface waters, in particular by building 50 additional dams.

In **Morocco** the building plan foresees the construction of 60 major dams between now and 2020, controlling 14km³ per year, plus some 100 small or medium-sized dams (2 to 3 per year), and an increase in the exploitation of underground water to 3km³ per year.

Figure 1.7 Main water transfers, NV



Source: Margat, 2004

Unsustainable exploitation of an increasing proportion of water resources

With the more intensive use of renewable water resources, a growing proportion of water supply in some countries is being met in an unsustainable way.

With increasing water demand, the underground water tables are sometimes *overexploited*, which lowers their levels excessively. Here again we are, in a way, borrowing the 'natural capital of water' from future generations. Such 'overexploitation' has been diagnosed and inventoried in most Mediterranean countries, even if it has not always been defined according to standardized criteria.

Box 1.4 Overexploitation of Mediterranean coastal aquifers

In **Spain,** the condition of 'overexploitation' has received legal recognition with regulatory consequences since the law on water was passed in 1985. Sixty-one 'hydro-geological units' in the Mediterranean Basin, covering 7222km^3, are considered to be overexploited with an overall exceedence of withdrawals that are in excess of the natural recharge of 404hm^3 per year, or 41 per cent of the total pumped volume in these aquifers. This corresponds to an overall exploitation index of 172 per cent, mainly concentrated in the Segura Basin. Nine of these units have been 'temporarily declared as over-exploited' according to the law.

In **Israel** withdrawals from the coastal plain aquifer (using about 1000 boreholes) have been greater than the 'Safe Yield' (estimated at 240–280hm^3 per year) since the 1960s, since when they have been reduced progressively, from 480hm^3 to 330hm^3 per year.

In **Libya** excessive exploitation of the Jeffara aquifer to the south of Tripoli has created a regional depression of the water table, the levels of which have been lowered by several dozen metres, up to 100m in places, with accelerated falls in level of 1–5m per year. It has been calculated that if all withdrawals were to stop, it would take 75 years for the aquifer to replenish to its original level.

In **Tunisia,** out of 196 water table aquifers, 54 are being extracted in excess of their average recharge.

Overexploitation has particularly damaging effects in the case of coastal aquifers where the balance between freshwater and sea water is fragile and can easily be disturbed, causing almost irreversible *salt water intrusion into aquifers*. This has already occurred in many coastal regions of the Mediterranean countries, resulting in the abandonment of some wells. Underground coastal water tables have been reduced below sea level by excessive pumping in *Spain* (Campo de Dalia, near Almeria, in the 1980s), in *Italy* (Ravenna, up to 40m below sea level), in *Sicily* near Augusta, up to 50m below sea level , in *Sardinia* at Iglesias (as a result of mine pumping), in *Greece* (the Argolis Plain where the water table, exploited by 6000 wells and boreholes, has been lowered by 80m to 150m and is now below sea level over 100km^2), in *Cyprus*, in *Turkey* (the region of Cesme, Marmaris and Bodrum), in *Israel* (in the coastal plain aquifer where several 2–15m depressions have been found), in the *Nile* delta, where sea-water intrusion is estimated at 2km^3 per year, in *Libya* (where overexploitation of the Jeffara aquifer has caused a sea-water invasion over a 50km front in the Tripoli region, estimated at 166hm per year) and in *Tunisia* (in the Sfax region).

The proportion of the total quantities of underground water withdrawn that can be attributed to overexploitation (in excess of their average natural recharge, and thus unsustainable) is already considerable in several Mediterranean countries: 20 per cent in Spain (25 per cent in the Jacar Basin, 4 per cent in the Balearic islands), 13 per cent in Cyprus, 24 per cent in Malta (in 1990), 29 per cent in Gaza, 32 per cent in Israel (in 1994, where overexploitation is, however, compensated for to a large extent by artificial recharge), and 8–10 per cent in Tunisia.

Source: Margat, 2004

An *indicator of unsustainable water production* (calculated on the catchment basin level or NV, Table 1.1) shows that more than 10 per cent of water supply is probably already being taken from unsustainable sources in Libya, Israel, the Palestinian Authority, Cyprus and Malta, and also in some regions of Spain.

The situation at the N1 level (all Mediterranean countries) is even less 'sustainable', as some water-poor countries (group 1) are exploiting *fossil water* stocks,[12] thus irreversibly depriving future generations of this resource, as in all 'mining' undertakings. Overexploitation is added to fossil-water withdrawals to bring the unsustainable production indices in Libya, Tunisia and Algeria to 84, 22 and 35 per cent respectively.

In some ways, irregular resources created by dams could also be considered as unsustainable. Indeed, the *silting-up of retained water* in many dams gives them a limited life span while simultaneously reducing the number of possible sites for building new dams, so that future generations with need to develop other sources (it should be remembered that 70 per cent of the renewable natural resources in the Mediterranean catchment basin are *irregular*).

Box 1.5 Water regulated by dams – an unsustainable resource?

The high sediment load in run-off water in the Mediterranean countries makes the 'silting-up' of dammed water a particularly serious issue; it reduces the regulatory function of dams despite the planned provision of large volumes of 'dead storage'.

In **Spain**'s Mediterranean basins some 50 dams examined in 1996 had lost 6 per cent overall of their original capacity; the annual loss of capacity, although small on average (about

Table 1.1 Unsustainable production indices, NV, 2000

Country	Value date	Overexploitation of renewable resources (in km³/year) (1)	Demand in water (in km³/year) (2)	Index of unsustainable water production in % (1)/(2)
Spain	1997	0.70	18.20	**4**
Malta	1997–1998	0.02	0.05	**31**
Cyprus	1998	0.04	0.33	**12**
Israel	1999–2000	0.19	1.80	**10**
Palestinian Territories	1995	0.03	0.13	**23**
Egypt	1995–1996	0.00	66.00	**0**
Libya	1999	0.77	2.24	**34**
Tunisia	2000	0.18	2.27	**8**
Algeria	2000	0.00	2.90	**0**

Source: *Plan Bleu*, Margat, 2004

0.1–0.5 per cent), nevertheless amounts in a few extreme cases to more than1 per cent, even 2.8 per cent in the Jucar basin dam, which is already 84 per cent silted-up.

In the southern countries, the loss of useful reservoir capacity is typically between 0.5 and 1 per cent per year, sometimes even more: 1–2.5 per cent in **Tunisia** (28hm³ per year on average at present); 0.5–2 per cent in **Algeria** (0.8 per cent on average at 19 dams studied, i.e. 15hm³ per year); in **Morocco** these losses are generally of the order of 0.5 per cent (70hm³ per year), leading to a reduction in regulatory capacity equivalent to the loss of potential irrigation of 6000–8000 ha per year.

The dams in **Algeria** have already lost more than a quarter of their original capacity (over 1km³), and six are more than half silted-up; the height of five dams has already had to be increased, and several large reservoirs are irreplaceable. In **Morocco** the reservoirs had, by 1990, lost 8 per cent of their original capacity (800hm³) some of which were already half filled. In **Tunisia** the reservoirs of seven dams studied had, by 1976, lost 15 per cent of their original capacity. The total reservoir capacity should reach a maximum (1.9km³) by 2010, then reduce and stabilize at around 1.8km³ between 2020 and 2030 with the consequent reduction of exploitable irregular resources. In **Egypt** the Aswan dam is on an entirely different scale: a new Nile delta is forming in its upper reaches where sediment is accumulating at 60–70hm³ per year (about 2km³ since 1970), but the 31km³ of dead storage is designed to be enough for five centuries.

Small dam reservoirs are no less exposed to these problems, and their life expectancy can be even shorter, about 20 years in **Tunisia**, for example, for reservoirs of from 50,000 to 100,000m³. Many Mediterranean reservoirs will doubtless fill up during the 21st century. Moreover, as the number of sites suitable for building dams is limited, there is an *irreversible* loss of the exploitable irregular resources that make up most of the exploitable volumes in the Mediterranean. Preventative measures (such as re-foresting basins, sediment trapping) can at best delay matters but cannot indefinitely extend the life expectancy of these dams. This will inevitably lead to a diminution of the water resources that are manageable through regulation. The 'post-dam' period will begin in the 21st century.

Source: Plan Bleu, Margat, 2004

Other freshwater sources? The limited potential for re-use and desalination

To limit their dependence on 'unsustainable' withdrawals, countries faced by a limit to their exploitable natural resources (mostly group 1 countries: Libya, Malta, Israel, Syria, Spain and Cyprus) are committed to developing water production from other sources: successive water-recycling or sea-water desalination.

Recycling agricultural drainage water currently represents about 12.6km³ per year at the NV level, mostly in Egypt, making it possible to meet annual demands (73km³ per year) that are greater than the average annual natural resources (57km³ per year) by recycling the same water for several successive irrigations. Such recycling could double between 1990 and 2025 (an increase of 8km³ per year between 2000 and 2025). However, it does not come without major public health problems since the drains are very often used for waste (in the Nile delta, for example, where market gardens are irrigated by water of doubtful quality). Moreover, there is a serious risk of soil salination, since drainage water concentrates salts.

Re-using wastewater is also being developed for irrigation. It represents about 1.1km³ in the entire Mediterranean Basin (Spain, Israel, Cyprus, Egypt and Tunisia). In Cyprus the quantities re-used could triple or quadruple between now and 2010. In Egypt re-use could increase by a factor of ten. In Israel this potential is being

intensively explored. However, the development of wastewater re-use at the basin level may remain technically and economically limited by the volume of wastewater produced, the places of discharge (usually far from places of re-use), and the need to store it and provide preliminary treatment before re-use, as otherwise the risks for animal and human health or soil contamination are significant. The potential for wastewater re-use may reach a total of 5.7km^3 in the NV catchment areas by 2025, or 3 per cent of total demand in the baseline scenario (from less than 1 per cent in 2000).

The industrial production of freshwater through *desalination* of sea water or brackish water is another and growing non-conventional resource. Total production in the entire Mediterranean Basin (Spain, Malta, Cyprus, Syria, Israel, Egypt, Libya and Tunisia) approached 0.4km^3 per year in 2000. However, in spite of a regular reduction in costs,[13] and its particular adaptability to meeting the needs of islands and tourists, its development remains limited (0.1 per cent of the 360km^3 per year of exploitable natural resources in the NV basin and 0.2 per cent of total demand). It is reserved for domestic or industrial uses. Desalination represents a large fraction of supply in only a few countries (Malta and Libya). In Malta all additional demand can only be met by desalinated water. The impacts of desalination on the cost of supply, energy consumption and the local environment must also be remembered, even if these should be put into perspective at the Basin level, given the small volumes involved compared with those of conventional water.

The *direct use of brackish water* for industry or even agriculture is also being developed (in Israel, 166hm^3 in 1999, and in Tunisia).

Thus a growing percentage of water supply is coming from sources other than withdrawals from renewable natural resources. This trend should continue, mainly where it has already begun: increased use of non-renewable resources (Libya, and if necessary Egypt, Tunisia and Algeria), re-using drainage water and wastewater (Egypt, Israel, Syria and Tunisia), desalination (Malta, Cyprus, and in certain areas in Spain and Israel) and the recourse to imports from other basins (inter-regional or international transfers: Spain, Israel). Progress will be determined by the relative evolution of the costs and technological feasibility of these sources compared with those of withdrawals from natural resources. It may be limited by their impacts on the environment and health. It is important not to be misled by this apparent diversification of supply sources. In all Mediterranean countries, withdrawals of natural renewable resources are expected to remain the main, if not the only source of supply for a long time and by a large margin. On the basis of the trend projections to 2025, as a proportion of total demand, withdrawals would remain at:

- 100 per cent or thereabouts in most of the northern-rim countries, as well as in Turkey, Syria, Lebanon, Algeria and Morocco; about 95 per cent in Spain, Libya and Tunisia; 87 per cent in Cyprus;
- about 70 per cent in Israel, the Palestinian Territories and Egypt;
- 33 per cent in Malta.

By 2025 the demand met other than by withdrawals from natural resources may reach a maximum of about 25km^3 per year (90 per cent of which will be in Egypt, by using return water from agricultural drainage) and represent less than 8 per cent of total water demand in the Mediterranean region (and less than 1 per cent ignoring the particular case of return water in Egypt).

Water policies and planning, in the various Mediterranean countries considered by the P*lan* B*leu* baseline scenario, rely mainly on an extension of water supply in order to keep pace with increasing demand that is too often considered to be irreducible. First, the plan is to pursue major hydraulic projects aimed at exploiting an increasing proportion of renewable natural resources. Secondly, other non-conventional resources are envisaged, but in fairly limited quantities and mostly in water-poor countries. These strategies for a considerable increase in water supply are expected to increase environmental as well as social impacts and the cost of water supply. The two following sections attempt to analyse these impacts. Without claiming to be exhaustive (the landscape and social aspects, and the risks related to non-conventional water production are not considered), they stress, above all, their sometimes irreversible effects on the water resources themselves.

Resource and ecosystem degradation

Man-made degradation that modifies the regime and quality of natural water resources adds to the stresses on them. Although not a recent problem, such degradation increased to a significant level during the 20th century as a result of demographic growth, major development projects and industrialization.

Changes to the water regime

I*ncreasing withdrawal* and the infrastructures that go with it modify the natural water regime. The increase in water withdrawals has inevitably reduced the flow of many Mediterranean rivers, especially during low-water periods. Generally speaking, about 80 thousand million m^3 per year are currently being taken from Mediterranean Basin rivers, which cannot fail to have an impact on the regimes and the functionalities of many rivers, especially in the south.

When these rivers feed aquifers, the reduced flow can in turn have harmful effects on underground water resources. In Italy, for example, in the lower Piave valley

to the north of Venice, upstream diversions of water for irrigation and hydroelectric plants have reduced the levels of the free or captive alluvial water table. Conservation measures of low water flows of the Piave were vital for preserving the supply to the water table and limiting the sinking of Venice.

Intensifying underground water withdrawal has also had inevitable and major effects on surface run-off. The most visible have been the drying-up of springs in the Po plain in Italy or in Tunisia's Djeffara coastal plain. The 'basic flows', the regular components of river flows, have consequently been affected. In Spain the basic flow of the Rio Jucar in the Albacete region has been reduced by a factor of four in roughly ten years as a result of intensive exploitation of the eastern Mancha aquifer.

Water projects also disturb water regimes. Reservoirs may well be useful for regulating water, but these installations and their operations also have negative effects on downstream regimes: reducing average and low waterflows; interrupting the continuity of and degrading aquatic ecosystems; impacts of water release and decennial emptying (for example impacts in the Rhone Valley on local wells and boreholes from plugging caused by reservoir emptying); attenuating the positive effects of flooding, disrupting and blocking the movement of sediments (reservoirs are silted-up but deltas are depleted and made even more vulnerable to erosion by the sea); and loss of the retained water through evaporation.

The case of the Nile in Egypt is the most evident. The regulation of water flows by the Aswan dam resulted in a considerable increase in the quantity of water used and the perpetuity of irrigation. But 97 per cent of the 134 million tonnes (Mt) of sediment transported annually by the river, some of which (about 16Mt) once fertilized the irrigated land, are now held back in Lake Nasser. To compensate for this, the land now requires 13,500t per year of nitrate fertilizers. For want of inputs of sediment, the delta's coastline has already receded noticeably. Moreover, it is estimated that one of every 10m^3 of water regulated by the dam is lost through evaporation. The Ebre delta also now receives only 3Mt of sediment a year compared with 20Mt formerly and has begun to recede by nearly 50m a year.

River-bed water developments can also cause considerable lowering of alluvial surface-water levels; this is the case with the 'run-off canals' downstream of hydroelectric plants, for example in the Rhone Valley in France. *Poor irrigation practices* (especially in alluvial plains where drainage is difficult) can be the cause of an increase in salinity and be responsible for the irreversible loss of millions of hectares of soil (see Chapter 5, Rural areas).

These regime changes are aggravated by other factors such as changes in *land use* in the catchment areas or the *exploitation of gravel in active river beds*, which leads to considerable drops in river levels and, in consequence, in the levels of associated alluvial surface waters. In France's southern Var valley, intensive gravel diggings in the 1960s near the city of Nice – satisfing large demands from the building sector – caused the alluvial surface water level to drop several metres, harming farmers and the harnessing of drinking water.

Degradation of the quality of natural water and ecosystems

Changes of a *qualitative* nature that alter the quality of water resources that are already naturally vulnerable have to be added to the changes in the *quantities* of the water resource regimes described above and may further limit the possibilities of using them.

The increase in pollutant emissions

The *increase in withdrawals* in the SEMC projected in the baseline scenario threatens to degrade the quality of water resources. The examples already given in Box 1.4 provide a good picture of such overexploitation, which can sometimes have irreversible effects. Moreover, the expected increase in withdrawals of water for drinking, which demands top quality, poses a threat to the best-quality resources. The example of the Milan region in Italy illustrates the interaction between water regime and quality: after an industrialization phase that drastically lowered the level of the water tables, changes to the industrial structure (an evolution towards the financial sector) resulted in the water-table levels rising again, bringing to the surface poor-quality water that had been affected by years of various polluting activities.

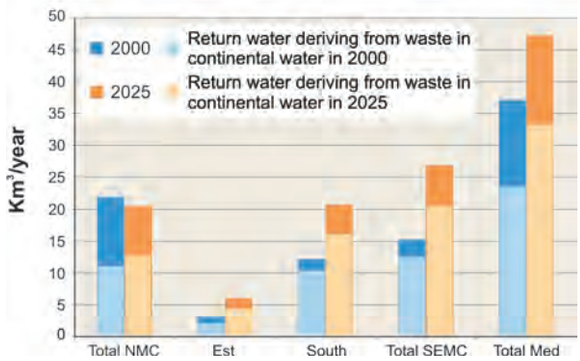
But water quality is also threatened by the many *pollutants discharged into freshwater* either locally (for example untreated industrial or domestic waste, uncontrolled discharges, drains used as conduits for household waste) or in a diffuse manner (fertilizers and pesticides for intensive agriculture, solid waste, sludge from treatment plants). The threat is hard to quantify, as there is little information on these pollutant flows (particularly for diffuse pollution), so one can only use rough estimates that have been made indirectly.

Wastewater discharges by industry and households, although stabilized in volume in the NMC (or even falling) as a result of demographic changes and progress made in industrial processes, still constitutes a very considerable pollution load (in terms of the concentrations and the nature of the products it contains, which is becoming more and more complex). The amount of pollution will certainly increase in the SEMC as a result of demographic growth, rising living standards and urbanization (which often leads to an increase in water consumption per capita), and the arrival of more than 133 million additional tourists per year by 2025 (Part 1). Given the evolution of sectoral demands, it is estimated that, globally speaking, emissions of urban and industrial

wastewater in the Mediterranean countries could continue to increase by 1 per cent per year (30 per cent in total) between 2000 and 2025, from 37km^3 to 47km^3 per year (NV). The increase is expected to be mainly in the SEMC, which may experience a doubling of wastewater volumes during this period. More than 60 per cent (80 per cent in the SEMC) of this wastewater could affect freshwater, the estimated remainder being emptied into the sea.

Industrial wastewater in the NMC, when expressed in terms of the volume of dissolved Biological Oxygen Demand (BOD) per year, has stabilized (or even decreased slightly) over the past 20 years , but is growing rapidly in the SEMC. At the N1 level, an increase of 1 per cent per year between 1980 and 1997 has been recorded[14] in Turkey, 2 per cent in Egypt, 5 per cent in Tunisia and 7 per cent in Morocco.

Figure 1.8 Urban and industrial wastewater, NV, 2000–2025



Source: Plan Bleu, J. Margat; from sectoral water demands

Note: Urban and industrial emissions should decrease in volume from now to 2025 in the NMC, but not in pollutant load.

Urban and industrial emission volumes could double by 2025 in the SEMC.

Total commercial *fertilizer* consumption in the agricultural sector in the NMC has stabilized, or even slowed, since 1990, after a period of high growth between 1960 and 1990. Many SEMC still have high growth in the use of fertilizers (4 per cent per year between 1985 and 1997 in Syria, 2 per cent in Turkey and Israel, 1.3 per cent in Egypt) which will probably continue (see Chapter 5). *Pesticide* consumption is less well known; it has stabilized in France (the world's second-biggest user).

This information provides only very indirect information on discharges of pollutants into the environment. It must be complemented by information (that is still hard to come by) about the level of processing pollutant flows prior to their release into the natural environment (see below, the section entitled 'Combating pollution') and about the capacity of the environment to absorb the flows without being altered.

Degradation in water and ecosystem quality

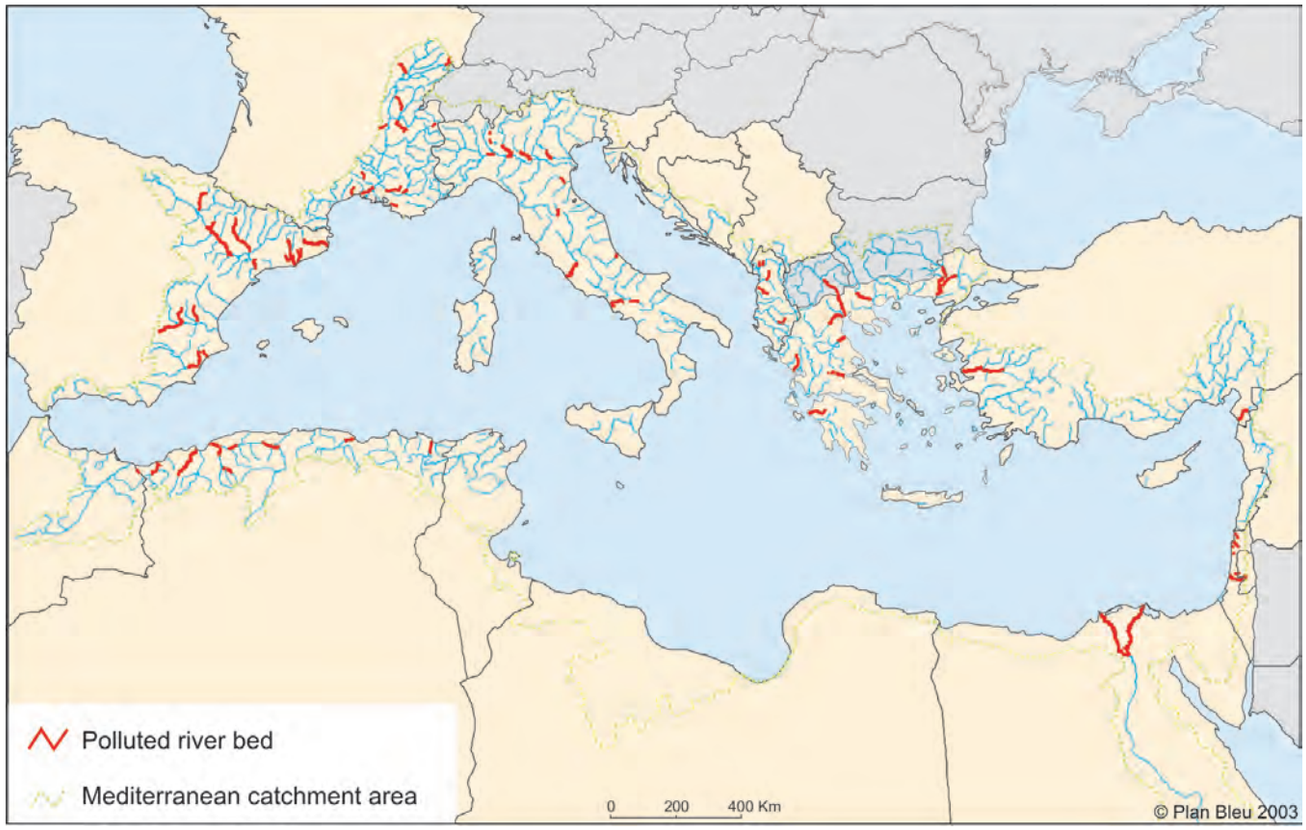
If pressure on the water resource increases, the resulting degradation in water quality is impossible to assess on the too-vast scale of the Mediterranean catchment area. One of the main problems is the variety of parameters that define quality and its variability in space and time. Added to this is the serious inadequacy of the monitoring networks in most Mediterranean countries, which makes it very hard to establish a summary overview of the situation. Data are noticeably incomplete (in time and space and in terms of the parameters covered). Nevertheless, attempts have been made to map rivers in terms of quality (identifying those whose 'poor quality' is attributable to pollution) in a few countries: Spain, France and Algeria. Figure 1.9 provides an incomplete summary, probably not standardized, and limited by the state of the available information.

Despite inadequacies in monitoring, many *signs of degradation* are observed locally. Degradation of water quality is becoming a major concern in many countries. Surface waters very frequently have high biochemical dissolved-oxygen demand (BOD), high phosphate, nitrates and heavy metals content, and local bacteriological pollution. The wadis that flow through many Mediterranean cities are often transformed into literal open-air sewers (for example Tirana, Damascus and Beirut). Underground waters are the most vulnerable because the pollution takes much longer to reverse (Box 1.6). Natural lakes and dam reservoirs are also under threat from climate-induced eutrophication.

Since 1940 the EU-Med countries have experienced considerable degradation of their water resources. More recently, with improvements in the level of treatment of domestic and industrial waste,[15] they have registered some improvements in surface water quality (concentrations of BOD, phosphates and heavy metals in rivers have been falling for the past 10 years). On the other hand, non-localized agricultural pollution, particularly by nitrates, is continuing to inflict lasting degradation on resource quality.[16]

Data on the presence of dangerous substances such as pesticides in the environment are very scarce, even in the European countries, where the European Environment Agency has deplored the continuing inadequacies of the monitoring networks.[17] Many compounds escape detection, despite most of them being very persistent in the environment and their possible effects on health and ecosystems being under study. In the few countries that are beginning to monitor them, traces of phytosanitary products are found in natural water, drinking water and food. In France, of the 3000 monitoring points in 2000, 90 per cent of those located in surface water and 58 per cent of those in underground water are affected by the presence of pesticides.[18]

Figure 1.9 Main rivers subjected to chronic pollution, NV



Source: Plan Bleu, Margat, 2004

Note: Attempt at a summary based on a compilation of water-quality maps from various countries, which do not always specify the quality-defining criteria.

Box 1.6 Examples of underground water pollution in the Mediterranean Basin

Many types of pollution from agriculture (fertilizers, pesticides), industry (wastes) and cities (untreated sewage, wastes) threaten the quality of the underground water in plains with intensive land use: urban areas or intensive farming. However, such pollution is no more marked in the Mediterranean Basin than elsewhere.

In **France**, more than half of the country is already classified as zones suffering from excessive nitrate pollution.

In **Italy**'s Turin province alone, for example, where 381 collecting wells for producing drinking water (5m^3 per second in 1985) are concentrated in an area of some thousands of square kilometres, 252 rubbish dumps (mostly urban), 159 quarries and 840 boreholes for injecting polluting industrial effluents have been recorded, which leads to significant interactions between the areas drained by the withdrawals and those subject to the effects of sources of pollution.

Results showing a high nitrate content are beginning to appear in various areas. For example, more than 100mg per litre are found in several **Spanish** aquifers (Levant, the Balearic Islands, Catalonia – even up to 600mg per litre in places) where 25 (out of 206) polluted hydro-geological units are located in the Mediterranean basins. In **Italy**, aquifers are often contaminated by nitrates, heavy metals and persistent organic chemical compounds, making it necessary to draw water from deeper springs, the natural quality of which is not always adequate (because of the presence of manganese, iron and sulphates). In **Turkey**, occasional checks show the infiltration of wastewater or the seepage of discharges, and the contamination of water tables by toxic substances from industry (cyanide in the Kelmalpsa Valley and fertilizers and pesticides in the Cukurova, Bursa and Bornova Valleys). In **Israel**, the average nitrate content of water extracted from the coastal aquifer has exceeded 40–50mg per litre since 1975. In **Malta**, as a result of the use of fertilizers over the past 20 years, the nitrate content in the aquifer high on the Rabat plateau has increased significantly, often exceeding 100, and sometimes even 300mg per litre.

Source: Margat, 2004

The intensive exploitation of underground water can also affect *aquatic ecosystems*, especially local 'wetlands' associated with emerging sites, the conservation of which is desirable for many reasons. This is particularly the case for the brackish water of coastal wetlands, the quality of which is very sensitive to the balance established between emerging underground water and sea water.

Is access to water becoming more difficult?

Stress on water resources and the increase in pollution thus have considerable environmental impacts, which, in turn, limit the quantities of water physically available to meet any additional increases in demand. But they also increase the vulnerability of water supplies by increasing costs, health risks and conflicts between users.

The rising cost of water supply

The 'easiest' investments for exploiting water resources were the first to be made. With dam sites progressively being used up, the lowering of water tables and, more generally, the increasing distances between the points of abstraction and water use (longer and longer transport of water), the costs of exploitation and supply are increasing. For example, the intensive exploitation of many Mediterranean aquifers (even without disturbing the balance between use and replenishment) has had the direct effect of lowering the levels of water tables, as observed during recent decades (by several dozen, even hundreds of metres), which has increased the pumping costs.

Box 1.7 Examples of lower levels observed in water tables

In **Italy**'s Milan region, the intensive and increasing exploitation of the alluvial aquifer of the Po plain has lowered levels by more than 25m, even up to 40m in places, in 80 years. The rate of reduction increased during the 1970s from 1 to 2m per year. In the karstic aquifer of the Sierra de Crevillente, near Alicante in **Spain**, exploitation, initially through galleries starting in 1967, then by drilling and pumping, lowered the levels by 250m in 20 years; 75 per cent of the extracted volume corresponded to a reduction in stocks. In the Messara Valley in Crete (**Greece**) 30m falls in ten years were observed. In **Libya**'s Jeffara plain, increased pumping has lowered the water table to the south of Tripoli by several dozen metres (up to 70m in places), with accelerated reductions in level varying from 1 to 5m per year. In the **Tunisian** Djeffara, the reductions in the level of the intensively exploited water table have accelerated, going from 0.5 to 0.7m per year in 1970 to 1 to 2m per year by 1987.

Costs are also being pushed up by the growing need to *treat* water before using it (and the increased stringency of drinking water standards in Europe). The more a resource is degraded, the more expensive is the treatment. Moreover, this rising cost of water exploitation and treatment is expected to be increasingly passed to the end-user. Budgetary limitations make it no longer possible for states to pay, as they often did in the past, the huge costs of major hydraulic facilities for distribution or treatment. The contribution of users to the funding and operating of facilities is increasing with a more general acceptance of the 'polluter- or user-pays' principle. For all these reasons, satisfying water demands by increasing the supply (baseline scenario) is therefore expected to result in increasing costs to the community and users for access to water; this will probably not be defrayed by technological progress in the sector. This trend is seen very clearly in the EU-Med countries.

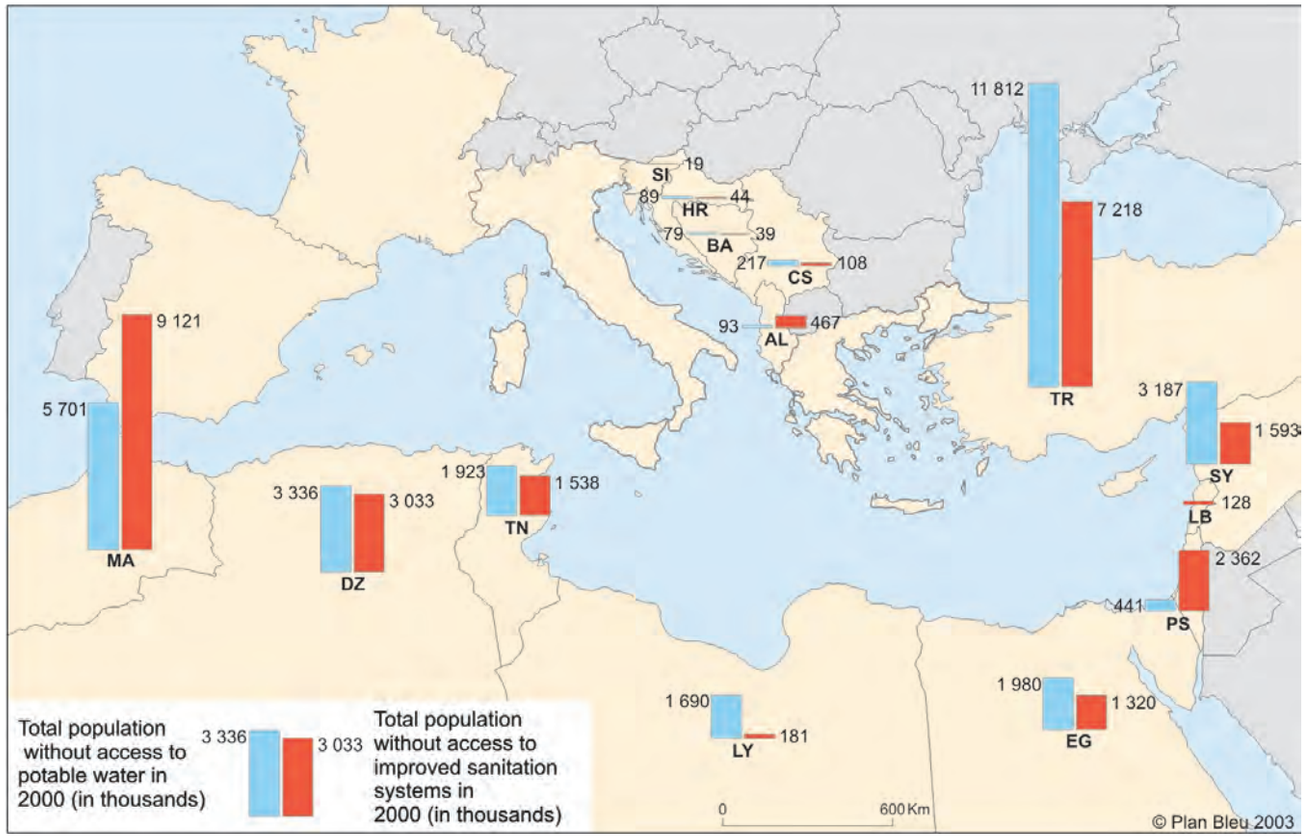
Today 30 million people in the Mediterranean without clean drinking water, and tomorrow?

'Water is vital for life and health. The *right to water* is indispensable for enabling a healthy life in human dignity. It is a preliminary condition for arriving at other human rights'.[19] But this basic right may increasingly be put to the test with the rising stress on ever-more polluted water resources.

While drinking water is still allocated priority over other uses such as agriculture or industry[20] and still represents much smaller volumes than the other sectors, the limiting factor for access to drinking water is very rarely the quantitative availability of the resource but much more the *quality of service* of water distribution and the *access conditions* to these services for the poorest. There is now a risk that the degradation of the quality of natural water resources and the predictable increase in supply costs will increase the difficulty of access by the poorest populations to drinking water services, the frequency of accidents, and the risks of a breakdown in distribution services. For these very different reasons, a growing part of the population may see itself excluded from access to water that fulfils the conditions of drinkability.

The scarcity of available statistics about access to drinking water often makes it impossible to distinguish between the causes that limit access to 'safe' water. Nor do they allow comparisons in time or between countries with different standards when trying to define what is meant by 'access' and 'drinking' water. Caution is therefore needed when using these statistics. There were nearly 30 million Mediterranean inhabitants[21] who officially did not have permanent access to drinking water in 2002 (Figure 1.10). The largest numbers were in Turkey, Algeria, Morocco, Egypt and Syria. Rural dwellers and the poorest in suburban neighbourhoods are often the worst affected.

Figure 1.10 People not having access to an improved source of drinking water or improved sanitation, N1



Source: World Health Organization and United Nations Children's Fund. Water Supply and Sanitation Collaborative Council. Global Water Supply and Sanitation Assessment (http://unstats.un.org/unsd/mi/mi_goals.asp or www.unicef.org/wes/mdgreport)

Note: 27 million Mediterranean inhabitants may be deprived of an adequate sanitation system, and 30 million of access to safe water.

In the sense of the World Health Organization, 'improved' water supply technologies are household connections, public standpipes, boreholes, protected dug wells, protected springs and rainwater collection. 'Not improved' are unprotected wells, unprotected springs, vendor-provided water, bottled water (due to concerns about the quantity of supplied water, not the water quality) and tanker truck-provided water. 'Access' implies a source would be likely to provide 20 litres per capita per day at a distance no greater than 1000 metres.

In the sense of the World Health Organization, 'improved' sanitation technologies are connection to a public sewer, connection to a septic system, a pour-flush latrine, a simple pit latrine and a ventilated, improved pit latrine. The excreta disposal system is considered adequate if it is private or shared (but not public) and if it hygienically separates human excreta from human contact. 'Not improved' are service or bucket latrines (where excreta are manually removed), public latrines and open-pit latrines.

The *quality of distributed water* is a growing concern in all Mediterranean countries. In 1997 in Turkey, quality was not acceptable in 12 per cent of the samples taken at the national level. In France in 1998, 8 per cent of the population was served by water with a non-conformity rate of over 5 per cent from the bacteriological point of view.[22] These figures conceal problems of management capacity[23] and equipment condition, and the pollution of springs.

With an increase in chemical substances poured into freshwater, *uncertainties* persist about the long-term effects on health and ecosystems. Knowledge about the effects on health of many substances included in water (but not regularly measured, such as plant-protection products) is still sketchy, especially if one takes the possible synergistic effects of the different compounds into account. Epidemiological studies that show the effects on health of the poor quality of distributed drinking water are lengthy, scarce and difficult to access. A study begun by the EU in 1991, which was to test the health effect of 900 active compounds, was, by 2003, able to reach conclusions on only 5 per cent of these products. It is estimated that in France 10 million citizens drink water that is contaminated by pesticides

without, however, being able to identify the immediate risks to health. However, some studies are beginning to show the possible effects of plant protection products on the health of rural and farming populations, linked in particular to the handling of the products and the accumulation of very persistent substances in water and food (fertility, cancer, development anomalies and headaches).[24]

As a result of such concerns, the people of the Mediterranean are increasingly turning away from tap water to bottled mineral water. A survey[25] has shown that, in France between 1989 and 2000, the proportion of people saying that they drink tap water fell sharply from 72 to 58 per cent, and that 39 per cent of them drink only bottled water.

The poorest populations are the hardest hit by these shortcomings in terms of both resources and management facilities. They are often the first affected by disease (e.g. gastro-enteritis, hepatitis diseases and diarrhoea) or forced to buy high-priced water (in comparison with their incomes) from tankers or in bottles.

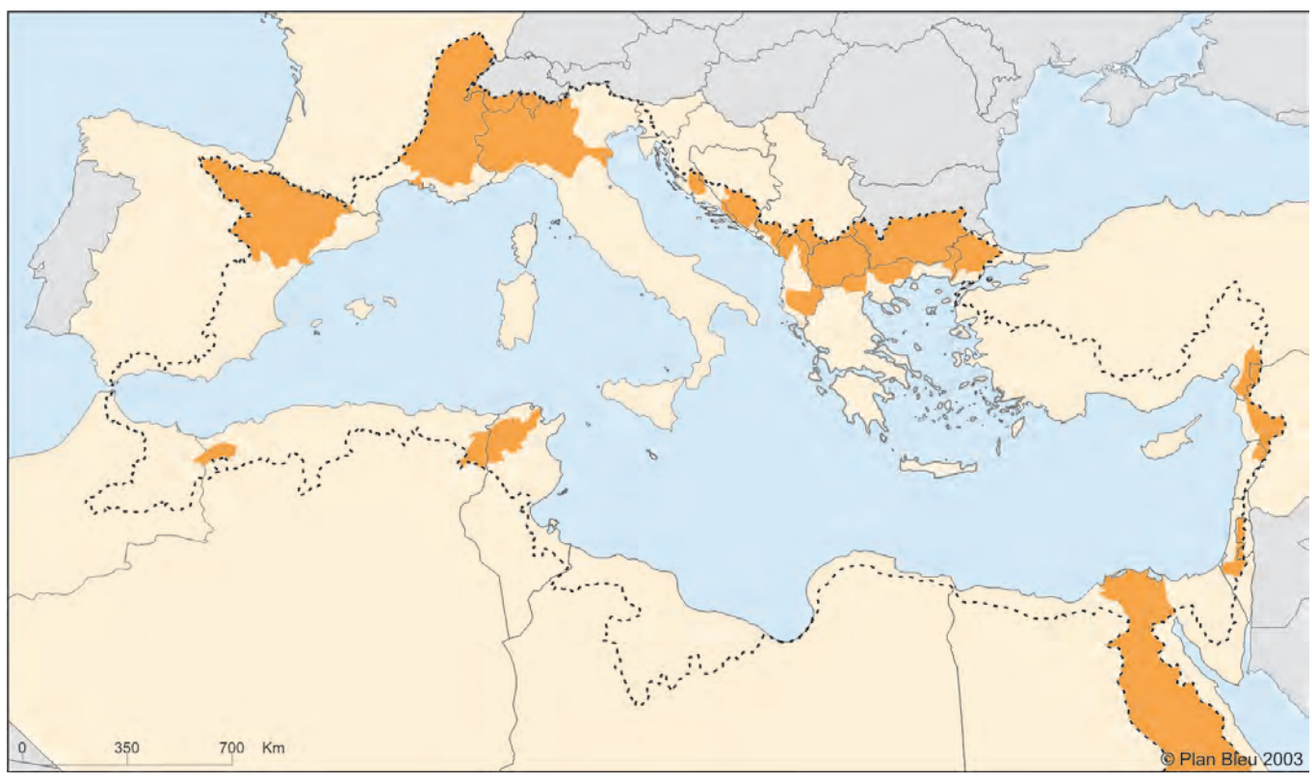
The scope for progress in improving access to safe water lies far more in protecting upstream resources and improving management than exploiting new resources. It is also about the implementation of compensation systems to allow the poorest to have access to water distribution services. These paths to progress will be explored in the second part of the chapter.

Conflicts over water

Tensions over water resources may also increase conflicts:

- between users of the same resources: for example falling water-table levels resulting from their intensive exploitation have already caused violent conflicts between the best-equipped irrigators (with deep-drilling technology) and those using more traditional techniques;
- between the main categories of water users (drinking water/industry/agriculture), with arbitration often being at the expense of the agriculture sector;
- between regions or even countries (Spain, the Balkans, the Near East, Egypt). For example, the issue of sharing underground resources (or those in the Jordan Basin) between Israelis and Palestinians is indissociable from that of the territorial conflict and its resolution. Generally speaking, although the diffi-

Figure 1.11 Shared Mediterranean basins



Source: Plan Bleu, Margat, 2004

culty of access to water is rarely the only cause of conflicts, it feeds them by generating stress, resentment and even some violence. Some do not hesitate to call water the 'oil' of the 21st century.

Countries become more vulnerable to external issues, for example as a result of an increased sensitivity to droughts or an increase in the frequency of shortages, with increased *dependence* on others for their water supply (cross-border water transfers or increasing recourse to imported energy to operate desalination plants). From this point of view, many Mediterranean countries depend to varying degrees on inputs from outside their national territories. Apart from the specific case of Egypt (which depends for 98 per cent of its renewable resources on the Nile from up-stream countries), the other countries have dependency indices[26] ranging from 0 to 38 per cent. The most dependent countries are Croatia, Israel and Albania. Trans-border basins are common in the Mediterranean, with some 20 covering about a third of the Mediterranean catchment area, representing 46 per cent of the Basin's overall run-off. This essentially comprises the Nile, the basins of the eastern Adriatic countries (Drin, Vardar, Struma, Maritza) and the basin of the Orontes in the Near East. These basins may be sources of conflict over access to resources, hydroelectric power plants and the distribution of their effects (cross-border pollution). More optimistically, they can also be special opportunities for cooperation strengthened by necessity.

The projections of water demands and resources thus show a highly contrasting situation depending on the country. The situation is particularly worrying for most of the SEMC, expected to experience the largest growth in water demand. Some of them are already in water shortage situations and exploit their resources in an unsustainable way. The predictable increase in tensions over water resources is expected to result in geo-political, environmental, social and economic risks that could limit the prospects for future generations by altering some resources in an irreversible way. The NMC have less stressful 'supply and demand' balance sheets. On the other hand, they are more and more concerned about degradation of water quality, which boosts supply prices and the effects of which on health and ecosystems are still poorly known.

In any case, classic 'supply' policies, which rely on natural resources to meet all the forecast increases in demand, are being stretched to the maximum. Although the limits in some countries are physical, they are also above all socio-economic and environmental. Such policies will have to be justified more and more on the basis of economic, social and environmental criteria.[27] They will also have to be compared with other policies, such as those that involve, as a priority, managing the water we already have in a better way before asking Mother Nature to cough up more, as discussed in the next section.

Paths to more sustainable water management

Compared with the baseline scenario, which projects increasing exploitation of natural resources, resulting in greater vulnerability, and increasing effects of such exploitation, which is already reaching its limits, an alternative path of *greater efficiency* in water management provides many advantages from three points of view: social, economic and environmental. Such an alternative path is already being explored in many Mediterranean countries.

The goal is the *integrated management* of water resources, 'a process which promotes the coordinated development of water, land and related resources to maximize the resultant economic and social welfare in an equitable manner, without compromising the durability of vital ecosystems'.[28] This concept is increasingly being used in water policies, even if effective implementation is slow. It is at the heart of the recent European Framework Directive on Water.

Box 1.8 The Framework Directive on water, a major stimulus for integrated management

The European Union has, after more than five years of negotiations, adopted a new framework (Directive 2000/60 EC) for a common integrated policy in the water sector (water supply and the disposal of wastewater).

Its dual goal is coherence and a search for effectiveness in national measures for preserving or restoring the quality of the resource. It is a major stimulus for the integrated management of water resources in the EU and future member countries. It acknowledges the needs for hydrographic basin planning and management and confirms the principle of cost recovery and the importance of public participation in management. It introduces a new approach based on objectives, with Member States in principle responsible for the results.

It should be transposed to national legislation during 2004. Plans of action are to be drawn up basin by basin, relying on shared diagnoses and targets for 'good ecological status' appropriate to each hydrologic unit, to be achieved by 2015. The European Commission will publish a first assessment report in 2016, to be updated thereafter every six years.

For the sake of clarity, this section will discuss first the management of the *resource*, then the management of water *demand*. However, it is important not to lose sight of the basic interdependence underlying the very concept of integrated management, since the boundary between

resource and demand is sometimes difficult to define. Nevertheless particular stress will be placed on the less-frequently explored path of possible progress in managing *water demand*. The *Plan Bleu* and the Mediterranean Commission on Sustainable Development have shown in recent studies how such an approach could lead to more sustainable development in the Mediterranean.

Given the many political, sectoral and geographical interactions between the actors, the greatest scope for progress in water management is in *water governance*, since water crises are often crises of governance. This concept refers to the broad panoply of political, social, economic, administrative and cultural systems that govern the development and management of resources and water services. It involves a multitude of actors and interests, including public actors, who, because of water strategic, social and long-term implications, have played a particularly important role in the water sector in recent decades.

Improving resource management

One of the first areas where progress in water management may be possible is the management and protection of water resources. It is dealt with only briefly here, because it comes up again in Chapter 6, in the section entitled 'High-impact land-based pollution, improvemens remain insufficient'. Policies for preserving and conserving water resources rely on a wide range of legal instruments; these are often less expensive than restoring the quality of the resources, but they are not yet sufficiently effective.

Combating pollution

Most countries have introduced legislation to protect their water resources but are encountering great difficulty in applying their laws, mainly because of the spread of responsibilities between the various institutions involved and their limited resources. Effective monitoring of withdrawals and waste disposal in most Mediterranean countries remains limited.

Treating polluting wastewater

The scope for improvements in processing wastewater can be appreciated by considering the expected increase between now and 2025 in the flows of pollutants in the SEMC and the inadequacy of the financial resources that have been allocated for treating them. Sewage is defined here as the *collection* of wastewater (essentially a health-oriented service) followed by *treatment* of the water collected (essentially an environment-oriented service).

Information on the rates and levels of collection and treatment of wastewater are highly variable and difficult

Table 1.2 Percentage of population connected to a sewage collection network and benefiting from treatment, N1

	Year	Resident population (thousands)	Percentage of the population connected to public collecting sewer (*1*)	Percentage of the population connected to public treatment plant (*2*)	Percentage of the population connected to a collecting system and benefiting from treatment (*2*)/(*1*)
Spain	1995	39,433		48	
France	1998	58,497		77	
Italy	1995	57,268		63	
Greece	1997	10,507		56	
Malta	2000	391	100	13	13
Cyprus	2000	669	34	34	100
Slovenia	1999			30	
Turkey	1998	62,810	59	23	39
Syria	1994	13,782	59	10	17
Israel	1999		100	89	89
Tunisia	2000	9618	47	42	89
Algeria		29,100	66	4	6
Morocco	1996	26,848		3	

Source: Eurostat. New Cronos 2003 (http://epp.eurostat.cec.eu.int/); Eurostat (2003) Statistiques de l'environnement dans les pays Méditerranéens. Compendium 2002. Office des publications officielles des Communautés Européenes, Luxembourg

Note: The last column is estimated as the ratio of the percentages of population concerned, not in pollutant loads.

to compare. According to the WHO, for the countries publishing such data, the proportion of the population with access to an adequate sanitation system in 2000 was more than 85 per cent everywhere except in Morocco (68 per cent) and the Palestinian Territories (25 per cent). Between 1990 and 2000, an additional 10 per cent of the population in Morocco, Egypt and Tunisia gained access to an adequate sanitation system. However, 27 million Mediterranean inhabitants still do not have adequate sanitation systems (Figure 1.10 p87).

The percentage of the population not connected to a *treatment plant*, on the other hand, remains high (between 30 and 70 per cent depending on the SEMC.[29] (Table 1.2) In Turkey, for example, in 1998, 69 per cent of the population was connected to a collection system but only 23 per cent to a joint collection *and* treatment plant.

The levels and efficiencies of *effluent treatment* are even less well known; the efficiency of treatment plants is rarely measured and published. It is normally very low in many SEMC because of the lack of maintenance and the poor training of maintenance staff. Although treatment rates in the industrial sector are generally higher, they seldom exceed 50 per cent (see Chapter 6).

In the *northern countries*, there is more pollution, which is coming more and more effectively under control, but the NMC still have some way to go to meet the requirements of the 1991 European Waste Water Directive.[30] Although the EEA has welcomed the improvements in urban wastewater treatment in Europe, it has stressed the low treatment rates of southern European wastewater, where less than 50 per cent of the population is connected to a treatment plant and only between 30 and 40 per cent to a secondary or tertiary treatment system.[31] In 1995, 64 per cent of the population in the four EU-Med countries were connected to a system for purifying urban wastewater with primary treatment.[32] But when connection to more elaborate tertiary treatment is considered, the figures for Spain, Italy and Greece fall to 3, 24 and 10 per cent respectively. In France only 40 per cent of pollution flows receive satisfactory treatment.[33] Increasing treatment raises the question of treating sludge, which is less and less easy to spread on agricultural land and requires ever more expensive treatment (dumping, incineration).

In the *southern and eastern countries*, the levels of collection and (in particular) treatment are very low, not to say non-existent. Many large cities still have no treatment plants. Investments in pollution control are very low. In Turkey these are very modest compared with those devoted to developing distribution infrastructures and irrigation networks.[34] Given the large growth expected in the urban populations of the SEMC (98 million between 2000 and 2025) and the low current level of water treatment, there is an urgent need to develop simple treatment technologies that are not too expensive, such as lagooning. Israel is the exception, with 85 per cent of the population connected to tertiary treatment in 1999.

Prevention rather than cure

Steps can be taken upstream to limit the polluting water discharges. They and their impacts are more economical than curative treatments, which are always very expensive. Preventive steps against pollution include facilities that regulate discharges, pollution monitoring and, further upstream, the creation of protective boundaries for harnessing drinking water, reasonable use of fertilizers in agriculture and the promotion of clean production processes in industry. Water demand management (see below) reduces emission volumes by limiting the volumes required for a given use, therefore the volumes to be purified, and is thus again beneficial from this point of view.

There are many examples that demonstrate the considerable potentials for savings in the *industrial* sector in the Mediterranean that result from the introduction of *clean technologies*. Major savings in natural and financial resources in industrial establishments can be made just by raising awareness during an environmental audit and providing relatively limited investments. These are often amortized in only a few months (Box 1.9). In the SEMC the scope for progress by introducing such clean techniques is even greater since production processes are generally poor compared with worldwide standards. Foreign direct investment can be the vector of such modernization, but the low current levels in the SEMC justifies massive public action in this area (subsidies and public aid for development).

Box 1.9 Examples of savings made by clean production techniques

Much experience has been gained in the Mediterranean countries that demonstrates the effectiveness of industrial action to introduce 'clean' production processes that save resources and limit polluting emissions. Many case studies in the Mediterranean registered by RAC/PP show the magnitude of the savings that are made possible by such processes, with return-on-investment times seldom exceeding two years.

In **Turkey**, for example, a tyre-making factory in the Izmit region reduced its water consumption by nearly three-quarters, from 900,000 litres to 250,000 litres per day, thus reducing its discharges into the community sewers. A detailed analysis made it possible to replace a cooling system with a closed-circuit system for an investment cost of US$5000 and a return time of two years.

In **Egypt**, one of the largest tinned food manufacturers (Montazah near Alexandria) underwent an eco-audit and introduced measures to reduce energy consumption: insulating

steam pipes, replacing leaky parts, fitting a pressure regulator to the sterilizers, and improving the recuperation system and boiler efficiency. Water consumption was reduced by implementing water-consumption hydrometer monitors, installing sprinklers (so that water flows only when needed) and improving the water collection and recycling system. The savings made in water, steam and energy (nearly a 40 per cent saving in fuel consumption) made it possible to reduce discharges and amortize investments in between 1 and 44 months.

In **Croatia,** one of the biggest dairy companies, LURA in Zagreb-Lurat, undertook measures such as employee training programmes, a reduction in the diameter of cleaning pipes, and changes to the hot-water circuit, that resulted in a reduction of 286,000m^3 per year (or 27 per cent) in the quantity of effluents, and savings of 280,000m^3 per year of drinking water. As a result of these simple measures, which involved the employees, and at a low cost (a total investment of 31,000 euros), the factory made significant savings in water and energy, equivalent to 328,000 euros per year, with an amortization of the investment in less than one month and a reduction in its effluents.

Source: Regional Activity Centre for Clean Production, Barcelona; www.cema-sa.org

Increasing the exploitable potential in a sustainable way

There is also a wide range of resource management methods – not yet sufficiently explored – that would make it possible to increase the exploitable potential of renewable natural resources (a definition was given in Box 1.2) at the lowest possible environmental and economic cost. For the arid countries, some options are described in Box 1.10 and merit consideration in detail in all countries, although they often call for difficult innovations covering a wide spectrum (hydro-geology, hydrology, agronomy, pedology (study of soils), geology and socio-economics) and a large number of actors. Other options such as harnessing coastal or underwater freshwaters or mildly brackish springs are beginning to be explored in the Mediterranean.

Box 1.10 Some options for better resource management in arid climates

It may be possible to better manage water in an arid country like Tunisia with very scarce and vulnerable water resources. The following options may enable progress towards more sustainable and integrated management:

Artificially recharging the water tables: in arid areas, unlike in wetter climates, the immense regulatory capacity of the water tables could be better exploited by using water from dams when they are at their highest level for recharging water tables through infiltration (in infiltration zones or wadi beds), thus achieving underground water storage. The advantage of this is to transfer part of the irregular surface water (high water run-off) to regular water (in the aquifers), which is more easily exploitable. It would also make it possible to sustain dry-weather flows and limit losses through evaporation. For example in Tunisia in 1996, 65 million m^3 of water were transferred through the artificial refilling of aquifers. By 2030 this transfer is planned to reach 200 million m^3.

Dividing up regulatory works upstream of catchment areas by creating many hillside lakes above big dams would help to limit the silting-up of reservoirs by reducing the erosive energy of run-off and reinforcing the effects of artificial water-table charging.

Interconnecting water networks would make it possible to re-establish regional balances and optimize resource allocation.

A more balanced exploitation of aquifers with poor renewable resources could be achieved by matching withdrawals to practicable reductions in 'natural loss' (by evaporation in endoreic depressions), thus limiting withdrawals to achieve such a better balance. Depending on the situation, this strategy would be opposite to a more intensive exploitation of reserves (which would be more productive but unsustainable) or else could replace the final phase of such exploitation.

More active management of renewable-resource aquifers, making more use of their reserves when there is large capacity, could artificially amplify their natural 'regulatory reserve'.

Water and soil conservation: some steps (re-vegetation, cultivation practices, soil conservation, biological processes) make it possible to increase storage capacity for rainwater via the ground and thus limit irrigation needs while also limiting erosion and the resulting silting-up of downstream reservoirs.

All these measures, which predominantly aim to increase rainwater infiltration and ground storage, would enable a re-balancing of the distribution of water resources in the regions. It might lead to a rethinking of the function of big dams around preventing floods and refilling water tables as a main goal. We can see with these examples that it should be possible to achieve better management and distribution of water resources by an **integrated** approach, by understanding the interactions between the different components of the water system (and the economic, social and environmental effects of the different possible options) and through:

- understanding the physical conditions that govern productivity and the long-term behaviour of the water resource 'system';
- implementing exploitation strategies that ensure acceptable levels, duration, production costs and environmental impacts.

Source: Plan Bleu, based on a personal communication from Mr Mohammed Ennabli, former Minister of the Environment in Tunisia

Improving demand management

In addition to improving resource management, there is huge scope for improving water demand management (WDM).[35] This includes *all actions and organizational systems intended to expand technological, social, economic, institutional and environmental efficiencies in the various uses of water.* It means making water consumption doubly efficient, by increasing both the efficiency of the ways by which water needs are met, and those by which water is allocated to various uses.

There is an analogy here with the energy sector. The rational use of energy (developed in Chapter 2) involves the same issues, limits and leverage as WDM (which could also be called 'the rational use of water'). The energy sector has experience in implementing efficiency measures that could probably be useful in the water sector.

The challenge: Saving nearly a quarter of the demand

There is scope for improvement in both the allocation between uses and each particular use of water.

It is impossible to quantify the possible gains for the entire Mediterranean from a more *efficient allocation* of the different uses from the threefold economic, social and environmental points of view. Such gains can only be evaluated locally by 'cost effectiveness' studies of the various options, by including the costs and benefits of the environmental and social externalities. Such studies are seldom undertaken, particularly on the questions of optimizing allocations on the basis of the various relevant criteria. In practice, arbitration of allocation issues remains dominated by power struggles and influenced by lobbying or is based on essentially economic considerations. Some Mediterranean countries are beginning to determine their allocation arbitrations on the basis of an optimization criterion of the 'more value per drop' type. This promotes considerable improvements in the technical and economic efficiency of water usage, but *social and environmental* impacts are still rarely factored into these decisions.

It is easier to quantify the physical *efficiency improvements* in the various sectoral uses than in the choice of allocations. *Plan Bleu* has tried to estimate very approximately the magnitude of water losses and 'poor use' in each sector and for each Mediterranean country, losses that artificially increase water demand in the various national planning documents. Many estimates of these average losses are found in the literature; losses in the distribution networks and by the users themselves often add up to a volume as large as the actual uses. *Plan Bleu* has estimated these losses for the entire Mediterranean from a set of hypotheses (ambitious but 'feasible') for the various sectors (for example losses in networks, leaks at the point of use), as summarized in Table 1.3.

The *feasible potential savings* at the Mediterranean catchment area level have been estimated at about 24 *per cent of current demand* in 2000, or 46km^3 of total demand of 190km^3.[36] This estimate should be treated with extreme caution because of the scarcity and poor reliability of the available statistics; it provides only the order of magnitude of the possible improvement in the purely physical efficiency of use.

This savings potential in the Mediterranean is therefore far from insignificant. The main quantitative potential is in *irrigation for agriculture*: in the northern countries the losses occur in the major networks while in the south and east they may also be in more fragmented irrigation practices. The potential savings in the agriculture sector are five times higher than in the domestic sector. Industry can contribute effectively through recycling, as shown by the example of French industry, and which will be promoted by the European Framework Directive. The drinking water sector would contribute only a small fraction of the total potential savings, but may be easier to achieve in the mid-term in the south and the north and to justify economically, *given the present price of water*.

Table 1.3 Estimate of recoverable losses by Mediterranean Basin regions, NV, 2000 (in km^3/yr)

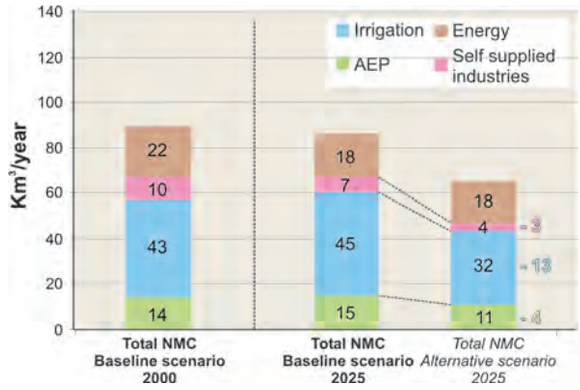
Sub-regions of the Mediterranean NV	Domestic	Industries	Agriculture/Irrigation	Total	
	Rates of loss reduced to 15%, user leaks reduced to 10%	Recycling generalized to 50%	Transport losses reduced to 10% and efficiency raised everywhere to 80%	Total	And percentage of sub-regions
North	3.0	4.9	11.9	19.8	43%
East	1.1	0.5	3.5	5.1	11%
South	2.3	4.0	14.6	20.9	46%
Total	6.4	9.3	30	45.7	100%

Source: Plan Bleu, Margat, 2004

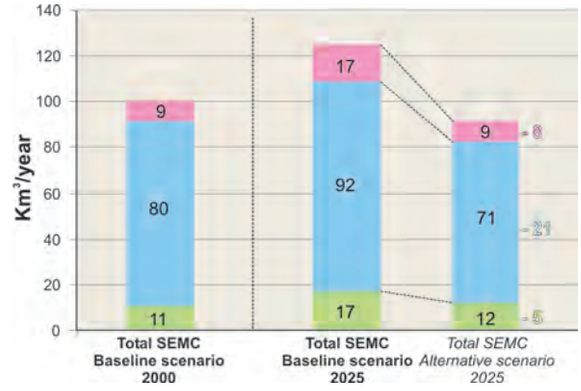
Note: 'Recoverable losses' from the point of view only of available technology, without allowing for opposition and social difficulties.

Figure 1.12 Total demand, baseline and alternative scenarios, NV, 2000–2025

NMC: 20km³/year of savings in 2025



SEMC: 34km³/year of savings in 2025



Source: Plan Bleu, Margat, 2004

These possibilities suggest a *variation* to the baseline scenario that would make more use of these potential water savings. In such an *alternative scenario*,[37] the losses mentioned above would be progressively reduced and finally eliminated entirely by 2025. Figure 1.12 shows the savings to be made in 2025 in relation to the baseline scenario by sectors and sub-regions. Compared with the baseline scenario, there would be a total saving of 54*km*³ by 2025, or 24 per cent of the baseline scenario demand by 2025. Most the potential (34km³) would be in the SEMC (in the irrigation sector), where it would actually amount to more than the expected growth in total demand between 2000 and 2025.

By reducing the demand without affecting the activity for which it is used, water demand management can reduce all the impacts and risks described above. The *benefits* are economic, social and environmental, all at the same time.

Over 25 years, the potential savings could reach a total of 675km[38] assuming a progressive (linear) exploitation of the potential. If the water 'wasted' in this way is considered as a cost (exploitation, supply, processing), the possible financial savings are huge. Given an average cost of supply per cubic metre of water of 0.4 euros (a cost that is near to that of irrigation water, without the treatment to turn it into drinking water) the *savings over* 25 *years* would be nearly 270 thousand million euros, or 11 thousand million euros per year. Of course, the costs of exploiting this potential (such as subsidies, awareness campaigns, training) have to be subtracted from these figures, but they are much lower than the resulting benefits. These (obviously theoretical) figures show only the scale of what could be achieved by better management of water demand in the Mediterranean and thus provide an indication of what is at stake.

For some countries, a strong commitment to WDM could prevent predictable water demand crises and even remove the need for some investments with large costs and impact while making it possible to meet needs and keep up with demographic developments.

The benefits would also be *social* by contributing to a rise in agricultural incomes, job creation (for the maintenance and management of infrastructures) and access to water for the poor (by reducing the supply costs).

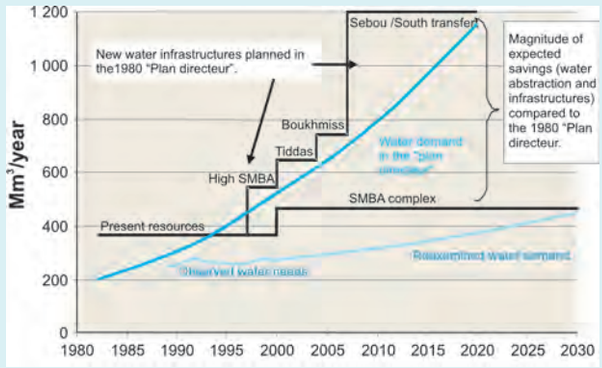
Finally, there would also be *environmental* benefits from reducing or stabilizing withdrawals from ecosystems and resources and decreasing the number of new infrastructures needed (from the hundreds planned, shown in Box 1.3). This objective is, however, seldom the first in the WDM processes, and quite often the water savings made are re-used at once, so much so that total demand is not even reduced. Careful management does not necessarily mean allocating more water to nature, unless that is clearly the aim.

Benefits could also be seen in *energy* savings. Considering that it takes nearly 1kWh to produce, treat and distribute 1m³ of water, drinking water savings alone could represent nearly 8 thousand million kWh by 2025. Spread over 25 years, the energy savings would be about 100TWh for the production of drinking water alone, more than the output of two 500MW power plants for a year.

On the Mediterranean Basin scale, these global savings are theoretical, but they are exemplified by the experience of cities like Rabat-Casablanca in Morocco (Box 1.11). WDM made it possible to avoid building many water infrastructures that had been planned in previous planning documents, which may have been too ambitious in terms of efficiency.

Box 1.11 Infrastructure savings through WDM, Rabat-Casablanca

The area of Rabat-Casablanca in Morocco has experienced a substantial reduction in the growth rate of water demand during the past 12 years, in spite of high and growing urbanization. This was achieved as a result of measures to find and repair leaks in the system; setting up a progressive pricing system to make consumers, including public users, more responsible but with welfare provision for the poor; systematic metering of the water supply; and a major public awareness campaign about water savings. These actions were made possible by an appropriate administrative framework that combines private business with government agencies and local authorities in a 'delegated water service management' supported by a charter involving several communities. These measures have allowed costly investments (dams, water transfer channels) formerly planned in the 'Plan Directeur' in 1980, to be deferred. These investments, which would have been difficult to finance without extra debts, may prove not to be necessary in the long term.



Source: DGH Rabat (2002) Analysis of the Case Study on the Drinking Water Supply in the Rabat-Casablanca Coastal Area. Final Report. In *Plan Bleu*, CMDD (2002b); www.gwpforum.org

The WDM issues vary according to the country. In the *northern countries*, rather better endowed in water and with falling demand, it is the *qualitative* aspects of the resources that dominate, as well as the interest in maintaining, even restoring, ecosystems and simultaneously *lowering water supply costs*. For the SEMC, with the squeeze coming from finite water resources and rapidly increasing demand, it is the *quantitative* issue that dominates.

Nevertheless, despite their immense potential, these issues are not yet fully appreciated in the Mediterranean countries, and even less included in policies. Even if WDM seems to be a winner from many sustainable development points of view, it still comes up against much resistance, which must be analysed in order to be overcome.

Too few Mediterranean countries commit themselves to WDM

Many private and local initiatives combine to achieve better WDM, but they are generally not enough to exploit the vast savings potential mentioned above that quite often requires much voluntary *public involvement*. More and more Mediterranean countries, often the most water-poor, such as Israel, Malta, Cyprus, Spain, Tunisia and Morocco, are making commitments to WDM. They are developing official national WDM strategies, announcing quantified goals that combine economic, technical and institutional instruments that mobilize the actors through the refurbishment of networks, the promotion of economic irrigation techniques, progressive pricing, bolstering water policies and raising the awareness of users. Some devolution of water management (such as catchment areas at the local level), a growing participation by users, and redefining the role of the state can favour such strategies.

The Tunisian example is without doubt one of the most advanced in this field, with the setting up of institutions officially responsible for WDM and real impacts on demand (Box 1.12). With a few exceptions, however, few Mediterranean countries have formally committed themselves to the WDM path; efforts are still mostly concentrated on exploiting new resources. Although WDM is an increasingly shared concern, it is only rarely included in the official objectives of water planning and even more rarely expressed in terms of targeted and quantified objectives. Very few Mediterranean countries have specific institutions to manage demand or define an environmental demand. In this regard, the EU Framework Directive on water and the Johannesburg objectives could act as a driver of reform in many Mediterranean countries.

Barriers to WDM

One of the main impediments to improvement in WDM is the lack of *understanding of the importance of the issue and its potential benefits by the various actors*, in particular the public actors. All too often, because of professional training, decision-makers in the water or agricultural areas rely too much on technology for increasing supply, underestimate the resulting impacts, and play down the credibility of alternative options. Thus dams, desalination or water transfers are seen as ready-made responses to the assumed increase in demand without factoring in their costs, the sum of their impacts (emissions, energy consumption, increased vulnerability) and, most importantly, with no adequate examination of alternative approaches and analysis of the demand structure and the possibility of achieving savings.

Systematic *evaluations* of cost effectiveness, comparing several options (increasing supply or using WDM) are still rarely carried out and published. Such evaluations,

Box 1.12 Tunisian national strategy for managing water demand

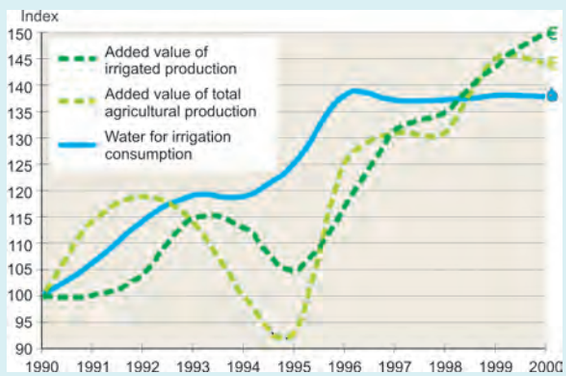
Tunisia was one of the first countries to adopt a **national water-saving strategy** for both urban and agricultural demand. By doing this, it confirmed a cultural 'oasis' tradition of a frugal and patrimonial management of water, such a rare resource in Tunisia. Thanks to this policy, water demand for irrigation has stabilized in spite of increasing agricultural development, the size of peak demands and the unfavourable climatic conditions (droughts). The water demands of both tourism (a source of foreign currency) and cities (a source of social stability) have been assured.

The underlying principles of the Tunisian WDM strategy are:

- moving from isolated technical measures to an integrated approach;
- a participatory approach, which makes the users more responsible (960 water user associations were created covering 60 per cent of the public irrigated area);
- a gradual introduction of reforms and adaptation to local situations;
- introduction of financial incentives systems aiming at promoting water conservation-based equipment and technologies (60 per cent grant for purchasing such equip ment);
- support to farmers' income, allowing them to plan for and secure agricultural investment and labour;
- a pricing system that combines transparency with flexibility, compatible with the national goals of food security and allowing a gradual recovery of costs.

As shown in the following diagram, thanks to these measures, the demand for irrigation water has stabilized while the added value of irrigated production has increased.

Water consumption and added value of irrigation, Tunisia, 1990–2000



Source: M. Hamdane, 2002, in *Plan Bleu*, CMDD (2002b)

which would include more detailed estimates of the potential for savings on the basis of precise analysis, and internalization, as far as possible, of the costs of the environmental impacts of the various options, would increase awareness of the opportunities and feasibility of WDM among decision-makers. Carried out prior to investments, they should make it possible to compare increases in supply with WDM or to optimize allocations. Broadly speaking, the question is whether it is less 'costly', after taking accumulated long-term effects into account, for the community to reduce losses than to exploit new resources. Very often WDM appears to be economically much more advantageous than increasing supply, even if it has a higher 'governance' cost. The few studies available that make this kind of comparison show differences of 1–3, even 1–10, between the cost per cubic metre of water 'saved' and 'supplied',[39] depending on the case considered.

But before being better managed, the demand has to be *known* (social, economic and environmental demand), which leads to defining the efficiency potentials of highest priority or the most 'profitable' for exploitation. It turns out that the largest potentials for savings are often in agriculture.

As well as the need for greater awareness, WDM also requires a profound change in practices and attitudes, even a questioning of production and consumption patterns. The challenge is how best to *combine approaches* of the 'hard' type (stressing supply technology and infrastructures) with those of the 'soft' type (trying to involve all actors in the search for the best possible enhanced value of each cubic metre of water while keeping in mind the needs of nature). More generally speaking, this means repositioning people at the heart of concerns, since people are not just users or clients but also 'citizens', and are therefore responsible for the patrimonial management of water.

Beyond this 'quasi-cultural' change of perspective, the problem for WDM is the need to integrate a mass of sectoral policies and actors that have sometimes antagonistic objectives, with the objective of improved water management. I*ntegrating* WDM objectives into *sectoral* policies (agriculture, energy, industry, commerce) raises first institutional difficulties. Indeed many policies conflict with water demand, in particular commercial agricultural policies, given the importance of irrigation for water demand. Integrating WDM objectives into the various *actors* activities in a country presents an additional level of difficulty. To overcome it, some Mediterranean countries have set up *coordination, cooperation or arbitration agencies* to facilitate analysis and cooperation.

At the *national* level, coordination of government action is the responsibility of inter-ministerial committees on water (Algeria). National water councils (Tunisia and Morocco) have a more consultative role but make it

possible to carry out analyses, raise awareness of actors and formulate proposals (such as developments of the regulatory and legislative framework).

At a more *local* level, *deconcentrated management units*, for a catchment basin or an aquifer, also prove to be favourable institutional frameworks for promoting subsidiarity. Water agencies (water or basin agencies) can be the preferred forum for political mediation in water management if they are based on strong legitimacy with the users (for example, willingness to listen and a sensitivity to social needs, independence, transparency and the authority to manage and to impose sanctions). User associations (irrigators, users, the local economic base) are also bodies that can cooperate, define and apply effective rules for WDM. Experience shows the advantage of *involving users* in managing common resources. It is often a matter of restoring local regulatory systems for water withdrawal that might have been destroyed by modern 'nation-states' without being replaced by more effective systems. The poor performance of the policing of water in most Mediterranean countries (a lack of resources, persistent illicit practices) encourages the use of more local and often more effective self-monitoring by means of concerted management processes. Groundwater or river contracts that are being developed in the Mediterranean illustrate the benefits of these processes (Box 1.13).

Box 1.13 The benefits of processes that involve users

Faced with the growing overexploitation of water tables associated with a number of failures in policing water, some contractual processes linking the multiplicity of actors have been shown to be effective in the Mediterranean. 'Water-table contracts', derived from voluntary processes that make users responsible (drilling declarations followed by metering) have made it possible in a number of cases to prevent water degradation and even restore environments:

- The high-basin region of the river Guadiana in **Spain** has seen a rise in alluvial ground-water and spring rehabilitation in spite of a large increase in irrigation. This was possible because new regulations were introduced for pumping from boreholes (including various measures for protection, warning, real sanctions and permits) together with compensation for loss of income for the irrigators and financial incentives for water-efficient technologies or for planting crops that need less water. These agri-environmental measures have played a part in making the plan to restore ground-water levels feasible and also to protect the natural park which is the region's major tourist attraction.
- In the coastal zone of the Languedoc region in **France**, the Astien water table is at present viewed by the 20 towns and villages that depend on it as a natural resource to be protected after 100 years of intensive exploitation (700 wells) that had led to its level being lowered and the penetration of sea water into its depths. In this tourist area, matters were made worse after 1960 by the development of camp grounds and holiday homes. In association with the Rhône-Méditerranée-Corse basin agency, a mixed inter-district study and project agency was formed. Through a water-table management plan, it took a series of measures: an inventory of resources, information (on the rights and duties of well-owners and public awareness raising), advice on the digging and maintaining of wells, a standardization of municipal drinking water and water savings by the gating of artesian wells, etc. A strong technical team and a system of aid for restoring wells and metering withdrawals made it possible to reduce withdrawals by 25 per cent, or a million cubic metres a year, without altering needs. In ten years, the quality of the water table stopped degrading, and the average piezometric level of the water table was raised.
- **Egypt** has also developed a participative approach to the management of irrigation and modernization of technology in the irrigated areas of the Nile valley. The technology is based on modern equipment and bottom-up irrigation management, including a centralized control, simplification of the network, and above all the involvement of user organizations in decision-making, management and maintenance through intensive training.

Source: Centro de Estudios Hidrograficos del CEDEX (Spain); Syndicat Mixte d'Etudes et de Travaux de l'Astien (SMETA), Agence de l'eau Rhône Méditerranée Corse; Ministry of Water Resources and Irrigation Nile Water Sector. In *Plan Bleu*, MCSD. *Case Studies*. Forum on Progress Towards Water Demand Management in the Mediterranean Region. City of Fiuggi Terme, 3–5 October 2002

Nevertheless, improving local management capacity cannot be done without legal and financial strengthening of its legitimacy and its decision-making power, along with increased accountability (penal and financial) of leaders and transparency of transactions. It also implies a clear-cut separation of monitoring and management functions. The large increase in the number of irrigation organizations that are emerging in the Mediterranean (as elsewhere) under pressure from the major donors (e.g. World Bank) can only provide real improvement in water management with a reform of their statutes and funding methods, which are often hard to implement (for example in Turkey where a reform project is still under way).

In the absence of cooperating agencies and political will at the highest level, more often than not the specific interests of pressure groups carry the day over the general interest. There can be powerful *resistance* (more or less intentional) to some WDM measures among actors. For example some major *donors* have difficulty in adapting their projects to WDM requirements (small-scale, soft-type actions); the *civil servants* in water administrations, having acquired power and fame at the time of major projects, may be afraid of losing some of their power or feel

uncomfortable with participatory processes; *local authorities* often do not have the resources to match their ambitions; and *water distributors*, trying above all to balance their operating income, may be afraid of water-saving measures. For example some WDM measures introduced in Madrid were compromised by the budgetary imbalance that they caused (a drop in income and cash flows in water companies and imbalances in municipal agencies). And, finally, *consumers* (industry, farmers, tourists and residents) seek to minimize the immediate cost of their water supply without realizing that measures that improve the efficiency of water use very often allow them to modernize their technology and increase their income (examples include the agriculture sector in Tunisia, see Box 1.12, and the introduction of cleaner processes in the industrial sector, see Box 1.9). Interest and lobby groups (farmers, builders and politicians) remain very powerful in favouring policies that aim to increase supply and seek to discredit the potential of WDM.

But the main cause of resistance is very often ignorance of the issues and opportunities for progress. This is why the efforts to *raise awareness* and understanding are as vital as political firmness. Often missing from academic curricula, the *training* of water professionals and technicians in the methods and issues of WDM could be a major contributor to the emergence of new, more integrated and economic water strategies.

Water demand management thus results from a *combination of instruments* (laws, economics, voluntary agreements, awareness-raising) and determination. It can provide considerable benefits, especially for irrigation. But to do so requires *progressive approaches* that are adapted to each local situation, with a greater involvement of consumers and a greater awareness by the decision-makers of issues at stake. For this almost 'cultural' change to extend to several Mediterranean countries, it must overcome much resistance. Support at the highest state level is needed to create a coherent strategic framework that is essential for coordinating actions and a continuing, long lasting involvement.

The difficult problem of funding

A lack of financial and human resources is often given as an obstacle to water management. Although substantial savings in infrastructures and reductions in environmental impact can be achieved in the medium-term, implementation of sustainable water management requires adequate resources for:

- the building and sustainable management of water supply and treatment facilities;
- the improvement of institutional capacities, in particular the drawing-up of national strategies, the perfecting of institutional, legal and financial frameworks, and the training and hiring of qualified staff.

Without these necessary (but not sufficient) financial resources,[40] it is illusory to try to improve water management. The financing needs of the water supply and sanitation sector for improving services to increasing numbers of people and activities are considerable. At a global level, the financial requirement for bringing drinking water to a thousand million people and providing sanitation and cleaning up pollution for two thousand million has been estimated at US$180 thousand million per year compared to the US$80 thousand million per year spent today.

The *northern Mediterranean countries* are soon to be faced with the necessity of changing and standardizing their old infrastructures to bring them in line with ever stricter European standards. These costs are considerable and, moreover, fully passed on to users.

The *southern and eastern Mediterranean countries* are faced with a double challenge: (i) the need to *upgrade* their infrastructures in accordance with minimum standards (as mentioned above, this objective is far from being achieved since 27 million people are currently not connected to sanitation systems and most polluting emissions are not processed); and (ii) the expected and very significant *population growth* (98 million additional city dwellers in the SEMC by 2025). To meet these challenges, the financing requirements will be huge. For domestic wastewater alone, applying the minimum standards of the European Waste Water Directive (91/271/EEC) in the SEMC would require the investment of a minimum of 40 thousand million euros in the SEMC up to 2010 and 60 thousand million euros up to 2025, that is around 10 per cent of their current GDP, an average of 2.5 thousand million euros per year for 25 years.[41] To that must be added operating costs of at least 0.3–1 thousand million euros per year.

These projections require a rethinking of the *financing modes* of water management and a definition of new roles for the several actors (states, local authorities, users, firms, banks, etc.).

To meet this funding need, *public budgets* are being cut back. Balancing budgets on a large macro-economic scale imposes increasing difficulties on most of the SEMC in making choices about the allocation of public expenditure. States, which have long been the main funders of large water infrastructures, are looking for other sources of funding. The *users* of water services are therefore being asked to contribute increasing amounts, but there are major difficulties in ensuring that all the investment and operating costs of water services are fully and rapidly covered. As we will see in the next subsection, this can only be achieved gradually (to factor in the ability of consumers to pay the real costs of water and the acceptability to them of having to make such payments), especially if the costs and very long time scales for amortizing the costs of water infrastructures

are taken into account. It is worth noting that it has taken European countries more than a century to balance their sewage budgets with consumers, through the very recent 'polluter pays' principle.

Given the difficulty of recovering costs from consumers and the low profitability of water investments (long return times, high costs of infrastructures, commercial and political risks), *private capital* is slow to invest in this sector. 'Public–private' partnerships, an approach that appeared during the 1980s, have so far had rather mixed results. Several of these sorts of approaches have been tried, successfully in Rabat-Casablanca (Box 1.11), but many others throughout the world have failed. Generally speaking they have been unable to meet the challenge of attracting massive private funding in a sector that is risky and not profitable enough. Moreover, these approaches are more appropriate for big cities and pose problems for contractors (local authorities, states) in supervising and regulating them (social and environmental clauses).

This is what has led many specialists in international cooperation in the water sector to propose an overhaul of the funding system[42] with the intention of increasing the amount of investment available through a combination of local (micro-credit, regional banks), national, international, public and private funding. The proposals aim to invert the present funding architecture by promoting a *decentralization* of funding and decision-making in order to improve the efficiency and monitoring of infrastructures and services.

Better application of economic instruments

Economic instruments are often considered the preferred instruments for integrated water management. Often given as *the* solution to water management problems, they deserve a closer analysis of their advantages and limitations in the light of their practical use in the Mediterranean.

The debate on applying economic instruments for water management inevitably leads to the question of the legal status of water and its ethical, cultural and even religious value. Far from being clear-cut, ideas on the nature of water are very controversial: it has status as an essential global public good (seen as a human right), an intermediary public good, a common good, an economic good or one that is both economic and social. Without going into this debate, it is important to remember that access to drinking water is not freely available to all, despite being a fundamental human right. The Dublin Conference of 1992 recognized water as an economic good too.

Table 1.4 Use of economic instruments for WDM in a few Mediterranean countries

Country	Group(*)	Importance of economic instruments	Incentive to save water		
			Agriculture	Drinking water	Other measures
Spain	1	Moderate	Low	Moderate to high	Seasonal restrictions
Israel	1	High	Moderate to high	Very high	Possible restrictions
Egypt	1	Low	Nil	Low	
Malta	2	Moderate to high	NA	High	
Tunisia	2	Low	Low	Low	
Cyprus	3	Moderate	Moderate	NA	
Turkey	3	Moderate	Low	Very high to low	
Lebanon	3	Low	Low	Very low	
Morocco	3	Moderate	Low	Moderate to high	
France	4	Moderate to high	Low to high	Very high	
Italy	4	Moderate	Low	High	
Greece	4	Moderate	Low	High	User awareness Possible restrictions & bans
Albania	4	Low	Nil	NA	
Slovenia	4	Low	NA	Very low	
Croatia	4	Low	NA	Very low	

Source: Cemagref, 2002, Fiuggi forum, in Chohin-Kuper et al (2002)

Note: Assessments of the encouragement to water savings rely on the combination of criteria of price levels and progressiveness.
NA = 'Not Available'

(*) the groups refer to the exploitation index, Figure 1.6 p77.

Table 1.5 Cost recovery and agricultural water prices in some Mediterranean countries

	Type of irrigation scheme	Cost recovery		Change in prices	Forecasts
		Operation and maintenance	Capital		
Spain	Small scale IPP Individual (underground water)	Low (to partial?) Total	Nil to low Total		1985 Law: principle of covering full costs
France	RDS ASA	Total	Partial	Stable	
Italy		Partial	Nil		
Greece	Collective (LLEC) Individual	Partial Total	Nil Total		Introduction of a volume-related pricing system for new networks
Malta	Poor water quality				Grants for micro-irrigation equipment
Cyprus	Small scale IPP Private perimeters	Partial Total	 Partial	+30 to +80% between 1990 and 1999	a 80% ↗ in prices by 2003, to cover 38% of the cost of water
Albania			Subsidized		Pricing system to be defined
Turkey	Large perimeters	Partial	Partial		
Lebanon		Low to partial			Prices: + 20 to 30% in 2002
Israel	Irrigation water (1999) Mekorot	Partial		↗ in price between 1986 and 1996, ↘ between 1996 and 1999. Lowering of subsidy	
Egypt		Nil	Nil		
Tunisia	Private area (210,000 ha) Small IPP (160,000 ha)	Total Partial	Partial Nil	+12% in nominal terms since 1983	Pricing system by hydro-agro-ecological areas. Capital cost in pricing system
Morocco	ORMVA	Partial to total	Partial	+ 0.001 to 0.004US$/m³/year	Objective 100% for O&M and 40% for investment

Source: Plan Bleu, Cemagref, 2002, Forum de Fiuggi, both in Chohin-Kuper et al (2002)

Notes: Irrigated Public Perimeters (IPP), Rural Development Societies (RDS), Authorised Syndicated Associations (ASA), Local Land-Enhancement Commissions (LLEC), Regional Offices for Farming Enhancement ORMVA.

Despite its scarcity, in practice water does not have an intrinsic commercial value: there is (as yet) no market for water as a trade in goods (in the sense of the market for raw materials), but we are gradually moving towards a services market linked to its availability (and its recovery after use through treatment).

Economic instruments are seldom used

Economic instruments (e.g. pricing, quotas, subsidies, taxation) can make a considerable contribution to the more efficient allocation of resources at the sectoral and inter-sectoral levels by improving access to water for the poorest and factoring in environmental concerns. On the

one hand, they can result in behavioural changes by the various users and, on the other, contribute to the funding essential for water management.

A brief overview of the economic instruments in use in the Mediterranean[43] shows that they are still seldom used. Moreover, there is no clear relationship between the level of water scarcity in countries and the level of recourse to economic instruments (Table 1.4).

In the Mediterranean, economic instruments are generally used for *recovering the costs* of water-distribution services and more rarely for research into the better allocation of resources or environmental protection (for example by integrating water scarcity into the price). Consequently it is the various forms of *pricing* (contractual or by volume) of irrigation and drinking water (block systems) that are by far the most used. Other instruments, such as quotas or subsidies, are much less common or else are used in conjunction with pricing.

In terms of *results*, the objective, even limited, of cost recovery is seldom achieved. It is above all in *irrigation*, where the savings potential is the greatest, that the prices are the lowest and the operational costs, as well as the investment costs, are furthest from being covered by consumers, as shown in Table 1.5. Lobbying and resistance from the agricultural sector explain most of this gap.

For drinking water, however, there is a general trend of increasing prices aimed at recovering an increasing proportion of the real supply and treatment costs (France, Spain, Morocco, Tunisia and Egypt). Thus in France, full recovery of costs has become a legal obligation.[44] This trend of an increasing recovery of water costs and thus an increase in the price of water is expected to continue. The price of drinking water has therefore risen considerably over the past decade: by 130 per cent in Egypt in 1995, and by 70 per cent (in current prices) in France between 1991 and 2000, from US$1.44 to US$2.45 per m^3 (in US$ 2000).

Enforcing the Framework Directive on Water on current and future EU-Med countries should result, increasingly, in the introduction of *environmental concerns* (such as resource scarcity, treatment) into prices, but there is considerable variation in these concerns from country to country. In France, for example, collection and treatment are systematically invoiced whereas in Spain and Greece only the biggest cities charge for treatment. In SEMC, in Morocco for example, invoicing for treatment was introduced in 1995, but some countries, such as Lebanon, continue to exclude treatment from their invoicing of drinking water. For the countries that have included treatment in the price of water (France, Spain, Greece, Italy, Slovenia, Turkey, Israel, Egypt, Tunisia and Morocco), its share of the total price of water per cubic metre is about 30–50 per cent and varied in 2000 from US$0.02 (Egypt) to US$0.8 per cubic metre in France. In addition to treatment charges, some countries have begun to introduce pollution or resource taxes that increase the price of drinking water and encourage resource saving while enabling the funding of pollution abatement and new resource development (in France in 2000 the resource tax was US$0.42 per m^3 and the pollution abatement tax US$0.38 per m^3.

Conditions for the use of economic instruments

Although more use of economic instruments should ensure better water demand management, certain conditions[45] must be satisfied for them to function properly.

Coherent goals and compensation mechanisms

First, there has to be a political will that is expressed by defining *clear and understandable objectives*: cost recovery and/or water savings; financial and/or social and environmental concerns (the protection of water resources); factoring in the cost of treatment. The selection of appropriate instruments and price levels depends on those objectives.

The effectiveness of economic instruments also depends on the *economic and institutional environment* within which they are implemented: proper performance of the regulatory and legal systems and complementarity with other non-economic instruments are indispensable conditions for their proper operation. Thus, it has been observed in the Mediterranean (Tunisia for example) that the imposition of taxes or quotas on water distributed by public networks can turn consumers away from the net work and have the perverse effect of increasing withdrawals from aquifers, which are seldom monitored.

Once defined, these objectives must be made *consistent* with other national objectives that could influence water demand (for example respecting the right of access to water, regional balances, agricultural independence or support of farmers' incomes). Such interference is very often cited to justify the total lack or the low level of current pricing of irrigation water in the Mediterranean. Some sectoral measures (subsidies for irrigated crops in Europe, Egypt and Turkey) even conflict with the goal of managing the water resource. Policies to freeze the prices of certain agricultural products, as in Morocco and Egypt, limit the room for manoeuvre in implementing incentive pricing for water savings.

But, in most cases, this apparent contradiction could be resolved through well-targeted implementation of *compensation mechanisms*. To restore some *intra-national imbalances*, a tax could be imposed on the volumes of drinking water distributed throughout a country, making it possible to finance the transfer of drinking water to the public network for the poorest districts (as in France and Morocco). The double objective of territorial equity and cost recovery would then be satisfied. Similarly, many

Box 1.14 Tariffs compatible with social goals

Pricing reforms in all Mediterranean countries have to face the problem of making WDM goals (e.g. reduction of wastage, recovery of costs) compatible with the aims of sustaining farming incomes or ensuring access to drinking water for everyone.

For **irrigation**, which has the largest water-saving potential, one can identify four types of policy in the Mediterranean that seek to ensure acceptable incomes for farmers:

1 Free allowances of water for farmers (as in Egypt); although these do not encourage water saving, the costs of withdrawal (formerly using animals, now pumps) in Egypt are increasing with the increase of salination problems and are increasingly being met by the irrigators, although they are far from marginal.
2 Price increases that are lower than actually required. In Lebanon, for example, prices are limited to 'what the users can pay'; a partial adjustment in the price of water is planned in those deficit-ridden areas of Morocco where irrigation water would be too expensive (adjusted tarif of UD$0.07 as opposed to US$0.02 per m^3 in the other areas).
3 Implementation of specific tariff structures with bonuses for water savings (a single volumetric tariff or block tariffs) that enable the impacts on the incomes of the producers (for a given saving of water) to be reduced. In the Valencia region of Spain, the reduction in income could go from 70 per cent with proportional pricing, to 30 per cent with proportional pricing plus bonus, to only 15 per cent with block tariffs plus bonus.
4 Recourse to other instruments such as quotas. The quantities of water used can be limited even if there are no economic instruments for encouraging water saving. In Egypt, for example, community water management has for centuries imposed taking turns in the use of water, the time allowed for each turn being a kind of quota.

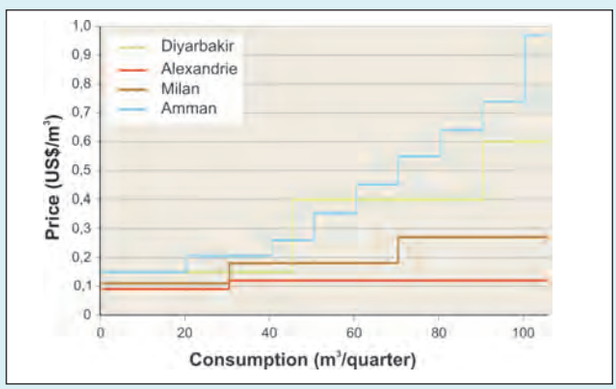
For **drinking water** various approaches are used to maintain the right of access to drinking water for everyone, including the most deprived (see also Chapter 4, Urban areas):

1 *A block tariff*: a single tariff structure is offered to all domestic users with a first, especially low-level block acting as a socially based tariff. In the block tariff structure, the balance between goals (the social goal and water-savings goals) can be adjusted by varying: (1) the volume of the first block; (2) the price level of the social block; and (3) the price step between the first 'social' block and the higher blocks.

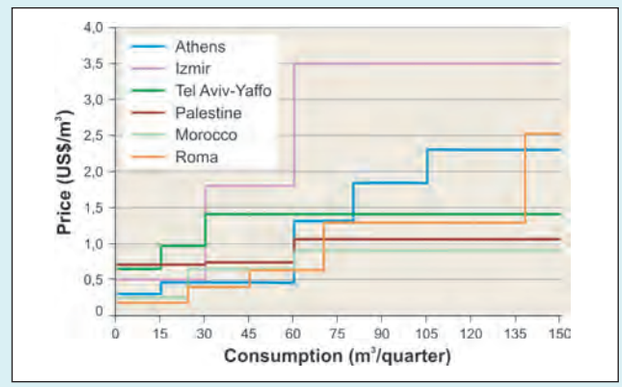
Too many Mediterranean countries have tariff systems that are not sufficiently targeted, with too large a segment of their population not having to pay any water charges. These systems do not have the required effect on water demand. The volumes of the first consumption block are more often than not larger than the 'social' volume (estimated at about $15m^3$ per quarter). In Egypt and Greece (Dyonisos), the volume of the first block is large and the initial tariff level and the progressive price levels are low. Even when the volume of the first block is small, the step in price between the two first blocks is often too small to discourage wastage (Greece and Israel).

On the other hand, in Malta, Morocco and Rome the volume of the first block is limited to 20–$25m^3$, and there is a large difference in price between the first two consumption blocks. These tariff structures therefore reflect a real social concern but remain compatible with the goal of reducing water demand. In Turkey, the large difference in prices between cities results from this social policy, with low prices for the first consumption block and a larger first-block volume for poorer cities such as Diyarbakir (compared with richer cities such as Izmir).

Drinking water prices that are more or less favourable for saving water



Tariff structure favouring social goals: low price level, little progression between blocks



Tariff structure combining social and environmental goals: high average price and large progression between blocks

Box 1.14 Tariffs compatible with social goals (continued)

2 *Tariffs with allowances that depend on certain criteria*: in Seville (Spain) there is a two-level block tariff with an allowance (50 per cent price reduction) for domestic consumption below a certain level and for families with more than five children (first-block tariff irrespective of water consumption); in Athens, the two-level block tariff is closely linked to the social objective by putting a ceiling on prices for large families (those with more than three children) and providing free water allowance for the most underprivileged.

3 *Paying the bill depending on social position:* in France, there is no social pricing as such, but the law of 1998, bans the cutting off of water for any person or family living in penury, and the Charte Solidarité Eau (Water Solidarity Charter) recommends cancelling the debt of households unable to pay.

Source: *Plan Bleu*, Cemagref, Fiuggi Forum, 2002

Mediterranean countries have implemented economic instruments that make it possible to reconcile *social* imperatives (access rights to water for everyone), *economic* imperatives (cost recovery) and *environmental* imperatives (reduction of water wastage). Box 1.14 shows some of the approaches adopted by the Mediterranean countries. However, poor design of these compensatory mechanisms (for example too large a tranche of low socially based prices), can nullify the desired effect on water savings or, indeed, make the poorest even poorer. The system must be adjusted as necessary by measuring its effects.

Relevance and social acceptability

The economic instruments must be chosen on the basis of whether they are likely to achieve the goals that have been set. *Tariffs*, for example, seem particularly appropriate for drinking water consumption or water for irrigation. But *subsidies* may be more appropriate when it comes to targeting water-saving equipment (for example water-saving irrigation equipment is subsidized in Tunisia). When there is strong pressure on the resource, *quotas* seem to be the most appropriate instrument for regulating demand, provided they are set in collaboration with all consumers and include environmental needs (e.g. low-water plans as in France and Spain).

But the implementation of economic instruments also has to take account of *transactional costs*, which should not exceed the expected benefits. These are the costs of implementing the system, for example installation of meters, awareness-raising campaigns, loss of well-being for some actors, the costs of implementing compensation mechanisms, etc.

And, finally, a proper understanding of the water supply and demand situation makes it possible to adapt the economic instruments to the desired goal in the best possible way. The choice of pricing structures requires knowledge of: the volumes consumed; the reaction of consumers to prices (Box 1.15) and income (Box 1.14); and the possible existence of other water resources (that may enable consumers to avoid economic measures).

Box 1.15 Large variability in consumer reactions to water prices

The **price elasticity of demand** provides an indication of the influence of water price on consumer demand. Many studies show that this is extremely variable and depends on many criteria.

Among these, it is important to consider whether or not there are any **replacement solutions**. The elasticity is greater when there are many water supply options available, for example households that have access to sufficient quantities of good-quality underground water stop using distributed water when there is even a small price rise (in Cyprus, for example). The same thing is seen in irrigation. In irrigated areas of Tunisia (Jebel Ammar), where a fourfold increase in the price of water resulted in the amount being consumed falling by a factor of three, while in other situations (Morocco and Tunisia), a price rise resulted in irrigators leaving the network, which sometimes led to an overexploitation of aquifers. In agriculture, the price elasticity of demand is influenced by the availability of accessible underground water, crop substitution, the flexibility of irrigation systems and the added value of irrigated crops. On the other hand, because it is so indispensable, drinking water demand is relatively insensitive to the price for low levels of consumption (basic needs), while it is more sensitive for 'comfort' needs (swimming pools, garden watering).

Elasticity also depends on the **price level** of water and the **size of the increase**. It also changes with **time**: the effect of a price rise on demand is short-lived. In France, for example, 'the large price rise towards 1971, due to inclusion of the treatment tax (30–40 per cent) resulted in a slight bend in the consumption curves that disappeared 2 or 3 years later.'

Source: Plan Bleu, Cemagref, Fiuggi Forum, 2002

The implementation and adaptation of economic measures thus implies a system of *monitoring and evaluation* based on audits and informed performance indicators that is rarely available in most countries.

Many failures of public–private partnerships in the water field result from a failure to consider social behav-

iour when implementing economic instruments and include consumers in the choice of systems. Just as in the energy sector, the acceptability of measures for WDM is fundamental and remains closely linked to the perception that users have of their utility, which can be promoted through dialogue, awareness-raising, confidence in the instruments proposed (transparency, simplicity) and in the institutions that are in charge. The decentralization of decision-making and 'crisis' periods (droughts) facilitate the acceptance of measures that would otherwise only be accepted as a result of much awareness-raising and progressiveness.

This overview of economic instruments has shown that they are still barely (albeit more commonly) used in the Mediterranean, especially in the irrigation sector, the main potential area for water savings. They could prove to be more effective for improving water management, provided they are not seen as a pre-packaged and single answer to the extreme complexity of the situations encountered. For economic instruments to work well, many conditions (discussed above) have to be met, including, most importantly, the definition of a clear objective, a coherent framework, and an indispensable combination with other instruments (regulatory, awareness-raising, etc.).

Consolidating Mediterranean cooperation

A *firm priority for 15 years*

I*nternational cooperation* is also being reoriented more and more clearly towards the objective of integrated water management. The many international conventions and conferences on water (from the Dublin Conference to the Kyoto Forum 30 years later) have gradually redirected the priority objectives of cooperation towards the promotion of integrated water management and access for everyone to adequate drinking water and sanitation services. In Johannesburg in 2002, the priority objectives of the millennium were to:

- implement plans for water efficiency and integrated management between now and 2005;
- reduce by half the number of people with no access to drinking water or sewage systems, between now and 2015;
- achieve better integration of sustainable agriculture and better consumption and production patterns.

But the fact that nearly a thousand million human beings are still deprived of drinking water and proper treatment facilities[46] shows that these objectives are clearly not being met. The reasons for these failures have often been analysed, including (in simple terms) failures in governance and weaknesses in financial and human resources for better water management. International cooperation should help to better target these objectives and improve the effectiveness of actions by promoting synergies with the private sector and the actors of civil society.

In the field of *regional cooperation for water management*, the Mediterranean can boast of something of a head start. Long-standing close networks between water professionals and actors have resulted in a valuable exchange of experiences. Without returning to the systems of the Mediterranean Action Plan, which, since 1975, indirectly involve upstream soft-water management (land-based emissions into the sea,[47] and clean industrial production, promoted by the Barcelona CAR/PP), it should be remembered that the issue of water demand management has been highlighted as one of the major Mediterranean priorities since 1996. Stimulated by P*lan* B*leu*, many Mediterranean fora (Marseilles, Fréjus and Fiuggi) have enabled the exchange of experiences on WDM and developed assessments and recommendations that have been adopted by the Mediterranean Commission for Sustainable Development and the Contracting Parties to the Barcelona Convention in 1997, aimed at better integration of water demand management in national strategies and the regular monitoring of progress.[48]

Twinning between water companies,[49] and the increased number of professional *networks* and consultations (basin agencies and irrigation associations) illustrate a promising cooperation that should enable progress in WDM. These exchange networks, sometimes quite long-standing in the Mediterranean, give it a certain head start in WDM compared with other regions of the world. Evidence for this is the emergence of an organization, the Global Water Partnership (GWP-med), that brings together most of the Mediterranean networks around a shared objective of promoting integrated water resource management. However, the real range of these exchanges in the field of integrated water management remains hard to evaluate, since they often rely on individual or local involvement, even fragmented partnerships. These should be intensified and consolidated.

The E*uro-Mediterranean partnership* is also a special arena for cooperation in the water sector. In founding the partnership, the 1995 Barcelona Declaration recognizes the rational management of water resources as a priority and recommends the strengthening of regional cooperation. Several European sub-programmes include water among their priorities as a result. The integrated management of water is one of the five priorities of the Euro-Mediterranean Regional Programme for the Environment.[50] A specific Euro-Mediterranean *regional* programme for strengthening local water management capacities was adopted in Turin in 1999. With 40 million euros (for five years), it reinforces the EMWIS, a regional

information programme on know-how in the integrated water-management sector. However, although it may open up interesting possibilities, its range is nevertheless limited by its modest budget when faced with the magnitude of its ambitions, but also when faced with the very great diversity of the subjects covered and the relative complexity of its procedures. *Bilateral* programmes (about 85 per cent of the MEDA budgets) might provide an occasion for stronger stimulation for implementing national integrated water management strategies in the most willing of the partner countries.

In the context of the EU Water Initiative launched in the Johannesburg Summit, the European Commission has pursued in partnership with Greece (lead country) the Mediterranean component of the EU Water Initiative (MED EUWI). With the objective of enhancing regional cooperation in the water sector in the Mediterranean, emphasis is put on Mediterranean and south-eastern European priorities.

Official Development Assistance, a necessary new stimulus

Among the systems for funding water management, Official Development Assistance (ODA) needs to play a stronger role in factoring in the long-term issues and the vital commonality between consumers, zones and generations, and the sector's limited attractiveness for private international capital. There is no doubt that the implementation of internal national mechanisms that make it possible to cover the investment and operating costs will, in the end, be the only guarantee of sustainable water management, but without international public aid, much of the necessary investment will not be forthcoming.

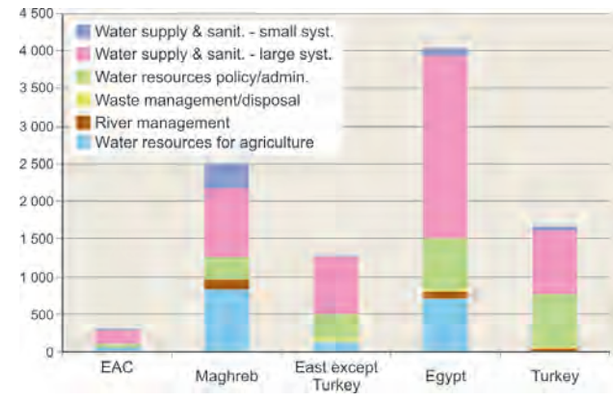
The ODA in the Mediterranean is experiencing the same serious reductions as in the rest of the world, and this also affects the water sector. Although it may be difficult to measure the flows of ODA *in the water sector of the Mediterranean* (since the region is split between the different areas of activity of international agencies), some trends can nevertheless be identified on the basis of the statistical data bank of the OECD Development Aid Committee (DAC).

Despite its importance, water[51] received less than 8 per cent of the total ODA attributed to the Mediterranean countries between 1973 and 2001, with a cumulative total over the period of about 9.8 thousand million dollars (or a yearly average of US$350 million). The funds allocated to the region in this sector underwent large fluctuations during the period, with a peak in 1996. On average, between 1990 and 1999, the region would have received about 700 million dollars per year, and aid would have halved between 1996 and 1998.

Multilateral *donors*[52] are well behind bilateral cooperation. More than 90 per cent of the cumulative aid to Mediterranean countries since 1973 comes from the following six countries: the US (US$2.7 thousand million) and Japan (US$2.3 thousand million), followed by Germany (US$2.3 thousand million), France (US$0.9 thousand million), then Italy and the UK. Funding from the Gulf Arab countries, remains to be assessed in detail, but an initial assessment shows only US$0.44 thousand million in the period 1961–2002. The EU makes a very modest contribution, mainly through its MEDA programme (a few tens of million of dollars per year[53]). On the other hand, it is very active through loans from the European Investment Bank with only the interest rebates being considered as public aid for development.[54]

Egypt is the biggest *beneficiary* of ODA for the Mediterranean countries in the water sector, followed by Turkey, Morocco, Tunisia, and more recently, the Palestinian Territories. The eastern Adriatic countries have so far received only a small amount and percentage of international aid, spread among many countries, despite post-war reconstruction efforts. Large countries such as Algeria and Syria remain the poor relations of the aid system. Flows of aid are still strongly influenced by geo-political and historical ties.

Figure 1.13 Official Development Assistance in the water sector in the Mediterranean, cumulative 1973–2001 (in million US dollars)



Source: DAC/OECD database

More than half (53 per cent) of the ODA aid received by Mediterranean countries in the water sector is still for major drinking water and treatment systems. However, the second item (21 per cent) involves support for water policy and reform of the management system, which gives hope that there will be improvements in water governance, even if three-quarters of the aid under this heading in the region focuses on three countries: Turkey, Egypt and Morocco. Next (18 per cent) comes actions for the development of irrigation water for agriculture. Aid

for small-scale drinking water and treatment systems[55] (5 per cent), essentially from Germany, goes only to Maghreb (12 per cent of the aid). Although some national funding methods may be such as to distort the analysis,[56] one can nevertheless get some measure of the scale of effort needed to reach the millennium goals, especially in Turkey and Morocco, which still have a high percentage of rural dwellers. Projects for 'resource protection', 'effluent management', 'basin management' and 'training and education' are poorly funded.

The donor countries have their sectoral priorities, but certain turnarounds are striking. Germany, for example, is disengaging from irrigation investment, as had the EIB.

ODA in the water sector in the Mediterranean, while falling, is still largely influenced by geo-political considerations, and continues to be absorbed mainly by the building of large infrastructures, with, however, a move towards support for water policies and management in a few countries.

If the states honour the commitments they made in Monterrey in 2002 to increase their development aid by 25 per cent by 2025, this could create new resources for ODA, the effectiveness of which could be reinforced by better *targeting* of integrated water management. Aid should be oriented towards tangible results in water demand efficiency matters and focus on the organizational and institutional aspects of demand management, the poor relation of national water policies. ODA would be more effective if it were seen as a 'catalyst' for reinforcing sustainable water-management policies in the SEMC, and if it were used more as start-up capital for private funding than for funding infrastructures. It seems essential to *reform the international aid system* to adapt it to the specific requirements of WDM (low investment costs compared with operational and transaction costs, dispersed activities). The mechanisms for monitoring and evaluating ODA also need to be strengthened (mandatory reporting, result indicators, monitoring implementation, etc.).

Some *priority paths* for better targeting of ODA in the Mediterranean water sector are:

- *Strategic support*: aid for establishing national strategic frameworks for sustainable water management, for example by:
  - twinning or providing technological expertise in the institutional sector; aid to decision-making; south–south exchanges (many SEMC have highly advanced experience in WDM that could benefit other SEMC), and closer relations with energy-efficiency experts;
  - the general use and publication of 'cost effectiveness' studies, comparing alternatives (improvement of management compared with exploitation of new resources);
  - support for the implementation of more lasting financial mechanisms, for example tax reforms; setting up cash flow funding for certain WDM activities that often have an immediate additional cost (for example water-saving equipment) but delayed benefits (cumulative water savings resulting from the use of such equipment);
  - the development of socio-economic and environmental indicators for planning integrated management at the various relevant levels.
- *Technology transfer*: promoting water-saving equipment, audits and aid for implementing clean-production procedures.
- *Awareness-raising and the strengthening of capacity* in the WDM sector:
  - awareness-raising of actors in Mediterranean water; training programmes and exchange fora;
  - the development of regional networks: basin agencies; sectoral networks (managers, agricultural consumers, consumer associations, water distributors, etc.);
  - the creation of support cells (legal and technological) for local authorities and administrations for specifying the terms of public–private partnership contracts, and follow-up and monitoring;
  - multi-disciplinary research to minimize consumption; the development of low-cost water-treatment technologies.

***

The Mediterranean countries are beginning to make noteworthy progress towards better water management but this is still inadequate given the outstanding issues and delays, particularly in the treatment sector. Progress in ensuring supply without increasing pressure on already degraded resources must be significantly speeded up if several SEMC are to avoid predictable crises. The economic, environmental and social challenges of such progress are considerable.

It is vital that reforms of all policies and moves to implement them (such as establishing sustainable financial systems) clearly focus on the goal of integrated water management. Understanding the vital issues and strengthening local management capacities will be just as critical as providing the financial resources. Regional cooperation, which benefits from a long tradition in the water sector in the Mediterranean, has a basic role to play in catalysing and accelerating the necessary changes.

Thus water, that precious resource in the Mediterranean, could, as a result either of necessity or proper foresight, become one of the prime drivers of sustainable development policies. The path to a complete change of

approach is clear – aim always to prevent rather than cure; take the long-term view, not the short; manage demand sustainably rather than increase supply.

Notes

1 In the Falkenmark sense, i.e. populations possessing on average under 1000m³ per year and per capita of natural, renewable fresh-water resources.
2 Run-off (surface or underground) from other, non-Mediterranean countries such as the Nile at Aswan.
3 Insufficient precipitation compared to averages.
4 Margat, 2004.
5 FAO, Global Water Partnership, *Plan Bleu*.
6 *Plan Bleu*, MEDTAC, 2000.
7 Mainly in France, for power plant cooling.
8 I.e. the number of harvests per ha and per year.
9 FAO, 2000.
10 Each according to criteria proper to the country or the evaluator.
11 605km³ per year in all Mediterranean countries (N1).
12 I.e. generally deep aquifer reservoirs fed by an annual volume of input less than 1 per cent of their reserves.
13 With technological advances, desalination is becoming less expensive: it varies depending on the technology, the degree of original salinity and, above all, the price of energy, from 0.5 to 1.8 euros per m³. (Hoffman and Zfati, 2003, p11).
14 World Bank, 2002.
15 Application of the Directive on urban wastewater treatment.
16 EEA, 2003.
17 EEA, 2003.
18 IFEN, 2002.
19 The United Nations Committee of Economic, Social and Cultural Rights, 2002.
20 Except in conflict zones; the Palestinian Territories.
21 These fairly subjective statistics provide little information about the variations in quality that can occur in a year, for example for populations connected to a network. They certainly under-estimate the populations not having access to drinking water by underestimating the number of people in many Mediterranean cities subjected to frequent water cuts (see Chapter 4).
22 IFEN, 2002.
23 In France small municipalities with limited management capacities are generally the most affected.
24 *Le Monde*, 23 April 2003.
25 IFEN, 2000.
26 Report: input from outside/(outside + inside input).
27 As shown by the very large demonstrations in 2001 in Spain while preparing the National Hydrological Plan, which brought more than 100,000 demonstrators onto the street.
28 GWP, 2000.
29 With the exception of Israel, 10%.
30 Directive 91/271/EEC (see Chapter 6 for a map of EU-Med large urban areas complying with the Directive).
31 EEA, 2003.
32 Eurostat and Table 1.2.
33 Laimé, 2003.
34 OECD, 1999.
35 Water demand is here defined as the sum of the water volumes consumed and lost during production, transport and use (water use); it in fact corresponds to water supply (water withdrawal + water production + imports/exports).
36 These figures concern the Mediterranean catchment area (NV) as defined at the beginning of the chapter. Estimated on a scale of entire countries (N1), they amounted to 70km³ per year in 2000.
37 With several possible variants.
38 25 × 54/2 = 675km³.
39 Louhichi-Flichman-Comeau, 'Amélioration de l'efficience de l'eau sur un périmètre irrigué en Tunisie'; 2000
40 There is also need for a good governance framework, i.e. a legal framework securing long-term investment, monitoring operators, anti-corruption measures, etc.
41 On the basis of an average cost of 100 euros/Equivalent habitant (EH) for upgrading and 400 euros/EH for new infrastructures. European Topic Center-IW, *Implementation of the urban waste water treatment directive in the 10 accession countries. Final draft report*, April 1999 and ADEME. Europe estimated between 3 and 10% of GDP as the cost of the necessary investments only for the upgrading of treatment infrastructures to meet the waste water directive in the ten accession countries (although their population is stable or even decreasing).
42 Camdessus, 2003.
43 Cemagref, June 2002, *The economic instruments for* WDM *in the Mediterranean*, Fiuggi Forum, SEE Chohin-Kuper et al, 2002
44 Accounting instruction MP49, which obliges municipalities to balance their water department budgets with consumers.
45 These conditions are derived from real experiences presented at the *Plan Bleu*–MCSD-GWP forum in Fiuggi in 2002.
46 Including 30 million in the Mediterranean.
47 Described in Chapter 6.
48 For the full text of the recommendations, see www.planbleu.org
49 Groupe des Eaux de Marseille and the Etablissement Public des Eaux d'Alger.
50 Short and Medium Term Environmental Action Programme for the Mediterranean (SMAP), with a total of 30 million euros for the MEDA II programme (2000–2006).
51 The Water and Agriculture section (the water and soil sub-section).
52 International Development Association, International Fund for Agricultural Development.
53 Between 1995 and 2004, there were 34 projects supported by various programmes of the MEDA, including 8 regional and 26 bilateral ones (see above for the various Euromed Partnership programmes). The total of these projects were worth 450 million euros or about 50 million euros per year.
54 All the loans granted by the EIB to the SEMCs in the water sector for the 1995–2003 period totalled 1.76 thousand million euros, or an average of 220 million euros per year, which represents about 19% of the total of the EIB loans in the region.
55 Systems using reduced-cost technologies.
56 For example, in Turkey, international aid generally reinforces the national budget and not the local projects that are usually funded by local communities' borrowing from the Provinces Bank, *Iler Bankasi*.

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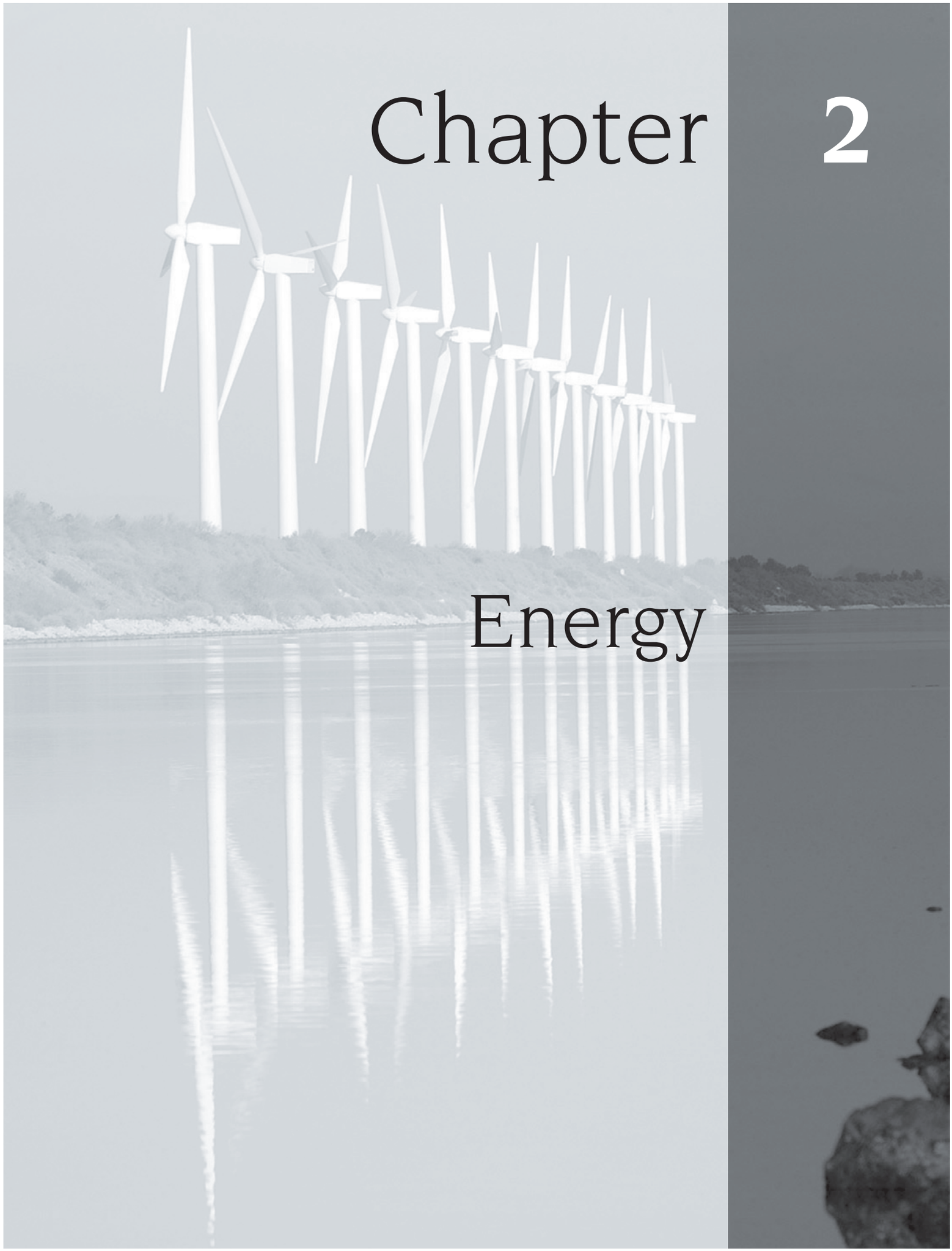


Chapter 2

Energy

Energy is at the heart of many concerns about sustainable development. It comes from natural resources (minerals, plants, the wind, the sun) and, like water, it constitutes one of the essential pillars of all human activity.

The use of energy results in short- and long-term effects on the environment and the climate (the greenhouse effect). The investments required for energy supply are so large that energy systems have a certain inertia. The long-term effects of energy choices on future generations, therefore, need to be particularly carefully considered. There are many prospective studies in this field, which raise questions about sharing responsibilities and costs between generations and people in different parts of the world.

The situation becomes more complicated when several geographical scales have to be considered: local, national, regional and global. This chapter will focus on the N1 country level since energy policies are implemented at the national level. At all scales, a growing share of energy consumed comes from trade, and impacts on the environment now have to be assessed at the global level. That is why the energy consumption of each *individual* affects the future of *all*.

The Mediterranean region is a perfect illustration of these interdependencies, and is therefore an ideal *laboratory* for changing interdependencies into complementarities that benefit everyone. Grouped around a commonly shared sea, the Mediterranean countries are unequally endowed with energy resources. Nevertheless, all of them have room for manoeuvre to improve the efficiency of their energy use and strengthen the security of their supply while contributing to more sustainable energy development.

Unsustainable energy development

The energy situation in the Mediterranean region is very diverse, with four hydrocarbon exporting countries (Algeria, Egypt, Libya and Syria); all the others are energy importers (including Tunisia, a small producer). The northern-rim countries (NMC), poorly endowed with fossil energy resources, consume two-thirds of the energy used in the Mediterranean region. Faced with a certain environmental impasse (in particular their responsibility for global warming), they are seeking to diversify their energy supply while trying to reduce the environmental impacts of their energy consumption. For the southern and eastern Mediterranean countries (SEMC), with rapid energy growth, the main challenge is to plan the future in such a way that their development patterns do not inevitably lead to the same impasse as in the northern countries and so that wasteful costs are avoided.

General growth in energy demand

Rapid growth in energy demand

Energy demand includes consumption by the users and the losses that occur between the sources and the users, which can sometimes be substantial. The demand for *primary energy* has increased rapidly in all Mediterranean countries during the past 30 years. Primary energy is that delivered by nature: the chemical energy contained in fossil fuels or biomass, the mechanical energy of wind and water, the thermal energy of subterranean water and solar radiation, and nuclear energy.

In most countries, most of the energy consumed is *primary commercial energy*. But in some very rural countries, *non-commercial energy*, directly from biomass for domestic needs, still represents a large part of energy supplies that is not included in the statistics. In Morocco, for example, this is estimated at nearly 30 per cent of overall energy consumption, about 15 per cent in Tunisia and 10 per cent in Turkey.

Demand for *primary commercial energy* in the whole Mediterranean region has more than doubled over the past three decades (an increase of 2.7 per cent per year) and in 2000 stood at 820 Mtoe (million tonnes of oil equivalent). The NMC, with an average annual increase of 1.9 per cent per year since 1971, accounts for three-quarters of the total, but the SEMC, with an increase of 6.1 per cent per year since 1971, accounts for a growing fraction (Figure 2.1). Details of demand by country and sub-region are given in the Statistical Annex. These figures match the highest values of the various scenarios considered by the *Plan Bleu* in 1989.

The Observatoire Méditerranéen de l'Energie (Mediterranean Energy Observatory, OME) has developed a *baseline scenario* for the whole Mediterranean basin up to 2025. This scenario, based on the main orientations defined in energy strategies (of both the Mediterranean countries and the major companies operating in the region) enables country-by-country projections of primary commercial energy demand and the contributions of the different energy sources (see the Statistical Annex). The driving force of energy growth in this scenario remains population and economic growth. Energy policies are dominated by the expectation of considerable increases in energy demand. The scenario assumes that there will be no significant shift towards priority being given to energy restraint, but that the current trends in technological progress will continue (a reduction of about 0.9 per cent per year in energy intensity[1]).

According to these projections, *total demand for primary energy* in the whole Mediterranean Basin could reach 1365Mtoe in 2025. Compared with 2000, this would be an increase of 65 per cent over the period (544Mtoe), or 2.1 per cent on average per year, compared with an average annual GDP growth of 2.7 per cent per year. This scenario

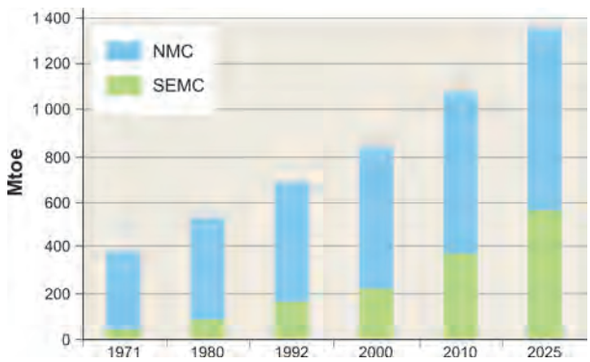
is in line with a global reference scenario drawn up by the International Energy Agency (IEA) for 2020,[2] which projects an average annual increase in the world's primary energy demand of 2 per cent between 1997 and 2020.

It is projected that energy demand in the SEMC will increase at four times the rate in the NMC between 2000 and 2025, an increase of 340Mtoe, or 3.8 per cent per year, compared with 205Mtoe, or 1.2 per cent per year in the NMC. This growth will be the result of economic development in the SEMC and from the needs of an increasing population (16 million Mediterranean people still do not have access to electricity). By 2025, Turkey is projected to become the second largest consumer of energy in the Mediterranean (Figure 2.1). The relative share of the SEMC in total energy consumption in the Mediterranean will increase from 10 per cent in 1970 to 40 per cent by 2025.

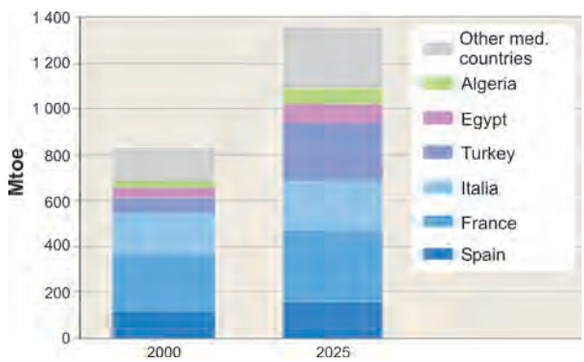
These growth rates are equivalent to a doubling of total Mediterranean demand during the next 30 years and a tripling in the SEMC.

Figure 2.1 Primary energy demand, baseline scenario to 2025

Trends and projections



The six main energy consumers in the Mediterranean



Source: OME, 2002

Given the demographic changes that have occurred, total energy demand *per capita* in the Mediterranean countries has increased continuously, but at the slower rate of 1.2 per cent per year since 1970, to reach an average of about 1930koe (kg of oil equivalent) per capita. In 2000, consumption of primary commercial energy per capita in the NMC was about 3100koe per year, half that in the US[3] but three times that in the SEMC. In terms of per capita energy consumption in the Mediterranean, the highest consuming country (France with more than 4000koe per capita) consumes over ten times more than the lowest (Morocco with less than 400koe per capita). By 2025, primary energy consumption could exceed 4000koe per capita in the NMC and 1700koe per capita in the SEMC.

Spectacular growth in electricity demand

Electricity production is the largest use of primary commercial energy (34 per cent of the total on average, possibly reaching 40 per cent by 2025). Electricity is the energy form that has seen the largest growth over the past few years with developments in the industrial sector (for example new processes and automation) and improvements in living standards in the residential sector (for example appliances and air-conditioning).

Total electricity demand in the Mediterranean countries has more than tripled over the past three decades and by 2000 stood at nearly 1500 terawatt hours (TWh). The average annual growth rate (AAGR) between 1971 and 2000 was 4.5 per cent, well above that of primary energy consumption and even that of GDP. In the baseline scenario, developed by *Plan Bleu* from OME studies, rapid growth in electricity consumption is projected to continue and may reach 2770TWh by 2025 (an increase of 2.5 per cent per year), with a possible tripling of electricity consumption in the SEMC by 2025.

Total electricity consumption (including all economic and domestic activities) per capita has increased since 1971 at a rate of 3.1 per cent per year and has now reached an average of nearly 3500kWh per capita per year in the Mediterranean. In 2000, northern-rim countries consumed an average of 6000kWh per capita, or about four times more than in the south and east. The largest consumer (France with 9000kWh per capita) uses nearly 20 times as much electricity per capita as the smallest (Morocco with 500kWh per capita). In the baseline scenario, per capita consumption in all countries will increase significantly and reach an average by 2025 of more than 8500kWh per capita in the NMC, but only 3400kWh per capita in the SEMC.

The importance of the transport and residential sectors

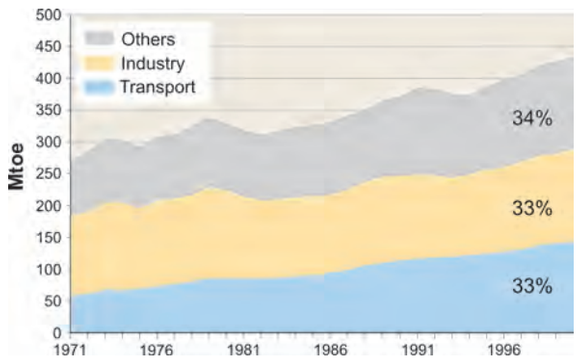
In the NMC, the *share of transport* in final energy consumption[4] has grown significantly and now stands at 32

per cent of the total, compared with only 21 per cent in 1971 (Figure 2.2). Growth in traffic and mobility has been well above economic growth (see Chapter 3) and has not been compensated by technological improvements. Car manufacturers have made much technological progress (lower consumption for a given power, lower pollutant emission per car), but the size of the fleet has increased even more rapidly, increasing the total consumption by the sector in a way that seems to be out of control.

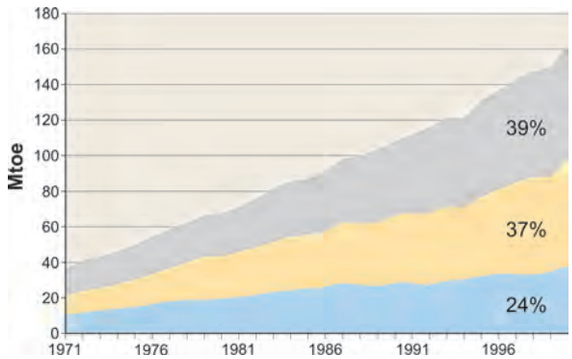
In the SEMC, transport-related energy consumption is increasing at an average of 4 per cent per year and this could accelerate with reductions in trade restrictions, the growth of the automobile fleet and urban sprawl (see Chapters 3 and 4). However, the most spectacular growth in final energy consumption in the SEMC has been in the *residential* sector (an increase of more than 5 per cent per year between 1974 and 1999). Because of population growth, smaller families, very rapid urbanization and the spread of new lifestyles, the residential and service sectors have become the leading energy consumers (approaching 40 per cent).

Figure 2.2 Final consumption per sector, 1971–2000 (% in 2000)

NMC



SEMC



Source: IEA, 2001c and OECD

The dominance of hydrocarbons and the breakthrough of natural gas

To appreciate the possible impacts of such growth in primary energy demand, the possible evolution of the energy supply structure needs to be analysed (Figure 2.3). In 2000, fossil fuels (oil, coal and gas) dominated energy supply in the Mediterranean: more than 75 per cent of consumption in the north and 96 per cent in the south and east, the rest being mainly nuclear and hydroelectric. During the past few decades, it appears that the share of coal has remained constant, that of nuclear has stabilized and that of *natural gas* has increased rapidly at the expense of oil. This is projected to continue over the coming years, confirming the predominance of fossil fuels, which will still meet 87 per cent of energy needs in 2025 with oil still representing 40 per cent of the total. Renewable energy remains marginal, especially as far as primary *commercial* energy is concerned.

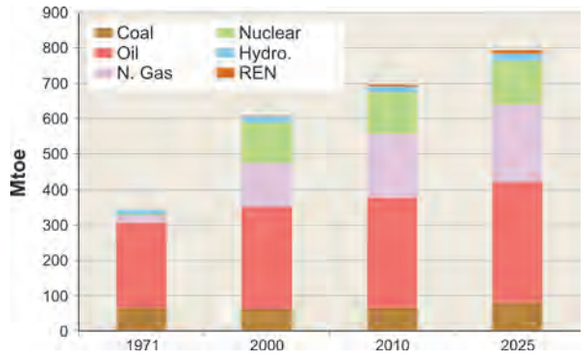
Since more than a third of primary commercial energy is used to produce electricity, the diversity of the supply facilities in the Mediterranean countries reflects the diversity of their power production systems (Figure 2.4). The choice of fuel types depends on the country's resources: gas in Algeria and Egypt, and coal in Greece, Turkey and in the eastern Adriatic countries. Nuclear energy plays a substantial role in France, important in Spain and Slovenia. Hydroelectric power is only significant in the eastern shore countries (Syria and Turkey) and in the eastern Adriatic countries (Albania, Bosnia-Herzegovina, Croatia and Slovenia, Serbia-Montenegro). The NMC intend to build coal and natural gas-burning power plants (except in France where the nuclear option is being maintained). In the SEMC, natural gas plants are expected to predominate; only Turkey, Israel and Morocco plan more coal-burning plants.

According to the baseline scenario, based on national forecasts, electricity production in 2025 could require 75 million tonnes more coal and 160Gm^3 (thousand million m^3) more natural gas than in 2000, a significant increase in primary energy consumption for all Mediterranean countries.There is as yet no co-generation of 'electricity and heat', but this might be developed, in particular to produce desalinated water in the coastal areas of water-poor countries (from Algeria to Israel) and some islands.

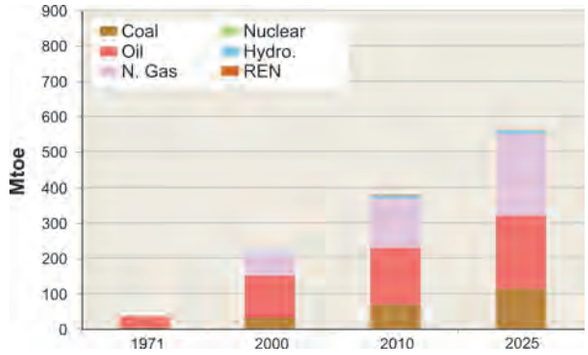
In 2000 *oil* was the primary energy source, meeting half of primary energy demand both in the north and the south. Consumption increased by 40 per cent between 1971 and 2000, although its share of energy consumption fell from 70 per cent to 28 per cent following the oil crisis. Although in the Mediterranean, as in the rest of the world, oil continues to dominate the energy market, it is increasingly used exclusively for purposes where

Figure 2.3 Primary energy demands by source, baseline scenario, 1971–2025

NMC



SEMC

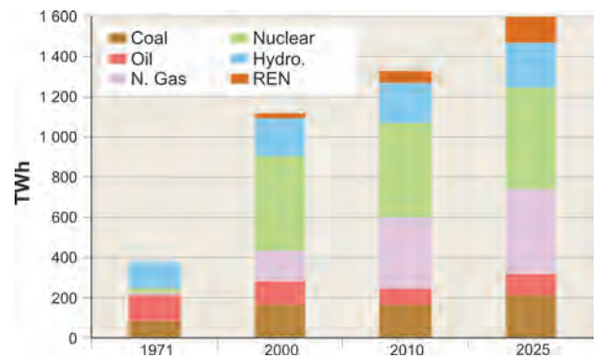


Source: OME, 2002

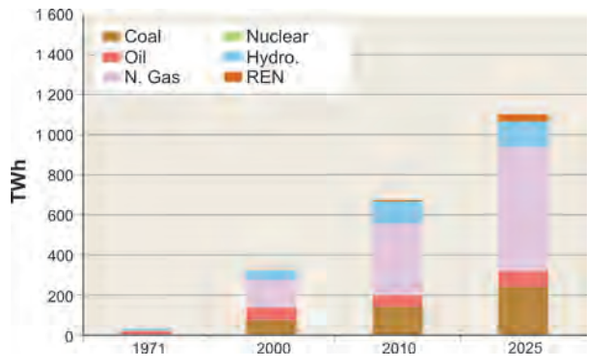
Note: REN – geothermal, wind and solar energy

Figure 2.4 Electricity production by source, baseline scenario, 1971–2025

NMC



SEMC



Source: OME, 2002

there are no alternatives (such as transportation fuel, lubricants); since the 1970s it has been used as a source of heat only to meet shortfalls in global energy needs (as seen, for example, in Italy). In future this stop-gap role may be reduced as a result of increasing competition from natural gas. To sum up, oil is projected to remain the main energy source for the Mediterranean, but its share in overall supply is projected to continue to fall, from 48 per cent in 2000 to 40 per cent by 2025.

This *relative* reduction in the share of oil is explained mainly by competition from gas in the residential and tertiary markets and even more for electricity generation. Oil demand will probably increase in *absolute* terms, from 409Mt in 2000 to 550Mt by 2025. This growth (2.3 per cent per year) is related to that of transport (petrol and diesel) and mainly concerns the SEMC.

N*atural gas* has seen the largest and steadiest increase over the past three decades, contributing to a diversity of supply (particularly if nuclear energy is excluded, the rapid growth of which is due to the massive development of the French nuclear programme during the 1970s). The share of gas in the energy balance, insignificant in 1971, reached 21 per cent in 2000 in all Mediterranean countries and 27 per cent in the SEMC.

Because its transport requires large investment, natural gas was first developed in the countries that had large reserves (Algeria and Italy). The most abundant source of energy in the region and among the least polluting, gas is rapidly overtaking other sources and is projected to meet most of the increase in demand between now and 2010–2025 (see Figure 2.10 p122). The preferred fuel for new electricity power plants in both the

north and south, gas is projected to penetrate the residential and tertiary markets of the SEMC. This will be facilitated by the increasing concentration of populations in towns and along coasts. For the whole of the Mediterranean, natural gas consumption is projected to increase rapidly between 2000 and 2025, from 176Mtoe to 445Mtoe (an increase in absolute terms of more than 3.7 per cent per year). Electricity companies will be the main purchasers, with their consumption increasing more than 3.5 times by 2025, by 260Mtoe. The largest gas-consuming countries will be Italy at 92Mtoe by 2025, followed by Turkey (75Mtoe), France (61Mtoe), Algeria (47Mtoe), Egypt and Spain at 43Mtoe. The share of gas in the Mediterranean energy balance is projected to increase from 21 per cent in 2000 to 33 per cent by 2025 (and its share in electricity production from 20 per cent in 2000 to 38 per cent by 2025).

The share of *coal* in energy supply has remained stable (at 10–15 per cent) although, in absolute terms, its total consumption has increased sharply, especially in the SEMC (by 6.5 per cent per year). The largest amount (two-thirds of the total) is consumed by the northern-rim countries. It is used in electricity power plants (Greece, the eastern Adriatic countries and Spain where 30 per cent of electricity is supplied by coal) and the metal-working industries. In the northern countries, coal consumption is projected either to remain stable or even to decrease under pressure from greenhouse gas-related agreements. The remaining third is used in the SEMC and more particularly in the countries without hydrocarbon resources such as Turkey, Israel and Morocco. These countries are planning new coal-burning power plants and their total consumption could double by 2025.

Present projections still show strong continued use of coal at the regional level, related to concerns about diversifying energy supply and cost considerations. Its share is projected to remain at around 14 per cent of the overall total despite the increase in the use of natural gas, with consumption doubling from 103Mtoe in 2000 to 190Mtoe by 2025, mainly because of increased use in Turkey (by 72Mtoe between 2000 and 2025).

Although nearly all southern and eastern-rim countries have *nuclear* research installations of varying sizes, the use of nuclear energy remains concentrated in the north, with a total installed capacity of 72GW. This nuclear power plant capacity is all in France (63.2GW, representing 78 per cent of the electricity produced), Spain (7.6GW or 28 per cent) and Slovenia (0.7GW or 40 per cent). France, in its long-term multi-year planning, is intending to keep its nuclear options open, with a recent decision to build a new EPR-type plant, which includes some technical improvements but is still based on pressurized water reactors.

In the baseline scenario, the share of nuclear power in meeting energy demand in the countries investigated is projected to fall from 15 to 9 per cent between 2000 and 2025, stabilizing at around 126Mtoe. Over the time period examined (to 2025), it is difficult to envisage a significant resumption in the construction of nuclear power plants in the northern countries as long as the major problem of treating nuclear waste is not resolved. In Europe, Finland is building a new EPR-type reactor, but Germany is committed to abandoning nuclear power, and Italy has shut down its four production units. Between now and 2025, the SEMC will probably stay away from this energy source. For the moment, Turkey has abandoned its project of building a nuclear plant. In the longer term, the use of nuclear power in some of these countries, using improved designs, cannot, of course, be ruled out.

Renewable energy (REs) sources considered here include hydro (small and large) and the other renewable energies (REn: geothermal, wind, solar; biomass and waste are excluded because of a lack of available statistics). Renewables contribute about 3 per cent of commercial energy supply in the Mediterranean countries (but more, at least 6.6 per cent of the total, if biomass, which is often not marketed, is included). Most of the electricity produced from renewable sources is from hydropower. There is a reawakening of interest in renewable energy sources, which have increased significantly (by 3.6 per cent per year on average between 1992 and 2000 in the Mediterranean region) and the costs of which are falling very rapidly. Renewable energy may well play an increased role up to 2025, especially in the NMC, because of momentum in Europe. The baseline scenario therefore projects an increase of 5.8 per cent per year in the use of these energy sources. In absolute terms, this corresponds to a quadrupling between now and 2025. But, because of the growth in total demand, the share of renewable energy sources (excluding biomass) in total primary energy in 2025 is projected to be less than 4 per cent. If biomass is included, this figure may increase to more than 10 per cent.

To sum up, the baseline scenario, which envisages a continuation of 'traditional' national and international strategies, projects a very large increase in primary commercial energy and electricity demands in the Mediterranean in 2025 (2 per cent per year), concentrated in the SEMC (4 per cent per year). Of these demands, 87 per cent is projected to be met by fossil fuel sources with a growing share being taken by natural gas without, however, allowing the use of oil and coal to be reduced. By 2025[5] renewable energies are projected to provide no more than 4 per cent of energy supply.

What are the possible impacts of such a scenario in terms of sustainable development up to 2025?

Increasing risks

The very strong growth in demand projected in the baseline scenario suggests the need to consider two main kinds of risks for the achievement of sustainable development that may lead to a reorientation of current energy choices:

- the first, which is of a geo-political and socio-economic nature, concerns the growing insecurity of energy developments in the Mediterranean countries, linked to the problem of access to energy by present and future generations;
- the second is linked to the predictable worsening of impacts on the environment and human health.

The increased vulnerability of energy developments

The strong growth in energy demand naturally leads to questions about the ability of Mediterranean countries to ensure their supplies and about the increase in their energy dependence. The situation in this regard is clearly different for the oil-producing countries.

Oil producers, transition to the post-oil period

The five oil-producing Mediterranean countries (Algeria, Egypt, Libya, Syria and Tunisia) are in a special situation. In these countries, which represent 6 per cent of the world's oil production and nearly 5 per cent of the world's gas production, the risk of very rapid energy development must be analysed from two points of view: (i) the eventual exhaustion of their fossil reserves; and (ii) the funding of planned ambitious extensions to energy production capacity on which a large part of their economies depend.

The risk of hydrocarbon *reserves* being exhausted needs to be analysed with much care, since the Mediterranean is one of the regions of the world where there has been relatively little prospecting. Every new exploratory campaign and new technology has resulted in an increase in the proven reserves in Algeria (oil and gas), Libya (oil) and Egypt (gas). Twenty years of prospecting have doubled the known gas reserves in the region.

At the present rate of exploitation (about 200Mt per year), and in the absence of major discoveries, *oil* is likely to have the shortest exploitation period of the known reserves: approximately 30 years. With the exception of Libya, these reserves would be exhausted by 2025, a possibility that weighs heavily on the prospects for economic development in the mid-term. Egypt may become a net importer of oil (but an exporter of gas) well before this date, as Tunisia has already done. On the other hand, the known and probable reserves of *natural gas* appear to be much larger in volume than the oil reserves and should last beyond the end of the 21st century given the present rate of exploitation of the major known fields, which are concentrated predominantly in Algeria, Egypt and Libya.

Given the strong growth in domestic energy demands, these countries will need to ensure a large growth in production capacity if they are to export a total of about 170Mt per year of oil and 100 to 170Gm^3 per year of natural gas by 2025 (Figure 2.5). The challenge for these countries is therefore to attract and secure the necessary investments for expanding their production capacities in the oil and gas sectors. Because of the inertia of energy systems, there is also a need to get ready for the 'post-oil' period and the transition of oil-income economies to more diversified economies over the coming decades. Furthermore, the importance of the income from energy exports makes these countries especially vulnerable to the volatility of hydrocarbon prices. Hydrocarbons in Algeria, Libya and Egypt are a major source of income (98 per cent of export income and 32 per cent of GDP in Algeria, and 95 per cent of Libya's export income) and that income fluctuates with the global market.

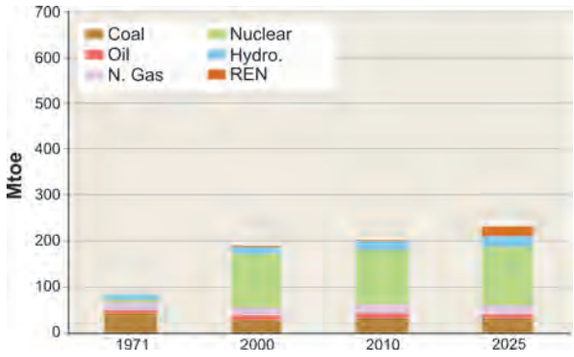
Energy dependence is increasing

The Mediterranean producer countries are in danger of seeing their export capacity reduced by growth in internal demand, and the other Mediterranean countries face a growing *energy deficit* (increasing by 1–2 per cent per year between 2000 and 2025). Indeed, the planned increase in national primary energy production (nuclear in France, coal in Turkey[6] and renewable energies) will not be enough to meet the growing demand. The Mediterranean basin as a whole may thus see a doubling of its hydrocarbon imports (oil and, in particular, gas into the NMC), increasing from 290Mtoe in 2000 to 530Mtoe in 2025.

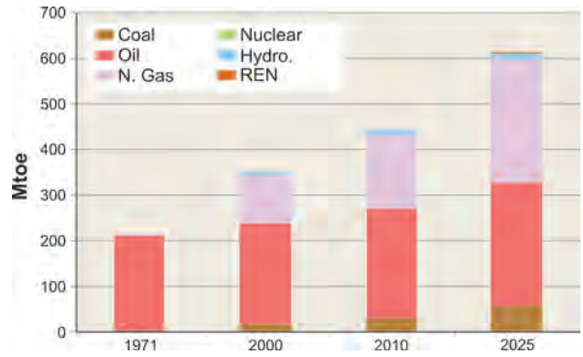
Despite some diversification of supply resulting from the increased use of gas (Figure 2.3), the energy dependence of most Mediterranean countries is projected to increase, with imported fossil fuels still having the dominant share of the total (87 per cent in 2025). This growing energy dependence can be illustrated by a *dependency index*, defined as the ratio '(Demand – Production)/Demand' for primary energy, expressed as a percentage. The index is increasing in most countries. In the NMC it is projected to increase from 68 per cent in 2000 to 71 per cent by 2025. Dependence on oil in the NMC is likely to remain stable (at 97 per cent), but is projected to increase for gas. It is projected to increase slightly in the SEMC,[7] so that the average dependency index of all Mediterranean countries will have doubled between 1970 and 2025, from 21 to 38 per cent. The most dependent countries are the smallest (various islands, Israel, the Palestinian Territories and Lebanon) but also Morocco, Italy, Spain, Tunisia, Greece and above all Turkey, where the index may go from 35 per cent in 1971 to 70 per cent in 2025.

Figure 2.5 Primary energy production by NMC and SEMC source, baseline scenario

NMC: little increase in production



SEMC: increase concentrated in four countries: Algeria, Egypt, Syria, Libya

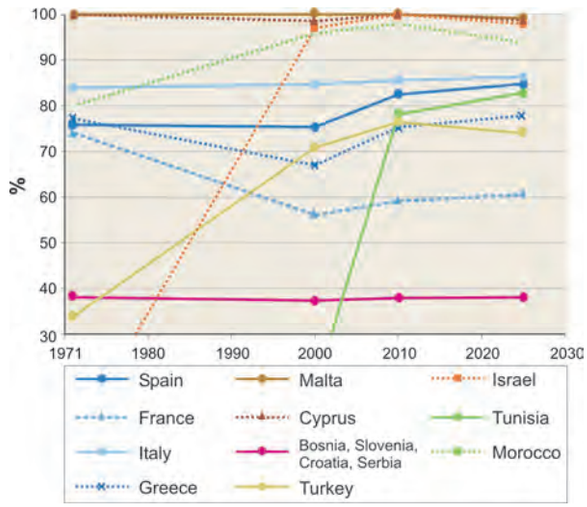


Source: OME, 2002

Note: REN – geothermal, wind and solar energy

A brief overview of the world's energy outlook (Box 2.1) provides a better indication of the vulnerability that can result from such dependence and enables a better analysis of the possible ways in which growing Mediterranean import needs may be met. It shows that, essentially for geo-political reasons, with the increasing concentration of the world's oil reserves, supplies of hydrocarbons on the world market are likely to become more and more expensive and risky (with price volatility persisting).

Figure 2.6 Growing energy-dependence index of a number of Mediterranean countries



Source: Plan Bleu, OME, 2002

Note: The dependence index is defined as (Demand – Production)/ Demand for primary energy ratio.

Box 2.1 The risks to the worldwide supply of hydrocarbons

Many forecasts of world energy supply try to be reassuring about the global availability of energy resources. The reserves are generally physically sufficient to cover the growing worldwide demand, particularly up to 2025. Indeed the known world reserves are estimated to be good for about 40 to 50 years of production for oil, 60 to 100 years for gas and more than 200 years for coal and uranium, time scales well beyond the time scale of this report. Moreover, these reserves are certainly widely underestimated, since knowledge of fossil resources is still partial, and the role of non-conventional oil may be considerable.

The main risks cited by energy experts for the development of worldwide supplies of hydrocarbons therefore result less from exhaustion of reserves than from geo-political factors. The progressive substitution of oil by gas and the increase in the world's production capacity requires a level and phasing of investment (in production and transport infrastructures) that is much higher and longer than for oil and requires long-range planning. With the growing geographic concentration of oil reserves, the geo-strategic importance of the Middle East is expected become even greater (the five major oil producers: Saudi Arabia, the United Arab Emirates, Iraq, Iran and Kuwait will probably produce more than 50 per cent of the world's oil by 2050 and play a growing role in the world's exports of gas). If the situation in the major producing countries does not improve, the capital invested in energy production by the world's oil and gas operators could prove to be insufficient to meet world demand, which could eventually lead to considerable tension in world energy markets, even as early as 2025. Even in the mid-term, therefore, the risk of a disruption in hydrocarbon supplies cannot be excluded. This is bound to affect the price of energy (risk coverage).

Few forecasters venture to make very long-term predictions on fuel *prices*, which govern energy bills, or the development of alternative energies. The price of oil plays a crucial role in energy markets and is characterized by large fluctuations related to the volatility of financial markets. In such a context the largest uncertainty is on supply, which depends on geo-political balances and the future level of investment in production. The few studies available predict a moderate *rise* in oil prices, linked less to the exhaustion of reserves than to the economic, political and environmental limitations of its exploitation and on continuing high price volatility. A 2001 reference scenario from the IEA[8] starts at $20 a barrel in 2000 rising to $21 in 2010 and $28 in 2020. The price of gas is still closely linked to the price of oil, although it may gradually free itself from oil. However, the increasing distances between production and consumption areas may lead to a price increase. The question is whether this will be compensated for by technological progress in the industry or a liberalization of the energy sector. Some experts forecast an increase in the price of natural gas of nearly 20 per cent by 2010,[9] but here too there remains much doubt.

Ever more expensive access to energy?

In the context of increasing prices and volatility, the massive growth in energy imports may well increase the costs of fuel for Mediterranean countries and households.

The economic impacts on the NMC may remain fairly mild, since the increase in their demand is moderate. These countries have diversified their supplies, gradually excluding oil from electricity production and they have undergone structural changes in their economies that reduce their dependence on erratic variations in the price of a barrel of oil. The cost of energy now represents only a small and decreasing share of GDP (2 per cent on a worldwide scale).

On the other hand, because of their growing trade deficits and possible inflation, the SEMC could face serious problems in balancing their macro-economic budgets. The combination of increasingly volatile prices and uncertainties about funding the investment needed for basic energy infrastructures could result in a larger energy bill and greater difficulty in providing essential energy services for a growing proportion of the population. In Morocco, for example, the cost of energy in 2002 was US$1.5 thousand million dollars (or about 4 per cent of GDP). A 20 per cent increase in oil consumption in a year would lead to a considerable increase in this cost, about eight times the annual average ODA received by Morocco in the energy sector.

It should be noted that rural electrification infrastructures in some countries are still inadequate, which calls for considerable investment. Access to modern forms of energy in many rural areas remains one of the essential requirements for improving living conditions (lighting, telecommunications, refrigeration and basic health services) and is an important factor in reducing poverty, raising educational levels, limiting rural–urban migration and a vital driving force for economic activity. In 2000, nearly 16 million people in the SEMC did not have access to electricity,[10] mainly in Syria, Egypt and Morocco (see Chapter 5). Since then, important efforts have been carried out, mainly in Syria, for serving 99 per cent of the population.[11]

With the ending of the welfare state, recovery of the costs of investment may affect the final price of energy, and thus consumers' budgets, with not insignificant social impacts. Although price increases would hit the SEMC harder, they are also of concern in the northern-rim countries where steep rises in petrol prices can sometimes result in social conflict. In this context, looking for ways to reduce the costs of energy supply seems to be one major challenge for sustainable development that concerns all countries, especially the SEMC.

Consequences for the environment and the increase in risks

In addition to the geo-political and socio-economic criteria already discussed, environmental criteria are playing an increasingly important role in national energy choices. Awareness of the global effects of their energy choices involve countries in international conventions such as the Climate Change Convention and the Kyoto Protocol, which are having a growing influence on national strategies. This Protocol commits the industrialized countries (Annex I countries – in the Mediterranean, the four EU-Med countries and Monaco, Croatia and Slovenia) to limit their greenhouse gas emissions (GHG) by 2012, but does not commit the SEMC.

Without going into all the possible risks and impacts on the environment of the various energy options (Table 2.1), it should be remembered that 'traditional' fuels consumed for energy (firewood, charcoal), for which the statistics are poor, can have considerable environmental impacts (Chapter 5). In Morocco, for example, firewood consumption in rural areas is blamed for the over-exploitation of forests, which contributes to the loss of about 30,000 ha of forest per year and thereby to desertification and soil erosion.[12] The impacts, in the baseline scenario, may get worse, especially if access to commercial fuels becomes more expensive and more sustainable management of woodland resources is not implemented.

The environmental impacts of the increase in maritime transport of hydrocarbons, with the increase in world trade in energy in and through the Mediterranean, are also considerable and are analysed in Chapter 3.

In this chapter, two especially sensitive aspects of the baseline scenario that concern urban areas and Mediterranean coastal regions will be analysed in more

Table 2.1 Risks and effects on the environment related to energy consumption and production

Energy consumption	
Air	Emissions of CO_2, CO, SO_2, NO_x, COV, dust, heavy metals, PAH (combustion) The release of CFC and fluorinated gas (air-conditioning and refrigeration systems)
Waste	Ash, oils, sludge (combustion engines)
Risks	Fires, explosions, electrocutions, intoxications
Energy production and transport	
Air	Emissions of SO_2, NO_x, CO, COV (coal extraction) Emissions of organic compounds, dusts and CH_4 (oil and gas extraction, oil refining, gas storage and distribution) Emissions of COV (storage, transport and distribution of oil products, especially fuels)
Water	Effluents that can contaminate river water (electric power plants, coal mines, refineries) Thermal pollution that can alter the ecosystem of a river (the cooling of traditional and nuclear thermal power stations) Change in the regimen of rivers (hydraulic equipment) Fuel dumping at sea (freighters) Fertilizer and pesticide irrigation and pollution (biofuels)
Accidental risks Nuclear accident risks (electro-nuclear power station, reprocessing plant, transport of nuclear materials)	Fires (oil-drilling platforms, storage or refining sites, hydrocarbon transport networks) Oil spills (freighter break-up) Explosions, land collapse, landslides (coal mines) Breaks (hydroelectric dams)
Risks of vandalism and terrorism	Attacks on production tools, transport or storage (nuclear power stations, repository sites for nuclear materials, a methane terminal, hydroelectric dams, and so forth) Misappropriation of dangerous materials
Waste	Coal mining waste Radioactive waste (nuclear) Residue (refining)
Footprint on the area and nature	The destruction or modification of ecosystems (hydraulic, wind, solar) In particular destruction of coastlines for production (land takeover of production and supply infrastructures by fuel-burning power plants and coal harbours) Fragmentation or alteration of landscape (pipelines, gas pipelines, high-tension wires)
Chemical substances and radioactive matter	Liquid radioactive emissions (nuclear plants, spent fuel reprocessing plants) Toxic substances contained in unburned solids (ash) or dust from burning fuel
Noise	Thermal installations (particularly engines)
Soil	Contamination (coal or uranium extraction sites, former gas factories) Abandoned industrial sites

Source: based on IFEN, 2002 p401

detail: emissions of polluting gases and the impacts of infrastructures.

The increase in gas emissions

Fossil fuels dominate Mediterranean energy provision. Any burning of fossil fuels produces large quantities of *atmospheric pollutants*, in particular nitrogen oxides and sulphur dioxide, which are responsible *locally* for the degradation of air quality and *globally* for acid rain.

Before discussing long-term global impacts, it is important to remember that the burning of fossil fuels is responsible for degradation of air quality in large cities

and around industrial areas. The effects of this pollution on human health are beginning to be evident in epidemiological studies that demonstrate higher mortality and many respiratory diseases (see Chapters 3 and 4).

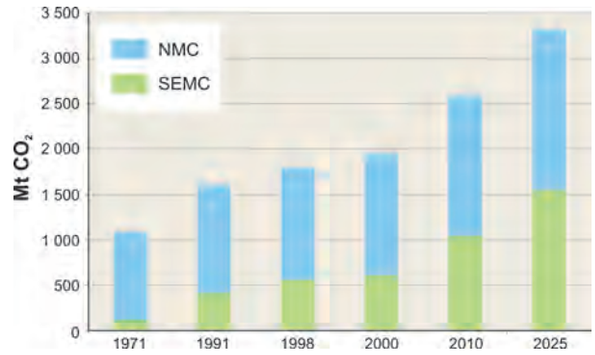
Such atmospheric pollution can be carried over smaller or larger distances and alter the chemical composition of the atmosphere. A recent study[13] has found very high pollution levels over the Mediterranean Sea, mostly from Europe but also from North America and even Asia; the presence of aerosols (in particular particulates of sulphur soot) in the troposphere over the Mediterranean could be the cause of a reduction in evaporation and in the amount of rain in the Middle East and North Africa. Concentrations of ozone higher than European standards have also been recorded, with possible impacts on human health, ecosystems and agricultural production.

Still more generally, the energy sector is a major contributor to the *greenhouse effect* and to global climate change. The OECD estimates that more than half of greenhouse gas emissions (GHG), most importantly CO_2[14] originate from the use of energy. CO_2 emissions from energy use will therefore be used as the main indicator of the possible effects of gaseous emissions in the baseline scenario. The emission level depends on the fuel used and its conversion efficiency. Natural gas, composed mostly of methane (CH_4), is considered to be the 'cleanest' fossil fuel, since it emits less carbon[15] than oil or coal and enables electricity production technologies with better efficiencies (co-generation, combined cycle power plants). The CO_2 emissions related to primary energy consumption are estimated here by applying average GHG emission coefficients for the contribution of each fuel to the energy supply of each Mediterranean country (current and those projected in the baseline scenario).[16] The estimates to 2025 are given country by country in the Statistical Annex. The 1990 value is particularly important since it acts as the reference level for the Kyoto protocol commitments.

According to these estimates, total emissions from Mediterranean countries from energy use have increased steadily and amounted to 1900 million tonnes of CO_2[17] in 2000 (Figure 2.7). They represent more than 7 per cent of total worldwide emissions and this may reach 9 per cent by 2025, in the baseline scenario. The transport sector is one of the main contributors (between a quarter and a half depending on the country).

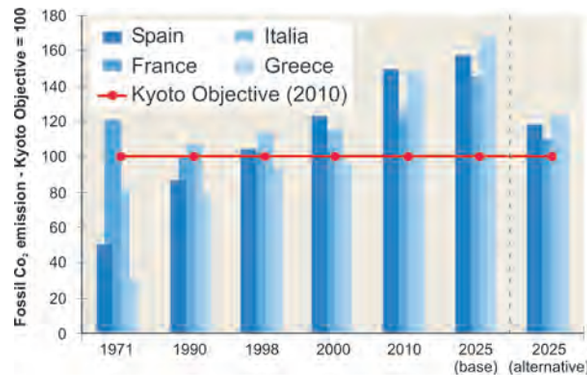
In 2000 the NMC accounted for 70 per cent of total energy-related CO_2 emissions in the Mediterranean, with an average increase of 1 per cent per year between 1971 and 2000. Given the current projections for the energy sector, the four EU-Med countries (the main countries officially committed to reducing their emissions through the Kyoto Protocol) may find it difficult to reach their reduction targets (Figure 2.8), especially Greece and Spain. Because of the delays in achieving their goals, these countries should agree to make greater efforts, given the short time available between now and 2008 to 2012.[18]

Figure 2.7 CO_2 emissions related to energy activities, baseline scenario, 1971–2025



Source: OME, 2002

Figure 2.8 CO_2 emissions from the energy sector in the four EU-Med countries, 1970–2025



Source: Plan Bleu and OME, 2002

Note: Baseline and alternative scenarios.

At the same time, the SEMC are experiencing spectacular growth in their emissions (6 per cent per year between 1971 and 2000), and may increase their emissions still further, by a factor of 2.5, by 2025. There will probably be a huge increase of more than 500 per cent in Turkey between 1990 and 2025.

Thus in the *baseline scenario*, the gradual replacement of oil by gas, although beneficial in terms of specific emissions, does not seem to compensate at all for the increase in emissions resulting from the overall increase in energy consumption. Although a modest contributor to the increase in the global greenhouse effect, the Mediterranean Basin may well, however, be particularly vulnerable to the possible impacts of climate change (see Part I).

Impact and risks of energy infrastructures

The production, distribution and transport of energy, all of which – particularly electricity production – are growing rapidly, also call for massive infrastructures that have impacts in terms of land use and destruction of landscapes and coastal ecosystems. Some infrastructures, such as nuclear reactors, pose problems of dismantling at the end of their useful life.

Drilling and oil and gas production installations, refineries, power stations and high-voltage electric cables all *occupy ground* areas that may appear small in comparison with other activities,[19] but pose problems of competition for highly coveted coastal areas and may contribute to the degradation of coastal ecosystems. They also have considerable impacts in terms of landscapes, *fragmentation of land* (linear enclosure by electricity cables) and increased risk of death for some bird species.

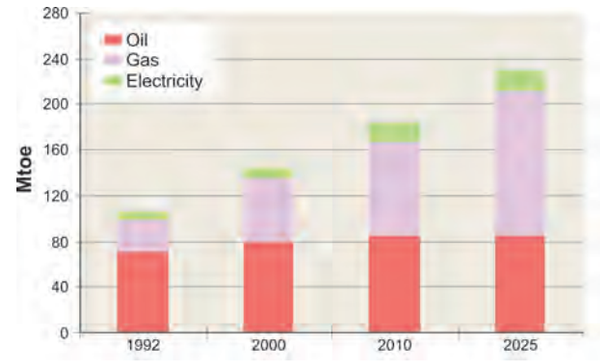
Expansion of these infrastructures also increases the risks of *accidents and pollution*. The production and transformation of hydrocarbons (refining, liquefaction and petro-chemistry) are hazardous (having led to the development of the European 'Seveso' directive), highly polluting (gaseous emissions, damage to coastlines and liquid waste), and are not adequately assessed. Some indication of the risks can be obtained by analysing the planned increase in infrastructures related to gas and electricity developments in the Mediterranean.

Gas infrastructures

To meet the forecasted doubling of intra-Mediterranean trade between now and 2025, a large number of infrastructures are projected that will have considerable impacts in terms of land use, especially on coastlines (Figures 2.9 and 2.10).

Natural gas is carried as a gas by pipelines or as a liquid at very low temperatures (LNG) by methane carriers. Liquefaction plants (at the points of production) and re-gasification terminals (at the points of arrival) are needed for LNG, as well as a fleet of methane or LNG carriers. International gas transfers should ideally be by sea because of the technical, economic and even political limitations of long-distance land routes. LNG is therefore expected to take a growing share of international gas trade, already standing at 25 per cent.

Figure 2.9 The doubling of intra-Mediterranean gas trade, 2000–2025



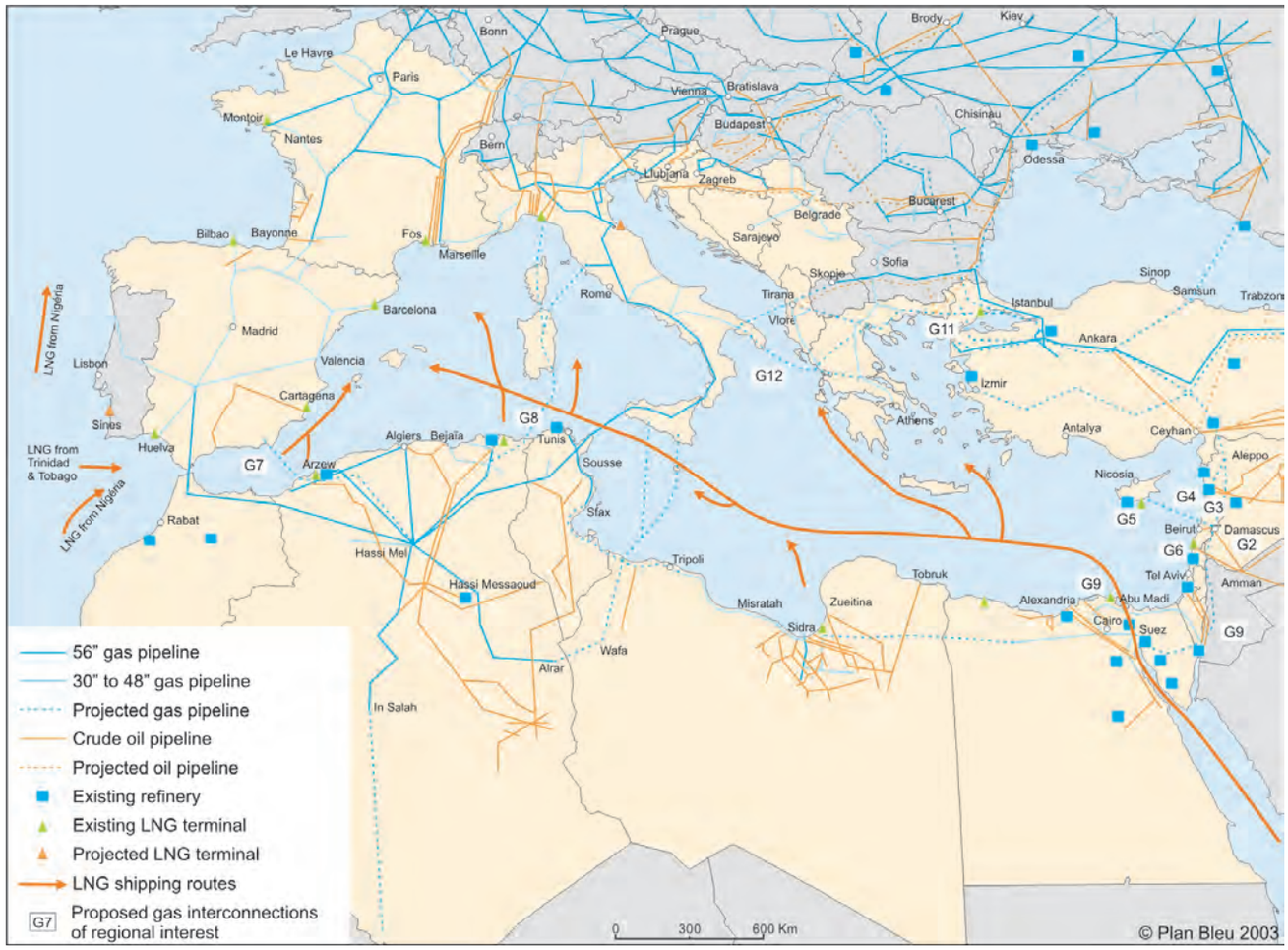
Source: OME, 2002

In general the transport of natural gas does not present pollution problems comparable with those of oil, but it does carry risks of major technological accidents, especially when the delivery points are in populated industrial areas. Permanent infrastructures are potentially very vulnerable to terrorism and vandalism. It is important to note that although accidents have so far been rare, the consequences could be serious.

Electricity infrastructures

The capacity of the electricity *generation system* has increased 2.5 times over the past 20 years in the Mediterranean Basin and installed capacity is now 350GW. Growth is projected to continue, with a further 120GW planned between 2000 and 2010, including 70GW in the SEMC, a near doubling of capacity between 2000 and 2010. This will lead to an increase in infrastructures (power plants, supply networks feeding the power plants, for example coal ports and transport, and electricity distribution). To meet the planned growth to 2025 (to 1270TWh per year in 2025), about 400 new power stations (of 500MW each) would have to be built[20] (beyond the 440 existing plants). These energy infrastructures will accentuate the *'littoralization'* or coastal overdevelopment effect, that is the process of population and activities being concentrated on the coasts. Power plants are often located on the coast, which enables them to be closer to the areas of consumption and facilitates the supply of fuel by sea and water for cooling. Many oil and natural gas fields are located near the coast (the western Egyptian desert, the eastern areas in Libya) or offshore. Inland power plants use water that is precious in arid environments and produce large amounts of waste and emissions, some of which are directly disposed of on site.

Figure 2.10 The development of gas infrastructures in the Mediterranean



Source: OME, 2002

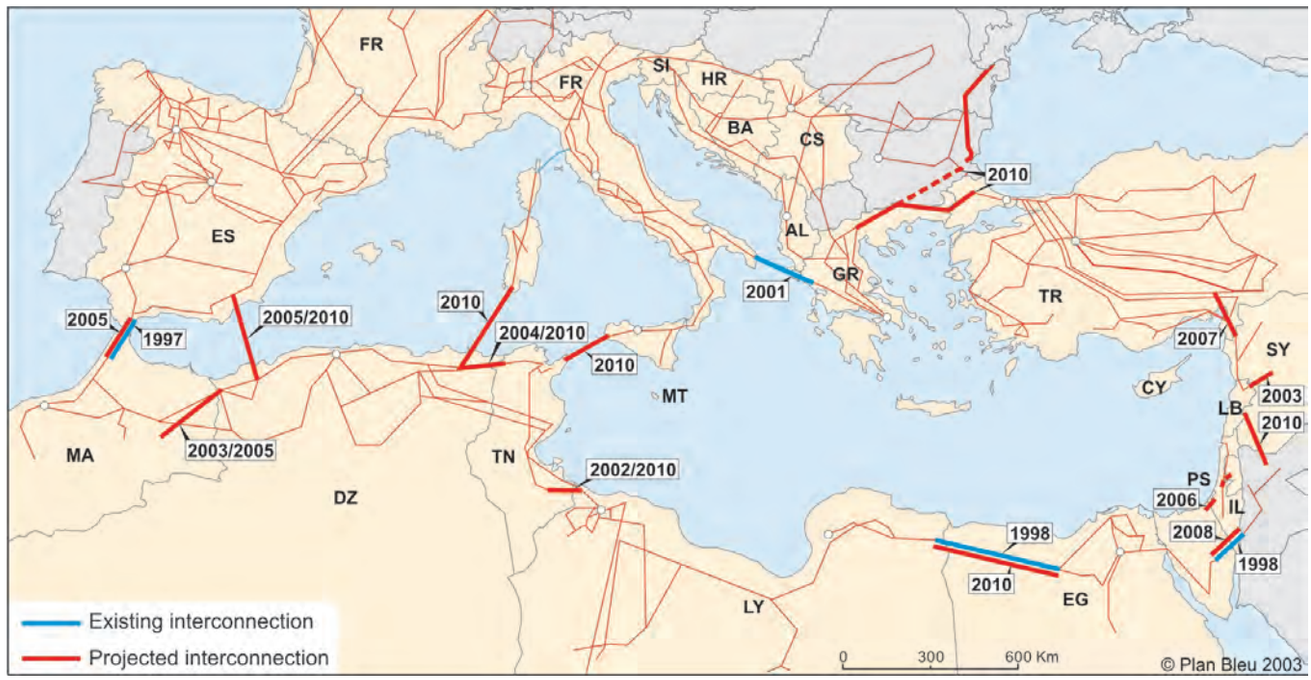
Distribution networks and electricity interconnectivity are also projected to increase and will have a growing impact on landscapes and the fragmentation of land. The corridor of land affected by a high-voltage electricity line can be between 30 and 120m or up to 400m wide. In the NMC, projects for building overhead lines are facing increasingly hostile public opinion because of their environmental impact. People living near such lines also have growing concerns about the possible impact of electromagnetic fields on their health, although this has never been established by epidemiological studies, more of which are needed. These public reactions sometimes result in a rethinking of the proposed technical options and a shift towards solutions that combine decentralized power production and energy management, making it possible to defer (or even cancel) the building of some infrastructures (see the preliminary studies for reinforcing the 400kV Boutre-Broc Carros line in France's Provence–Côte d'Azur region).

Box 2.2 The main electricity interconnections in the Mediterranean, 2002

Before 1990 there were only a few, low-capacity electricity interconnections between Maghreb countries. Of the 17 interconnections built between 1952 and 2003, half came into service during the past decade, which shows the efforts made in electric interconnection in recent years. Between now and 2010, 16 new links are planned for construction and the North Africa network will be strengthened to 400kV.

In addition to the existing interconnections in Maghreb (Algeria–Morocco (2 links) and Algeria–Tunisia (4 links)), and recently inaugurated links (like those connecting Spain to Morocco, Libya to Egypt, Egypt to Jordan and Syria to Jordan

Figure 2.11 Electricity interconnections in the Mediterranean



Source: OME, 2002 and Systmed report, 2003

and Lebanon), there are a number of projects and lines being boosted to 400kV (the 400kV links of the northern African countries and the interconnections between Tunisia and Libya (3rd link), Tunisia to Algeria (5th link), Algeria to Morocco (3rd link) and Syria to Turkey).

When the Spain to Morocco interconnection was put into service in 1997, the two shores of the Mediterranean were joined, and a doubling of this link is now planned for 2005. It will be boosted between now and 2010 with interconnection projects joining Algeria to Spain (direct undersea link), Algeria to Italy via Sardinia, Tunisia to Italy, and Turkey to Greece.

According to the preliminary estimates of the MedRing project (a study of an electricity loop around the Mediterranean, which is underway), plans are being made for the trade in electricity between the Mediterranean countries to exceed 75TWh per year between now and 2010, compared with only 45TWh in 2000, of which 5TWh was between the SEMC.

These interconnections create technical but also political links between the Mediterranean shores.

In conclusion, under the baseline scenario, the projected strong growth in energy demand will *increase the level of risk in the Mediterranean*. Energy supplies will be ever more dependent on today's uncertain geo-political situation. The energy bill may well increase, and all countries (both importers and exporters) may suffer from highly volatile prices. Environmental effects are likely to be considerable, some may be irreversible, and will affect the worldwide and regional heritage through an increasing contribution to global warming and the destruction by infrastructures of some of the coastline and landscapes. These risks and effects will differ between countries but will be most serious in the SEMC. These countries will urgently need to find answers to the spectacular increase in demand to meet the basic needs of the population today and in the future. They will also be exposed to a significant share of the environmental risks of transporting hydrocarbons to supply energy to the northern-rim countries.

Towards more sustainable energy systems

Faced with geo-political, socio-economic and environmental risks, there are alternative paths to more sustainable energy development.

The first is that of *energy efficiency* (EE) or *energy demand management*. This aims to increase the efficiency of current energy systems, breaking the link between economic growth and energy growth. The aim is to provide the same services while using less energy. This is a winning strategy from all points of view: it reduces the dependence, the costs and the impacts connected with energy supply.

The second is to ensure supply while reducing the related environmental impacts, by *diversifying energy supply and promoting 'clean' sources of energy*. Many countries have already committed themselves to this path, particularly through increasing use of natural gas and renewable energy sources that reduce geo-political and environmental risks and, under some circumstances, costs. There has also been progress in reducing the environmental risks of conventional energy sources (e.g. research into nuclear waste processing, coal technologies using fluidized beds, regulating the transport of hydrocarbons), and measures aimed at optimizing supply (for example electrical interconnections). Such projects are already well underway, but it is impossible to list them all here.[21] In contrast to the energy efficiency path, it is not always possible to minimize all types of risk *simultaneously*. Choice, governed by societal factors, is called for. For example, some countries (e.g. Turkey and France) are still subsidizing nationally produced coal, despite local and worldwide pollution, with the objective of maintaining jobs in the mining sector or limiting energy dependence. These strategies may sustain economic development or social cohesion, but at the expense of deprived populations who are exposed to air pollution, or future generations being directly affected by the effects of climate change. There is no such thing as an impact-free, neutral energy source. Energy decisions require choices between various options, choices that increasingly take environmental and long-term considerations into account, as is clear from the debate about the nuclear option.

In the vast field of possible energy strategies, this chapter explores energy efficiency and renewable energy, which, in combination, seem to promise more sustainable energy supplies, without, however, obviously excluding the use of other sources for which technological improvements can be expected.

The challenges of energy efficiency and renewable energy

Advantages

As noted at the Johannesburg Summit on sustainable development in 2002 (Box 2.9), energy efficiency and renewable energy are considered the most promising paths for ensuring access to energy for the greatest number and contributing to the development of the least advanced countries, while facing up to the planet's major environmental challenges. Indeed, in the light of the risks highlighted by the baseline scenario, these solutions provide many advantages:

- Reducing national energy *dependence* through reducing the need to import energy.
- Reducing the *vulnerability* of supply systems, since renewables are not subject to geo-political risks or those of reserve depletion, and thus contribute to security and diversity of supply. Well adapted to the production of decentralized energy, they reduce some risks of supply breakdown (accidents or terrorist attacks on distribution networks or power plants). In remote or lightly populated areas, such as the many Mediterranean islands, they remove the need for large connection infrastructures with the mainland. In such areas, they can provide the energy needed for local development and satisfy basic needs at the lowest price. Renewables may be phased in gradually, which gives them an economic advantage in terms of flexibility in adapting to demand, since the investment is also phased.
- *Savings in the costs* of energy, from offsetting the investment costs of large infrastructures, energy efficiency and the negligible operational costs of renewable energies (or lower investment costs than for traditional energy in remote areas).
- *Local development and job creation*: developing renewables and energy efficiency may create more jobs than in the energy production sector (for example the insulation of dwellings, solar water-heating, wood-burning heaters).
- Renewables may also provide *economic export opportunities* for some SEMC (exporting 'green' fuels, green certificates or within the framework of new 'clean' funding measures).
- Indirect effects on the *efficiency of use* of other economic items (water, labour, waste) and fall-out in the industrial sector (benefits related to advanced technology) in the high-growth sectors that are being developed in preparation for the 'post-oil' period.
- *Reducing the risks and environmental impact* through energy efficiency that reduces the need for infrastructures and fuel transport. Energy efficiency and renewables also result in considerable reductions in gaseous emissions thus reducing local and *global* air pollution and impacts on climate change. Like all energy sources, renewables are not without *local* impact on the environment. The most troublesome in the Mediterranean are wind farms in the landscape, which call for preliminary studies. Micro hydropower plants are also often opposed because of their potential impact on wildlife. This calls then for choices between various types of impact, although renewables have undeniable advantages in terms of gaseous emissions and the minimization of environmental risks.

The benefits of energy efficiency and renewables are quantified on the Mediterranean basin scale in an alternative scenario in the section entitled 'The challenge: an alternative scenario to 2025', below (p143).

Reasons for committing to more rational use of energy

Seeking a more rational use of energy aims to accelerate the decoupling of economic growth from energy growth and to make a significant break from the trend observed over the past 30 years in the Mediterranean, which is the basis of the baseline scenario. Currently, a 1 per cent increase in GDP means, on average and for all Mediterranean countries, an 0.8 per cent increase in primary commercial energy consumption.

This weak decoupling between energy and the economy can also be illustrated by the *energy intensity* indicator, which compares primary commercial energy consumption with GDP. Diagrammatically it is an 'inverted' indicator of energy efficiency, in that a large and growing value of energy intensity reflects a highly energy 'consuming' mode of economic growth and suggests areas for possible savings. Table A.18 in the Statistical Annex shows that the NMC have reduced their energy intensity only slightly over the past 20 years.[22] Greece and Spain have even increased it. Moreover, the reduction seems to have been the result of structural changes in economies that are 'dematerializing' rather than of active efforts to improve energy efficiency.[23] I*n contrast* all the SEMC, except Israel and Tunisia, have seen an increase, sometimes a very large increase, in energy intensity (Turkey, Lebanon, Syria and Libya).

Generally, energy intensity is observed to fall as income levels rise, a trend that should be accentuated through energy efficiency. The *challenges* and room for manoeuvre vary between countries.

The SEMC still need to build their essential industries and infrastructures. They have not yet reached the dematerialization phase of their economic development. If they manage to achieve their share of globalization by technological 'leap-frogging' while remaining in control of their development, they will shorten their learning time and may well be able to choose paths that are more energy-saving and economically more efficient. They have before them an exceptional opportunity to manage their energy needs for the coming 25 years through judicious choices of infrastructures. Depending on whether the enormous investments planned for transport, housing, industry and energy supply do or do not include energy-efficiency objectives, the structure of energy demand by future generations may be completely different and this may indirectly affect their ability to develop their economies. The challenge of *anticipation* remains considerable and is also one for the energy-producing countries which may be able to increase the amounts available for export.

For the NMC the question is less one of anticipating what infrastructures to build than one of reducing their contributions to the growth of global environmental risks and to inequalities in the distribution of resources. It is also a question of fulfilling their international commitments and improving their economic performance through better performance of their energy systems. And there is a need to prepare for the 'post-oil' period by promoting the emergence of more flexible and decentralized energy systems.

The potential for energy efficiency in the Mediterranean

The objective of energy efficiency is to optimize energy systems through a broad range of actions.

First it means *improving the efficiency* of the energy chain (energy production, distribution and consumption) through actions such as improving the management of energy infrastructures, house insulation, reducing the electricity consumption of household appliances and light bulbs, and reducing wasteful consumption.

It is also an opportunity to generally *rethink energy supply systems* so as to reduce energy consumption without affecting the energy service to the user, through co-generation, decentralized energy production, peak-shaving of electricity consumption and rebalancing daily and seasonal demands to avoid or defer the construction of the infrastructures required for a safe and high-quality electricity service.

U*pstream actions on factors that determine energy demand* are also concerned, even including the questioning of some travel modes and the siting of housing, for example by rethinking the spatial distribution of functions in cities that result in unnecessary travel.

The *magnitude of the potential savings* from energy efficiency in the various Mediterranean countries depends, therefore, on the level of their present 'wastage' and their determination to reduce it by adopting new behaviour. Potential savings of the order of 20–25 per cent of total energy demand by 2025 are certainly feasible through using technology that is already available. This figure is at the lower end of the range and could be higher in the SEMC (50 per cent of total energy demand by 2025), and even higher in very voluntary or proactive scenarios (for example through control of urban sprawl, development of public transport). Many energy audits in Mediterranean countries have confirmed these orders of magnitude. Some studies show impressive savings, varying from 10 to 60 per cent in the construction sector. In Morocco, for example, such audits estimate potential savings of 10–25 per cent of energy demand in the industrial sector, or 1Mtoe per year, and scope for saving 15–20 per cent in public administration buildings, or potential savings of about 9.5 million euros per year, corresponding to 20,000toe per year[24] (which, however, have not been implemented because of a lack of start-up funds and inter-institutional coordination). On the French electricity market, the ADEME agency estimates 30TWh

per year of possible savings in less than ten years through demand-control measures. Of course these estimates must take the *net* global energy balance into account and include the 'upstream' energy needed to achieve 'downstream' savings (for example, some insulation materials may have a high energy content). Nevertheless, the potential savings remain considerable.

There is a very large potential for saving *traditional energies* in the mostly rural SEMC, through improved household technologies or substitution by more efficient energy sources (such as gas).

The *electricity production and distribution* sector also has a significant potential for savings, with distribution network losses often approaching 30 per cent. These losses, when added to low production efficiencies, can result in very low overall efficiency. Given the magnitude of the projected growth in electricity infrastructures in the SEMC, this sector seems particularly strategic in questions of energy efficiency; the current restructuring of these sectors (opening up, modernization, FDI, role separation) should promote improvements in network performance and efficiency. There is also a need to fight the very common practices of theft of electricity and non-payment of electricity bills by many users. Such behaviour discourages investors, cancels the effects of incentives in pricing policies and prevents rational energy management.

The *industrial* sector, representing more than a third of final commercial energy consumption in the Mediterranean countries, is where gains in efficiency are the easiest to obtain because of the small number of organizations concerned and the more immediate benefits that industrialists can derive from them (Box 2.3). It is also the only one of the three uses (domestic, transport and industry) for which the technological and substitution effects can exceed the negative consequences of growth and the rise in living standards.

Box 2.3 Energy savings by clean production technologies

Introducing 'clean' production processes in the industrial sector allows very significant energy savings, at a lower cost. Many examples can be found in the Mediterranean countries.

In **Morocco**, the implementation of 'clean' production technologies has allowed a fish cannery to save the equivalent of 9 tons of fuel per year, a saving of 2200 euros per year, following an initial investment of only 1740 euros with a return on investment period of only nine months.

In **Turkey**, a textile firm from the Y. Bosna-Istanbul region successfully reduced its energy consumption by 3kWh/day, using clean production technologies and applying stricter environmental regulation. In this case, the technologies put into practice generated total annual savings of 2000 euros at no investment or operational cost.

In **Spain**, a plant for assembling power transmission components reduced its electrical consumption from 465,100kWh/year to 118,200kWh/year. The cost subsequently fell from 50,800 euros/year to only 8,880 euros/year. However, the return on investment period was longer than three years.

Finally, in **Croatia**, a dairy factory near Zagreb offers a good example of energy reduction: thermal energy savings reached about 500,000kWh/year for a total investment of 31,000 euros. The annual savings are ten times higher: 328,000 euros. The return on investment period was only one month.

Source: MAP/Regional Activity Centre for Clean Production, Barcelona; www.cema-sa.org

However, in the Mediterranean, the priority sectors are the rapidly growing *residential and tertiary* sectors (nearly 40 per cent of final commercial energy consumption in the SEMC) where considerable potential for savings can be exploited.

In the *construction* sector, savings in lighting, heating, air-conditioning and clean hot-water production are among the easiest to justify economically given the present conditions of the energy market. For example, the European Directive on energy efficiency in buildings (2002) seeks to save up to 22 per cent of energy demand from now to 2010 in the EU by simple measures, such as standards for new (residential and tertiary) buildings and renovation of buildings of more than 1000m^2 (insulation, heating, ventilation, lighting, the use of renewable energies, and the location and orientation of the building). An energy certification system for all buildings and regular control of heating and cooling systems are also required. By 2025, 7 million additional households are projected in the NMC and 33 million in the SEMC, which will result in a large increase in housing demand. The issue of energy saving building technologies is crucial. In France, implementing building heating regulations has resulted in that a new dwelling, built today, consumes 50 per cent less energy than one built in the 1970s.

The Mediterranean region has traditionally developed exceptional expertise in architecture and urban design, showing great ingenuity in adapting to the climate (mild, sunny winters, very high temperature peaks in summer). The choice of layouts, openings, materials, patios and fountains, and narrow, shady streets have produced an urban development and architectural heritage perfectly adapted to the climate. But, more recently, urban expansion and changes in lifestyles have been contributing to the emergence of urban developments and architectures that, by their very design, are too disconnected from the climate, leading to an over-consumption of energy for ventilation, air-conditioning and heating. Glass-encased skyscrapers are increasing in Mediterranean cities despite their being totally unsuited to summer heat. Yet a few simple building rules, satisfying new demands for

comfort and adapted to the climate, would enable substantial cumulative savings for the whole life cycle of the buildings.

Box 2.4 Bio-climatic building to save energy

To get back in touch with its climate, Mediterranean architecture could reintroduce a few simple building principles that it has jettisoned rather too rapidly. The principle of bio-climatic architecture is to meet new demands for comfort while reducing, even avoiding, energy expenditure on active heating, ventilation and cooling technologies. Architecture in the region could thus exploit several parameters:

1 Using the exterior of the building to absorb winter sun, reduce the heat input in summer, protect the building from wind and noise, and light the inside by exploiting the particular luminosity of the region. The architecture can reduce heat loss by good organization of space, a compact shape, good wall and ceiling insulation, protection against predominant winds, window sizes adapted to exposure, insulated night-time protection of windows, main fronts oriented to the south, and a high thermic inertia of the building. It can reduce cooling needs by solar protection in windows, walls and roofs, good ventilation, heat retention linked to night-time ventilation, the planning of outside space to reduce outside temperatures, shady areas (trees, green spaces), reflecting colours for walls and outer materials, etc.

2 Using active technologies (heating, cooling). The traditional Mediterranean habitat sometimes had no heating. Nowadays, residents demand comfort (heating, cooling, ventilation), which is not necessarily more expensive, since there have been more energy efficiency improvements in the construction sector than in household appliances, for example. There is considerable scope for reducing heat loss and the costs of ventilation and cooling.

Experience is beginning to accumulate that shows the big advantages of bio-climatic architecture. The Energie-Cités (EC-GD Energy, Altener) project, for example, records initiatives such as the building of several bio-climatic hospital complexes in Murcia in Spain. The design of these complexes, for 300 people, has resulted in nearly a 70 per cent saving in energy costs for an extra cost of 5 per cent compared with a standard construction, and a return time of less than eight years for recovering this initial extra cost. In Lebanon, undergoing reconstruction, a FFEM project to support the design of energy-saving buildings (insulation of terraced roofs, water-proofing of walls, mechanical ventilation, double glazing) combined with the use of collective solar water-heating and compact fluorescent lamps is resulting in 30–60 per cent savings in energy consumption compared with existing buildings.

Source: Arene, ADEME, Projet Energie-Cités; www.energie-cites.org

After heating (for which the saving potential in the EU is an estimated 10–60 per cent, depending on the country), *hot-water production* is the second biggest energy consumer in the residential sector in the EU, with savings potential estimated at between 5 and 50 per cent.[25]

But along with the growth in the number of households, the number of *household appliances* has also increased (which explains the steady growth in electricity demand), the energy potential saving of which is estimated at 20–50 per cent. Among the main consuming items are cooling devices (refrigerators, accounting for one-third of the electricity consumption with a savings potential of 30–50 per cent) and lighting. In the Mediterranean countries of the EU, energy labelling of household appliances has been mandatory since 1995. Standards for minimum performance levels were set in September 1999, to complete a set of measures for domestic cooling devices, which has resulted in a major change in the market for cooling devices in terms of better energy performance. Thus, between 1992 and 2000 the average electricity consumption of refrigerators and freezers in Europe fell by 30 per cent. Given the energy performances of their household appliances, many SEMC are looking closely at the implementation of similar labelling and standardization programmes. The risk is that poorly performing equipment will increasingly appear on the markets of countries that have not yet adopted comparable legislation.

In the *lighting* sector the potential for savings simply by changing behaviour and by using compact fluorescent lamps is enormous (savings of up to 70 per cent with a pay-back period of less than two years). A recent evaluation of the potential for specific electricity uses in 400 dwellings in the EU (including half in Italy and Greece) identified a potential saving from approximately 20 per cent (Greece) to 40 per cent (Italy) based on simple measures (the replacement of cooling equipment by models with better performance, the replacement of incandescent lamps by compact fluorescent lamps and the suppression of stand-by settings).[26]

The very large expansion of *air-conditioning*, which particularly concerns the Mediterranean countries, and is expected to continue with the expected growth in urbanization and possibly global warming, also requires consideration of the savings potential through adapting construction technologies (natural ventilation, insulation, exposure), and using high-performance devices and control equipment.

The *transport* sector (between 24 and 33 per cent of final commercial energy consumption) also offers considerable energy-saving potential, but this is a sector where the trends are the most unfavourable and the inertia is the greatest. The present system based on road and private car transport is extremely costly, as shown in Chapter 3. This question is inseparable from that of *urban-*

ization. Indeed, purely technical solutions (more efficient diesel engines, hybrid or electric engines, fuel cells, substitute fuels) cannot compensate the effects of growth in transport demand. Transport energy consumption can also be reduced by better urban planning and management. Increased urban densities, bringing daily services (schools, shops) nearer to residences, the redevelopment of activity areas to minimize the transport of merchandise, and public transport are some of the vital actions for meeting the challenges of urban transport in a region that will have 100 million additional urban inhabitants between 2000 and 2025 (see Chapter 4).

The potential for renewable energy

The considerable potential for renewable energy in the Mediterranean is mostly underexploited, whether for electricity production or domestic purposes.

The potential in the SEMC is very high: it is one of the world's sunniest places (about 5kWh per m^2 per day) and the needs, both for thermal and electric applications, are many. There are many sites suitable for wind farms, considerable geothermal resources, for example in Turkey and Italy, significant possibilities for developing small hydroelectricity plants, and the use of biomass is an important energy option in many areas. A recent OME study has shown that the potential electricity production from renewable energies (excluding hydropower) in the SEMC could be about 105TWh per year, or between 10 and 15 per cent of total electricity production in 2020.[27]

Table 2.2 Electricity production potential from renewable energies in the SEMC in 2020

	Potential (MW)	Electricity produced/yr in TWh/yr
Wind energy	10,000	20
Photovoltaic	2500	5
Solar thermal	6000	15
Biomass	8000	48
Geothermal	2900	17
Total	**29,400**	**105**

Source: OME, 2002

B*iomass* is an important resource. In the SEMC (for example Maghreb and Turkey) firewood often constitutes a vital part of non-commercial supply, particularly for the most deprived. The challenge of improving efficiency of use is crucial, especially since the increase in energy demand risks aggravating an already visible over-exploitation of woodlands.[28] In the NMC a massive switch to biomass (especially the sustainable exploitation of woodland products) could enable a significant increase in the share of renewables in the primary energy balance.

For large *hydropower plants*, the Turkish potential remains considerable, and the very ambitious projects currently being implemented have not exhausted the possible sites. In the other SEMC, useable sites are being exhausted, and a number of dams are silting up, for example in Morocco. In the NMC all the possibilities have been exploited. M*icro-hydroelectricity*, a proven and now mature technology, is ideal for electrifying remote sites. It also provides a back-up for national electricity production, which is especially attractive at times of peak demand. Italy and France remain the leaders in terms of installed power with, respectively, 2230MW and 2020MW. Spain has made the greatest efforts recently. The Balkans, Greece and Turkey still have a large potential. Morocco has a potential of 3630MW of micro-hydroelectricity stations[29] at 200 sites that could be exploited within its borders.[30]

W*ind power* is being called on to play a significant role in the development of renewable energies in the region, as in the rest of the world. In recent years, technological progress in wind generators has been considerable and they have now become a genuine industrial sector. The most significant example in the Mediterranean is the Spanish market, with a total capacity of 3660MW in 2002. In the other NMC, launching the wind sector seems ongoing with an annual growth rate of more than 20 per cent in 2001. This includes Italy, with an additional 308MW (79 per cent) in 2001. In the SEMC there are wind sites with high potential in Morocco, Egypt and Tunisia, and all these countries have seen strong growth in wind powered electricity generation. Most of the other countries have begun to set up detailed wind power atlases, and projects are being studied for new sites. The question of environmental impact must be carefully monitored by the project designers, especially on the coasts. The question of the price for buying back the electricity produced is crucial; it should be the first to be decided for all national development plans.

Box 2.5 The situation and development perspectives for wind energy in the SEMC

In **Morocco**, installed wind power capacity could reach 200MW by 2004, or 6 per cent of the total electricity production capacity of the country. Moroccan authorities aim to reach 1000MW by 2010, adding 80MW of capacity per year, increasing the renewable energy contribution to total Moroccan primary energy demand from less than 1 per cent in 2000 to 10 per cent by 2010.

In **Tunisia**, current wind capacity is 10MW and *Société Tunisienne d'Electricité et du Gaz* forecasts 250MW for 2010, which means that wind energy would provide 3.4 per cent of annual electricity demand. A 400MW scenario has also been studied by the Tunisian Authorities.

In **Egypt**, there is an installed capacity of 60MW in Zaafarana and another 60MW project is under way. The national programme for wind energy development aims to reach 600MW installed capacity by 2010, or 2 per cent share of wind energy in overall electricity production. The low cost of gas restricts the development and use of the large wind energy potential of this country.

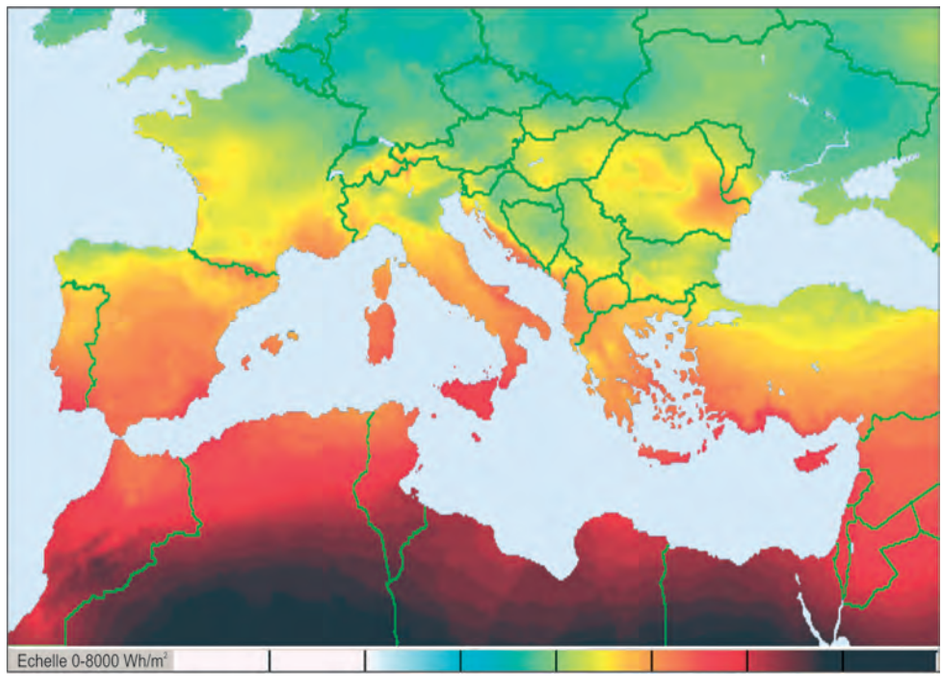
In **Turkey**, current capacity is 20MW; planned projects would increase this to a total capacity of 500MW with a guaranteed buy-back price system. A 2010 scenario developed by the General Directorate of Electrical Power Resources Survey and Development Administration aims at reaching 2000MW of wind power or 2 per cent of total electricity production. With the aim of joining the EU and implementing the European Directives on renewable energy for electricity production, considerable efforts have to be made in order to rely on wind power in a more intensive way. By 2010, with a total electricity production of 300TWh, a wind power share of 4 per cent would require the setting up of a huge 4800MW capacity.

Source: OME from national sources

Note: Wind load factors (assumed by national companies) are 40 per cent in Morocco, 27 per cent in Tunisia and 37 per cent in Egypt. For Turkey, the assumed load factor is 29 per cent (IEA Renewables information, 2004).

Because of the large amount of sunshine, the Mediterranean countries have a very large *solar energy* potential.

Figure 2.12 Map of average solar radiation, April, 1981–1990



Copyright: this map is issued from The European Solar Radiation Atlas 2000 (vol 1), published by Les Presses de l'Ecole des Mines (www.ensmp.fr/Presses collection sciences de la terre et de l'environnement)

Solar photovoltaic (PV) energy has a very large potential in the SEMC, especially in the countries where the electricity network covers only part of the country. This is the case in Morocco where the rate of electrification is low and where nearly 10,000 villages still have to be electrified, or over 300,000 households in rural areas. A project for electrifying 16,000 rural households was begun in 2002.[31] The total potential in Morocco is estimated to be 200,000 PV systems, and in Tunisia 14,000 systems.[32] Turkey is also interested in developing PV, particularly for applications related to water pumping, electric signals and telecommunications. The PV sector has grown enormously (23 per cent of additional capacity installed in the NMC in 2000). But the market remains small and its development is dependent on the implementation of more ambitious national programmes and the creation of a specific industry to manufacture 'solar silicon', which would enable the sector to enter another dimension. The installations still show some vulnerability to meteorological hazards (sand storms, saline deposits), which increase maintenance needs.

There has been large-scale growth in *solar thermal energy* use in the NMC. A total surface area of about 4.5 million m^2 of solar panels has been installed in the four EU-Med.[33] In France in 2001 the surface area installed increased by 17 per cent, and the national market is beginning to feel the effects of 'Plan Soleil' launched by ADEME in the middle of 1999. In this context, the target set by French industrialists of one million m^2 installed each year from 2010 appears achievable. However, these developments are less ambitious than those in other European countries, Germany for example, which, although having less sunshine, already has more than 4.2 million m^2 installed. Solar energy in the SEMC is used mainly for producing clean hot water. Turkey is one of the world's leaders in this field with a total installed capacity of 3.5 million m^2 of solar panels. At present solar energy contributes 290 kilotonnes of oil equivalent (ktoe) of the country's total energy production, and by 2010 this should reach 600ktoe. The importance of the national energy context is particularly relevant to

the development of the solar thermal sector. For example, the Palestinian Territories, very dependent on energy imports, had over 1 million installed m^2 in 2001. Tunisia, with about 90,000 m^2, saw a 37 per cent growth in 2001. In contrast, energy exporting countries, such as Algeria and Egypt, have a relatively small number of collectors installed (less than 1000m^2 in Algeria and 2000m^2 in Egypt).[34] In general, it is necessary to consolidate the emergence of an autonomous and sustainable solar thermal market. This means organizing the sector, training professionals, increasing public awareness and using high-quality materials developed in the framework of south–south as well as north–south exchanges.

Italy and Turkey are the leaders in *geothermal* energy in the Mediterranean. Italy and Greece aim to increase their installed capacity for producing electricity, to 912 electric megawatts (MWe) in Italy and 210MWe in Greece by 2010. As far as low-temperature geothermal energy is concerned, there are only limited data on the number of installations. The main producers are France (326 thermal megawatts (MWth)) and Italy (325MWth). In Turkey the geothermal potential is 31,500MWth, only 3 per cent of which is currently being exploited, and the target for 2020 has been set at 2000 installed MWth.

Renewable energies therefore have enormous potential that is just beginning to be exploited, especially in Morocco, Israel, Spain and Italy. We are seeing a build-up of increasingly structured industries and the emergence of mature technologies. The best examples are wind energy, photovoltaic energy and solar thermal energy. Spain has developed a first-class wind power industry. France is a leader in bio-fuels, and Italy and Turkey in geothermal energy. The diversity of situations and the complementarity of experiences makes the Mediterranean one of the world's regions with very significant potential (natural and technical) for renewable energy. In many cases, the renewables are the most economical option for decentralized rural electrification (for areas beyond the reach of electricity networks).

However, it must be stressed that industrial sectors and the market are much more developed in the north than in the south, while the potential, especially for solar, is found mostly in the south. Apart from wind and solar energy, and excluding a few isolated cases, the development of renewable energies remains dependent on many factors (see the next section): the local energy context, technological progress and a reduction in equipment costs, the implementation of appropriate regulatory institutional frameworks and the establishment of well-adapted and innovative financial systems. But, even more important, it is vital to undertake far-reaching information and dissemination programmes so as to raise the awareness of both decision-makers and users.

Conditions for developing energy efficiency and renewable energy

Despite the large potential and clear-cut benefits of energy efficiency and renewable energy, these have been largely underexploited in the Mediterranean. The conditions for a better realization of these potentials are analysed in the light of experiences in the Mediterranean.

Rethinking energy systems, involving all actors

Realizing the potential for energy efficiency and renewables requires a total change of approach in the thinking, planning and management of energy systems. In outline, this means shifting from the classical approach of increasing energy supply in the conventional energy sectors that are characterized by a fairly centralized and concentrated organization with a small number of actors (a few companies, even a single company and very often state-owned companies) to a *new approach* where a large number of actors are involved in energy supply and consumption. Changing the behaviour of users and suppliers (companies, local authorities, households, and energy producers and distributors) towards practices that optimize the energy resource is particularly complex (a problem that the more classical centralized approaches do not have) and requires the use of several possible measures:

- *Voluntary agreements*: for example the successful industry-wide agreements in Europe in the household appliance field (TVs, washing machines) that have enabled considerable energy efficiency gains quickly and inexpensively.
- *Regulations*: for example in the fields of construction and housing insulation (thermal regulations in Europe).
- *Financial incentives* for investment in energy-saving equipment.
- *Pricing energy* to internalize the externals, that is the impacts on the environment. This means introducing an element of 'truthfulness' when comparing various energy sources (and its corollary, the suppression of energy subsidies, which makes it possible to reduce demand).
- *Professional training and motivation*: the lack of awareness by salespeople has to some extent acted as a brake on the dissemination of efficient equipment in Europe.
- *Awareness-raising for the general public*: this is vital for ensuring acceptance of the need to change behaviour and prices; in this regard, the residents of the Latin countries seem less aware of these questions than those in the north of Europe. With growing urbanization, the general public is losing the link between its lifestyles and the natural resources it consumes, and people are mostly ignorant of the long-term impacts of their behaviour. Awareness-raising should enable this link to be re-established.

European experience in the field of renewable energies shows that it is the combination of all these measures that makes them effective.[35]

Given the number of actors and professional sectors involved in energy consumption and the complexity of their interactions, energy efficiency and renewables call for a significant amount of collaboration, teaching, adaptability and a capacity for innovation in the funding and regulatory systems. Choices may have to be made between the sometimes divergent interests of actors, including between the public and private sectors. Moreover, energy efficiency covers the whole spectre of economic activities. Strategies for energy efficiency and renewables cannot be designed without considerable political will and without being integrated into all economic sectors so that coherent signals are sent to users. Stimulating energy-management programmes with sufficient vigour therefore requires groundwork in awareness-raising and thought-out strategies. *Complementary levels of public action* must also be well articulated by ensuring convergence between economic measures (such as taxes on petrol) and structural measures (such as public transport supply). Failing that, the measures will remain ineffective and/or unfair. Such strategies, therefore, have a 'governance cost', and often a 'political cost'. They face obstacles that are often more of a cultural, institutional or political rather than a technical nature. Requiring new approaches, they also have a high 'learning cost'. This means time, patience and an exploitation of knowledge.

Public initiatives and national strategies

For all these reasons, actions to support energy efficiency or renewable energies, although often successful in the medium and long term, must in the short term overcome resistance and therefore require strong initiatives from public authorities supported if necessary by competent NGOs. Such actions are not triggered spontaneously by market forces alone, which lead, at best, to only a limited dissemination of effective technologies in a few niche areas. Public action remains indispensable for modifying user behaviour that is in the general interest, by including long-term signals in today's decisions by economic agents and ensuring a stable institutional and regulatory framework. This is why a growing number of Mediterranean countries are adopting official national strategies around the two complementary objectives of energy efficiency and the promotion of renewable energies (Boxes 2.6 and 2.7).

The *four* EU-M*ed countries* (Spain, France, Italy and Greece) were among the first to take this path, and vigorous energy management policies followed the first oil crisis in some countries. A degree of relaxation was observed in the 1980s, but we are now seeing a return to interventionism, less from the fear of a new oil crisis than from the climatic consequences of the greenhouse effect.

In these countries, the European Directives on energy efficiency and renewable energies are stimulating the renewal of such strategies. In its White Paper on renewable energy, the EU proposes to its members the ambitious overall objective of doubling the share of renewable sources in primary energy consumption by 2010 (increasing the share from 6 to 12 per cent). As set out for the electricity sector by D*irective* 2001/77/EC *on promoting renewable energies for electricity production*, this is equivalent to 22 per cent of electricity being produced from renewable sources, including large hydropower, by 2010.

All these objectives are incorporated in national energy plans. However, even in countries with 'official' strategies, the results rarely match up to the stated ambitions, and the savings made are often less than those hoped for. Progress with renewables (although very rapid) is overwhelmed by the growth in total demand. Thus, for example, Greece and France will find it difficult to meet the European objectives for an increase in the share of renewables in total consumption. The only alternative is to increase the share of renewables significantly by combining this with substantial action to control demand.

Box 2.6 Examples of energy efficiency and renewable energy strategies in the NMC

Three countries in the north, France, Italy and Spain, alone account for two-thirds of energy demand in the Mediterranean Basin. An increase in demand of more than than 0.5 per cent per year up to 2025 is projected.

Italy is among the countries most dependent on others for its energy supply. Over the past few years it has implemented a vigorous policy of energy management and the development of renewable energy sources. Improving energy efficiency has been a prime objective of the National Energy Plan since 1988. By setting detailed objectives, quantified in time, for electricity producers, Italy has seen a spectacular increase in renewables: in 1999 nearly 600GWh of electricity were produced from biogas, more than 400GWh from wind and more than 200GWh from biomass, whereas in 1990, none of these sources produced more than 2GWh. Quantified energy savings objectives have even been set for sectors up to 2006 (decree 2001). Italy has the best Mediterranean results in lowering energy intensity, which remains one of the lowest in the world.

France has weaker energy efficiency objectives than the northern European countries. Given the strong continuity of public development of nuclear energy and private investment by the major fossil-fuel producers, French energy efficiency policy has so far been characterized by remaining in line with the evolution of the situation, with public expenditure on energy management quite closely following fluctuations in oil prices. Actions have nevertheless borne fruit. Results in the

areas of thermal regulation of buildings and labelling of household appliances have been striking. Energy efficiency efforts made since 1973 have thereby led to savings of more than 30Mtoe compared with a 'laissez-faire' approach. A National Plan for combating global warming was drawn up in 2000, containing some 100 national measures that are still to be implemented. The renewables are seen as serious strategic alternative options. A price structure for electricity from new renewables has been implemented. In the thermal sector, ambitious objectives have been set for 2006 (thermal solar, fuel-wood, biogas and geothermal energy). The budget of the French Agency for the Environment and Energy Resources (ADEME) was increased in 2002[36] but thereafter decreased.

Spain voted for an energy efficiency plan for the 1991–2000 period, which enabled savings of 6.3Mtoe during the period (corresponding to an energy efficiency improvement of 10.4 per cent). Despite this progress, energy intensity during the same period increased.

Source: OME, ADEME, *Plan Bleu*

The history of energy management in the *other Mediterranean countries* began only in the mid-1980s, with more modest results. With a few exceptions, few Mediterranean countries have ambitious national strategies. This is the first major hurdle in developing energy efficiency and renewable energy activities, which, at best, are reduced to technological and isolated actions that are not enough to create a genuine market that can provide services.

Box 2.7 Examples of energy efficiency and renewable energy policies in the SEMC

Turkey, Egypt and Algeria alone are expected to account for 30 per cent of the primary energy consumed in the Mediterranean by 2025. With forecasted growth rates of more than 3 per cent a year, they will account for three-quarters of the additional demand by the SEMC between now and 2025. However, they have no explicit energy efficiency objectives in their energy strategies.

Turkey has to face up to a large increase in its primary energy demand. Its energy savings potential, although enormous, is not being exploited. Energy demand management is largely lacking in Turkey's energy policies. Energy prices even remain subsidized. Urgent action is therefore needed to promote the energy demand management essential for this demographically and economically growing country. In this context the resources allocated to the NECC (National Energy Conservation Centre) founded in 1992 are inadequate.[37] Turkey has not officially approved the Kyoto Protocol.

Egypt has been interested in energy efficiency for some years, but there has been only limited action. Several projects have been carried out with international support to identify the potential and the barriers to improving energy efficiency, and to strengthen capacity. A study has shown that a policy of rational use of local energy resources should make it possible to achieve savings of about 1 per cent of GDP and more than 10 per cent of annual CO_2 emissions by 2017 and help the country reach its ambitious development objectives in a sustainable way.

Algeria has long preferred to increase its energy supply capacities. However, faced with financial requirements, environmental impacts and growth in internal demand that risk compromising its export commitments by 2020, Algeria passed a law in 1999 and adopted a national strategy for energy demand management in 2003. Many measures have been set up: a national programme, a fund and a strengthening of the Agence pour la Promotion et la Rationnalisation de l'Utilisation de l'Energie. The use of renewables has been encouraged by a National Strategy and by creating an agency for promoting and developing renewable energies, the NEAL (New Energy Algeria) and several projects: a 120MW solar thermal power station, a hybrid wind-photovoltaic-diesel installation in Timimoun, electrification of the south using photovoltaics, the promotion of a local solar water-heating plant, a research programme on solar energy, and the marketing of LPG in the south to counter deforestation. A decree setting a minimum penetration (5–10 per cent) of renewable energy in energy supply is under preparation. Although it is too early to assess the results, the factoring of new energy management objectives into strategic planning documents demonstrates a national awareness of energy efficiency issues that may gradually spread to other producing countries that also have high energy intensities (such as Syria and Libya).

Experience in **Tunisia** also deserves mention; it implemented a national programme for energy demand management based on an institutional and regulatory framework in 1980 with the founding of the Agence Nationale des Énergies Renouvelables (National Agency for Renewable Energies) that later became the Agence nationale de maîtrise de l'énergie. The framework has evolved through a strengthening of its knowledge base, the standardization of incentives and a strategic and institutional realignment of the activity. It has contributed to the drop in energy intensity over the past decade and the reduction of emissions, but, given the development of the country's energy situation, a new energy-control programme has been relaunched for 2001–2010, involving two kinds of action:

Short-term priority actions:

- strengthening awareness-raising and energy management information;
- implementing adequate regulatory frameworks for promoting private investment;
- involving the public sector in exploiting the potential;
- mobilizing the required financial resources;
- strengthening local capacities and programmes in research and development.

A ten-year plan up to 2010, including:

- large-scale dissemination of solar water heaters, optimization of rural electrification by photovoltaic systems and the development of wind farms and biogas for electricity production;
- intensification of energy audits, promotion of clean technology and the development of energy-efficient programmes in all economic sectors.

Source: OME, 2002

Agencies to promote energy efficiency and renewable energy

To carry out these public actions, most Mediterranean countries have set up specific institutions for energy efficiency and the promotion of renewable energies. These public or NGO bodies are assigned actions of awareness-raising, training, making financial aid available and technical consultancy, depending on the situation; they also constitute a force for relevant proposals for tax or regulatory reforms.

These agencies play an essential role in *aid to decision-making*, the first step in energy efficiency strategies, by identifying potential energy savings, advocating renewable energies, demonstrating the economic rationality of actions and prioritizing the actions that are the easiest to implement. Their role may also prove to be fundamental in setting up projects and making use of knowledge of new methods and technologies. In addition to technical expertise, these bodies must also have a capacity for organization, dialogue, rapid intervention and an understanding of the problems and constraints of very varied partners.

However, their institutional situation, especially in the SEMC, remains fragile, and their financial and human resources insufficient. In general, institutional strengthening of these agencies (staff and operating budgets) is an essential factor in launching energy efficiency strategies. Their status and institutional position are also very important, since most of the potential energy savings call for direct intervention through sectoral policies (transport, housing, etc).

Funding energy efficiency and renewable energies

Immediate costs and deferred benefits

One of the main obstacles to disseminating energy efficiency and renewable energy technologies is financial. Being new sectors, energy efficiency and renewable energy development strategies have costs that are related to their complexity, their state of knowledge and, quite simply, the need for equipment. Like the older energy sectors in the past, they call for considerable financial resources for:

- aids to decision-making, to introduce these new options to the decision-makers;
- research and development;
- training and the exploitation of knowledge;
- organization of new sectors (training, organization);
- increasing awareness among users;
- above all, *investment* in infrastructures and equipment.[38]

From a *macro-economic* point of view, the 'profitability' of expenditure in the field of energy-demand management comes from the savings made. Many cost–benefit analyses show very advantageous internal rates of profit or very short return-on-investment times. Saving a unit of electricity costs from three to ten times less than producing it.[39] A study in France shows that the financial savings resulting from a low level of electricity consumption can be considerable, 2.5 thousand million euros per year on average for the electricity system (compared with total public incentives for energy savings of 7 million euros).[40] These savings provide ample room for manoeuvre in funding public policies for energy efficiency since they represent an expenditure of an additional 2.6 cents per kWh on electricity savings measures (or an additional equivalent expenditure of 130 euros on an average refrigerator). In the field of renewables, 'profitability' depends on technical progress being achieved, but also on how the costs of the different energy sources are compared, mainly on whether the costs of the externalities of the 'polluting' energies or, on the other side of the balance, the benefits of the non-polluting energies are entered into the accounts (see Box 2.8 p136).

From a *micro-economic* point of view, initial investment costs are often too high when compared with other traditional or alternative energies, and this continues to dissuade such investment, even though, in the building or industry sectors, it is common to have return-on-investment times of less than five years, even two years, as a result of the savings made (high-performance equipment in household appliances: fridges, compact fluorescent lamps and electronic devices with reduced 'stand-by' consumption).[41] The main obstacle to improving the energy efficiency of household appliances is no longer technical since economical appliances exist; it is mainly consumer buying habits, which *energy labelling* and the *label* itself aim to influence.

In most cases, bearing the cost of these investments is all the more difficult because the benefits that result, in the form of energy savings, reduced gaseous emissions, infrastructures not required and less vulnerability to risks (price variations, geo-political risks), are deferred in time or transferred to other bene-

ficiaries (future generations). This is why public intervention remains essential.

The need for public support

Since private funding alone does not generally cover these actions, many countries have implemented *public funding incentives* for clean energies and energy efficiency. These incentives aim to pay for all or part of the costs (energy analyses, feasibility studies, subsidies for buying efficient equipment) in the form of direct aid, tax deductions, investment subsidies or bank guarantee funds or through funding the staff and operations of energy efficiency agencies. However, these financial incentives are often woefully inadequate and seldom on the same level as the public support given in the past (or even currently) to 'conventional' sources such as nuclear or coal. Particularly in the SEMC, the few public resources that exist are allocated to other priorities. For example, investment in energy efficiency in Morocco between 1994 and 1996 was less than 8 million euros out of a total of about 2650 million euros invested in the energy sector.[42]

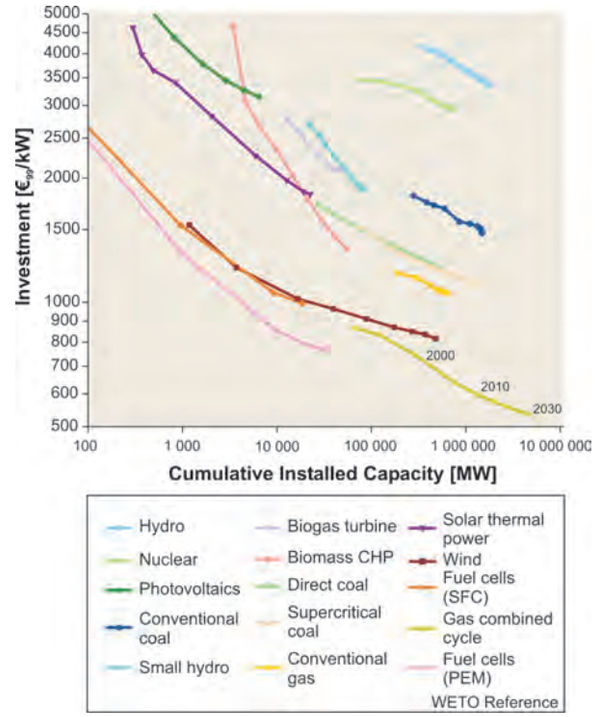
Massive participation by public authorities in *research and development* on renewable energies would be one way to speed up the transition to such energies by accelerating cost reductions through technological progress, the strengthening of the field of activity and the economies of scale of an expanding market. Experiments and research on energy efficiency are also needed to promote synergies between the short and mid-term. Here too, however, public budgets for R&D are very small and still oriented mainly to the extraction technologies and the production of fossil and nuclear energy. In 1998 France earmarked only 1.8 per cent of its R&D budget for energy efficiency and renewable energy with 93 per cent going to the nuclear sector.[43] Of the Mediterranean countries making the greatest efforts, Italy in 1998 allocated 35 per cent of its energy R&D budget to energy efficiency and renewable energies (US$73 million) and 44 per cent to nuclear. Spain, devoted 47 per cent of its energy R&D to energy efficiency and renewable energy (US$22 million), Greece 68 per cent (or US$9 million) and Turkey 34.5 per cent (US$1.1 million).[44]

But it is mainly efforts to promote the *dissemination* of already operational technology, rather than technological research, that could play a vital role in lowering costs through the emergence of critical size markets. Figure 2.13 shows the influence of the 'installed power' factor on average investment costs per KW for various energy sources. Public authorities can also stimulate technological change through socio-economic measures such as guaranteed purchase prices for renewables, competitive auctions and the trade in green certificates (imposing renewable energy quotas on suppliers).

Energy efficiency measures often require *adjustments in financial mechanisms*, in the regulatory framework or the banking system, in order to adapt to their specific characteristics, that is their high initial cost (investment), which may not always be covered by the savings made (operations). Indeed the investor often does not benefit from the savings (as is the case with the owner and the tenant of a dwelling) or cannot recover part of the savings made in order to invest further (as is the case of the French municipalities, which, because of public accountancy rules, cannot use the financial savings made by saving energy in public buildings for further investment in energy efficiency). The small size and wide range of energy efficiency and renewable energy activities also require flexible, specially adapted methods of funding (micro-credits).

Because of limited public funding resources, the 'leverage effect' of public aid is increasingly sought as a way of jointly involving the *private sector*. Over the past few years new financial products have appeared, developed by operators in the public–private sector, which make it possible to finance the additional costs of initial

Figure 2.13 Learning curves, the increase in installed capacity strongly reduces costs



Source: EC-DG research, 2003

Note: Points in curves indicate time steps of five years. WETO Reference: scenario made of a coherent set of assumptions used for technological forecasting, based on the analysis of historic trends.

investments through a mechanism for recovering these costs from savings made subsequently, either through an earmarked *investment fund* (for example a mixed public–private investment fund to finance the projects, such as the FIDEME, managed by ADEME in France[45]), or through the intervention of an outside third party (third-party investor or eco-energy service company). Public authorities can limit their involvement to covering the risks related to the novelty of the activity, by using bank guarantee funds to cover the investment-related risks (e.g. FOGIME in France[46]).

Providing clear price signals with energy prices and taxes

For users to change their behaviour and for investment in renewable energies to reach a critical level, 'price' signals sent to users and investors need clear objectives and duration. In simple terms, a price to the user of fossil fuels that remains high encourages energy saving and the search for alternative sources. For example, high prices per kWh in the residential sector is the main reason for the strong development of solar-powered water-heaters in Cyprus, Israel and the Palestinian Territories, while low summer energy prices in France slow exploitation of the solar potential, and, in Egypt, the very low price of natural gas (2.5 cents ($) per kWh in 2000) limits the development of renewable energies.[47]

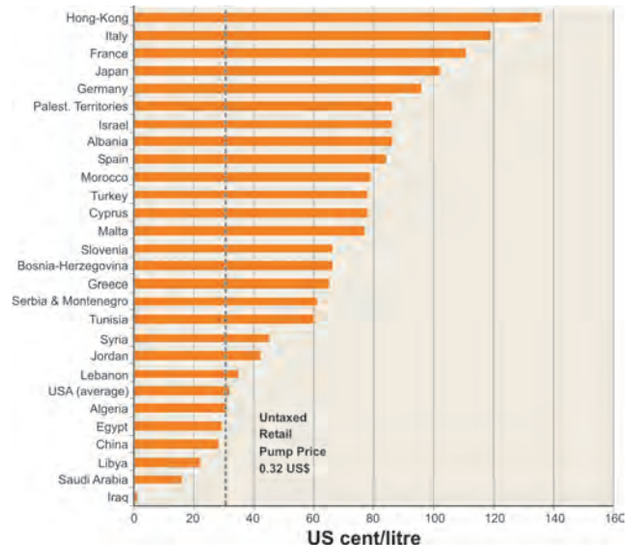
Public authorities therefore play a major role (consciously or not) through *energy taxation* or the setting of prices, and they can directly influence the behaviour of the various actors through the relative final prices of the various energy forms. In order to introduce such distortions into the relative prices of different energy sources and send a price signal to users (prices that would integrate short- and long-term environmental and social objectives), public authorities may, for example, tax the most-polluting energy sources more heavily. This provides a threefold advantage:

1. it internalizes some of the negative environmental externalities in the price[48] and therefore facilitates awareness of the sustainable development objective in energy choices by giving an advantage to the least-polluting energy sources;
2. it increases the price of energy, thereby encouraging energy savings;
3. it creates possible resources for funding energy efficient actions.

There are currently surprisingly large differences in electricity (particularly residential), heating and fuel prices between countries around the Mediterranean. Although there is an attempt to harmonize energy taxation in the EU,[49] the taxation levels in the other Mediterranean countries vary considerably.

This variation is shown by the *pump price of super-grade petrol per litre* (Figure 2.14), which shows indirectly the low level of petrol taxes in the hydrocarbon-producing countries (Algeria, Libya, Syria and Egypt) and differences of 1–5 between the prices in Libya and Italy, also between Greece and Italy (1–2). Italy has some of the Mediterranean's highest prices and one of the lowest energy intensities in the world.

Figure 2.14 Pump price of super-grade petrol



Source: GTZ, 2001

Note: $1 = 1.16 euros

The level of $0.32 per litre is considered as the average hypothetical cost per litre of super-grade petrol (including distribution costs but not taxes). Below this price, the petrol is probably subsidized; above this price, it is certainly taxed. This graph indirectly shows the taxation level of petrol in various countries. The hydrocarbon-producing countries are among those that tax petrol the least, or even subsidize it.

The price of *low-tension electricity per kWh* (especially residential) also varies widely in the countries around the Mediterranean, whereas, basically, there is almost a single price for oil, and the prospect of interconnecting networks and exchanges of energy flows should result in a similar trend for electricity prices. Table A.24 in the Statistical Annex shows the magnitude of these variations in the SEMC. The lowest price is found in Syria (0.006 euros for the first bracket), the highest in some Palestinian and Moroccan villages connected to generators (up to 0.30 euros), some 50 times higher.

However, the general level of *energy taxes* is fairly high and provides a substantial share of public income. The producer countries levy from 30 to 90 per cent of oil income. The consumer countries apply specific taxes to oil products. Taxes on automobile fuels account for more

than 50 per cent of the final price in all EU-Med countries and in Turkey.[50] These taxes contribute 10 per cent of total tax income in France, and 7 per cent in Italy. They contribute significantly to national budgets, which might explain a certain internal resistance to reforms in this field. On the other hand *environmental taxes* on energy are not widely used, except in the four EU-Med countries, which increased them gradually between 1985 and 2001 (coal tax, etc.). Moreover, the costs of the impacts of fossil fuels on human health and the environment are often paid by the community or transferred to future generations, but this is far from being included in the price to the user.

Box 2.8 Energy prices and costs

Energy prices currently do not always reflect the full costs to society, because they seldom account for all the impacts of energy production and consumption on human health and the environment. Estimates of these external costs for electricity, for example, are about 1–2 per cent of EU GDP and reflect the dominance of environmentally polluting fossil fuels in energy production.

Energy subsidies between 1990 and 1995 remained focused on the support of fossil fuels and nuclear power, despite the environmental impacts and risks associated with them.

With the exception of diesel and unleaded petrol for transport, energy prices in real terms fell between 1985 and 2001. This reflected trends in international fossil fuel prices and the move towards liberalized gas and electricity markets, which stimulated greater price competition. The reductions occurred despite increases in energy taxation – other than for industrial electricity where energy taxes fell.

Source: EEA, 2002

The introduction of taxes at a sufficiently high level to act as an incentive, without, however, adding excessively to existing mandatory charges or penalizing the poorest, requires *fiscal* reforms,[51] which involve the adoption of fairly sophisticated and complex tax measures to which public authorities are often reluctant to commit themselves. Among the easiest reforms to get accepted, the introduction of tax rebates for labour following the application of an incentive tax on energy may enable a partial transfer of productivity improvements from labour towards energy. Such reforms should, on the other hand, make it possible to guarantee access to energy for the poorest and get the measures accepted. Even in the industrialized countries, a steep rise in energy prices can lead to violent social disturbances, as shown by the scale of the truckers' strikes in Europe in 2000, following too steep a rise in fuel prices. One of the keys to energy taxation that favours sustainable development is therefore to introduce tax reforms and cross-subsidy mechanisms that make *apparently* antagonistic objectives compatible. It may indeed seem contradictory to want both inexpensive energy, accessible to the poorest, and sufficiently expensive energy to encourage savings and to integrate all the externalities related to its use. However, some countries have managed to invent operational pricing systems with socially based brackets that differentiate between users, or cross-subsidy mechanisms for the poorest, that make it possible to reconcile these objectives. Cross-subsidy mechanisms have been implemented between urban and rural areas, between regions and, more generally, between tax-payers and users or even between different categories of users. Morocco and France fund part of the investment needed for rural electrification (nearly 50 per cent in Morocco) by a charge on all customers of the national electricity grid.

Poorly targeted reforms (for example social brackets that are too large, subsidies for coal in some producing countries, tax exemptions for some professional categories or some areas), considerably limit the effectiveness of environmental taxes and obscure the signal for users. Many countries maintain the price of electricity well below its actual production costs for social reasons and through public aid. This is the case in Algeria, Egypt, Lebanon and Syria where most subscribers pay less per kWh than the average cost,[52] estimated at about 0.06–0.07 euros per kWh for low voltage distribution. Financial incentives and tax systems in the energy field in Mediterranean countries often remain extremely complicated and opaque; they overlap with one another. Social objectives or national independence are often put above environmental objectives. There results a clouded price signal that is generally unfavourable to more efficient energy use and 'clean' energy.

Such measures therefore require explicit, vigorous and coherent policies if they are to be implemented in anything other than a purely symbolic way. Renouncing the use of subsidies that encourage the waste of resources, and implementing energy taxes that are well adapted to the objectives of sustainable development are essential elements in the positive evolution of energy use, and may be facilitated by the following conditions:

- Strong determination and good communication efforts. To be accepted by consumers, who are familiar with a high level of taxation, tax reforms need to be explained by raising awareness about what is at stake in the long term, and applied in a fully transparent way.
- A certain consistency in time to avoid some reductions in energy costs, related, for example, to fluctuations in world prices, which should not be passed on to the consumer and thus cloud the message.

- Using the occasion of a falling trend in energy costs resulting from productivity gains in the energy production and distribution sectors (technological progress and the opening of energy markets to competition) to introduce tax reforms that internalize the cost of the externalities and thus restore the environmental objective into energy choices. Currently, except in the transport fuel sector,[53] taxes in EU countries have not compensated for the average reduction in the price of energy to the consumer between 1985 and 2001, resulting from liberalization of the gas and electricity market. They have therefore had little effect on reducing demand[54] (see Chapter 3). Also, given that a car in 2000 uses half the petrol it did 20 years ago, a rise in petrol prices resulting from the introduction of an environmental tax is likely to be more acceptable if it is seen to be partially compensated by this technological improvement.
- Increasing the price elasticity of energy demand in the short term by developing the possibility of substitution. Economic measures (such as energy taxes) can affect company profits or household incomes without necessarily resulting in behavioural changes unless alternatives are immediately available as a result of complementary structural changes (for example town planning that enables improved mobility, better engines in cars and better public transport).

Thus economic measures are invaluable for implementing more sustainable energy policies in some circumstances, but they have their limits and must be integrated into a wider framework that combines all the other measures: regulatory (regulations in the building sector), technological, and awareness-raising, which is sometimes the most effective (for example leading to industry-wide agreements in the household appliances sector).

The need for regional cooperation

Despite national differences, the need to improve energy efficiency and develop renewable energy is common to all countries. Regional cooperation is vital for progress down this path and for helping countries that urgently need to follow less costly development paths in terms of energy and environmental impact.

Regional Mediterranean cooperation is included in the framework of the major conventions and international agreements, particularly the Framework Convention on Climate Change and the Johannesburg Plan of Action (Box 2.9). They recognise the *energy development needs* of the poorest countries and confirm the importance of *energy efficiency strategies* and the *promotion of renewable energy* for more sustainable energy development. These paths will be a priority for international cooperation and this is reinforced by the commitment of the G-8 countries in 2002 to promote renewable energy and the International Energy Charter.

Box 2.9 The main recommendations of the Johannesburg Plan of Action in the energy field, 2002

Access to energy: improve access to reliable, affordable, economically viable, socially acceptable and environmentally sound energy services, including the target of halving the proportion of poor people by 2015.

Energy efficiency: integrate energy considerations, including energy efficiency, into socio-economic programmes conducted with the support of the international community. Accelerate the development, dissemination and deployment of energy conservation technologies related to energy efficiency programmes, including the promotion of research and development.

Renewable energies: diversify energy supply and substantially increase the share of renewable energy sources.

Energy markets: reduce market distortions by restructuring taxation and phasing out harmful subsidies.

Funding SEMC *energy development*

Major efforts on access to energy are needed in many SEMC, given current delays in providing the necessary equipment and the very strong growth in demand that is predicted. The funding needs of the energy sector in the SEMC are estimated at 200 thousand million euros to 2010, 55 per cent for the electricity sector and 45 per cent for the hydrocarbon sector.[55]

The role of Official Development Aid (ODA) in this funding is getting smaller and smaller. There is a significant and continuing decrease in bilateral or multilateral public capital likely to be invested in structural projects in the Mediterranean region (for reinforcing institutions or for large infrastructure expenditure). The average amount of ODA for the energy sector in the Mediterranean countries between 1973 and 2001 was US$300 million per year,[56] which is little compared with the needs (Figure 2.15 p139).

Governments have already begun to liberalize the energy sector in order to attract direct foreign investment. The strength of the big international companies has become a major determining factor. The 'return' to Algeria of foreign companies and the intensification of their presence in the other countries is significant. In the electricity sector, for example, to satisfy the very strong growth in demand, several SEMC have changed their laws to enable investors to build, exploit, even own independent electricity production plants (IPP) through different forms of concessions. More than 21,500MW of IPP projects have been awarded to private consortia, and 47,000MW are planned by mid-2004. Large developments

are underway in Turkey favouring operations that give foreign or mixed companies responsibility for installation (from building to operations) with the investors being reimbursed by payments from customers.

Clearly the specifications concerning respect for the environment in this kind of operation are vitally important given the risk of 'low cost, low environmental standards' in tenders and the difficulty of imposing environmental rules and managing them.[57] Although liberalizing the sector may in some cases contribute to modernizing networks and reducing distribution losses, the strategies of private operators may conflict with the search for energy efficiency by their client consumers.

Regional cooperation in energy efficiency and renewable energy

Mediterranean regional cooperation has an essential role to play in collective learning and the development of Mediterranean 'know-how', the importance of which has been seen in the implementation of new energy efficiency strategies and renewable energy developments. The most active countries and companies in this cooperation will, in the medium term, benefit from additional growth potential because of the savings achieved and the reductions in environmental impact. They will also have a technological head-start in sectors that are certain to develop in the run-up to the 'post-oil' era.

The original MEDENER initiative, the Mediterranean network of energy efficiency agencies, deserves mention. This network promotes the exchange of experience in the energy efficiency and renewable energy fields. The extension of such a network to the whole of the Mediterranean and the strengthening of its resources could play a very significant role in this collective learning process in a region with large renewable energy potential.

Box 2.10 MEDENER, a Mediterranean network for energy efficiency agencies

The objective of the MEDENER Association, founded in 1997, is to contribute to the development of partnerships among its members by promoting exchanges of experience and the sharing of know-how in the fields of rational energy use and the development of renewable energies, as well as the protection of the environment both on a local and global level in relation to the energy sector. At present, MEDENER gathers 12 energy efficiency agencies from the Mediterranean countries. Within the framework of its mission and since its founding, MEDENER has collaborated with a view to executing joint projects, in particular the current MEDA projects, 'applying solar thermal energy in the Mediterranean Basin' and 'urban environment in the Mediterranean cities'. MEDENER also organizes Mediterranean events on topics where it is active.

Cooperation could also play a fundamental role in reinforcing and supporting energy efficient agencies and the emergence of *energy efficiency* programmes in the Mediterranean countries, especially in the electricity field. Some progress has been made in the field of energy planning in the SEMC, particularly in awareness raising and training of energy teams at the local level. Pilot projects for managing electricity demand for public lighting and co-generation have also been implemented (Box 2.11).

Regional cooperation can also play a role in the harmonization of standards and coordination of several countries' activities. For example, the role of the European Commission was very important for the EU-Med countries in harmonizing methods and standards. The power of a group of 15 countries certainly contributed to voluntary agreements with industrialists (for example on refrigerators). The many European Directives (energy efficiency, labelling on household appliances, the harmonization of energy taxes, thermal regulation, renewable energies, etc.) have certainly played a very important role in the emergence of national strategies. Mediterranean cooperation could also influence this kind of harmonization.

I*nternational public aid* has a vital role to play in promoting the funding needed to implement energy efficiency actions and develop renewable energy in the southern and eastern countries. Official Development Assistance (ODA) could help the poorest countries to emerge from a vicious circle: 'to develop at the lowest energy cost you must already be rich enough to be able to afford energy-saving technologies which generally involve high initial expenditure'. Given the financial stranglehold in which a number of SEMC find themselves, ODA can trigger the process by paying the immediate 'additional cost' of taking long-term requirements into account (the benefits of such costs being collective and deferred). Such aid could be conditional on the implementation of the national instruments necessary to make such actions lasting. Outside the traditional methods of public aid to development, systems are being developed for exploiting the new financial mechanisms set out by the Convention on Climate Change and to increase incentives for local saving (such as micro-credits).

But cooperation in energy efficiency and renewable energy remains minimal compared with the scale of the challenge. It consists mainly of many isolated projects, with inadequate long-term structural capability (Box 2.11).

In the field of energy, the ODA for the Mediterranean countries has been falling significantly in absolute terms since 1991 (Figure 2.15). Moreover, for the whole of the 1973–2001 period, ODA for energy efficiency and renewables was only about 10 per cent of total ODA received by the Mediterranean countries in the energy

Table 2.3 The distribution of the ODA intended for the Mediterranean countries in the energy sector, Cumulative, 1973–2001

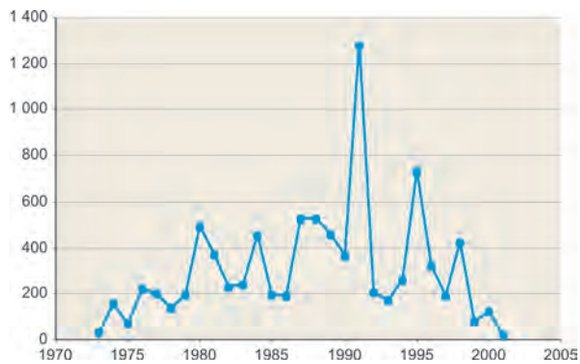
	Amount (thousand $)	% of total
Biomass	14,346	0
Coal-fired power plants	445,410	5
Electrical transmission/distribution	2,980,980	33
Energy education/training	17,526	0
Energy generation and supply	6596	0
Energy policy and administrative management	723,171	8
Energy research	6143	0
Gas distribution	236,602	3
Gas-fired power plants	607,773	7
Geothermal energy	5873	0
Hydroelectric power plants	1,558,174	17
Nuclear power plants	39,382	0
Oil-fired power plants	92,010	1
Power generation/non-renewable sources	2,004,112	22
Power generation/renewable sources	47,696	1
Solar energy	10,183	0
Wind power	128,087	1
Total	**8,924,063**	**100%**

Source: Blue Plan from OECD-DAC data

Note: in green, actions in energy efficiency and renewables.

sector (US$947 million out of US$8,925 million). Funds remain devoted mainly to the production and distribution of electricity (Table 2.3).

Figure 2.15 ODA total amount intended for the Mediterranean countries in the energy sector, 1973–2001 (in 1,000 US$)



Source: Blue Plan from OECD-DAC data

Note: The cumulative total between 1973 and 2001 comes to roughly 9 thousand million dollars, or an average of 300 million dollars per year. Some of the donor countries in diminishing order: Germany, Japan, the US, Italy and France cover over 80 per cent of the ODA.

If we look at MEDA regional and national projects since 1997, we find a more significant effort on energy efficiency and renewables, about 35 per cent of the total for the energy sector. Nevertheless the amounts remain very small (seven projects totalling about 24 million euros between 1997 and 2003) when compared with those invested elsewhere in the sector. For comparison, the EIB alone made 2 thousand million euros of loans to the energy sector in the SEMC, of which only 1 per cent went to renewable energies.

Box 2.11 Some energy efficiency and renewable energy projects in the Mediterranean region

This is an indicative glimpse of a few significant cooperation projects in energy efficiency and renewable energy in the Mediterranean. Given the budgets involved and the lack of time to assess such recent projects, it is difficult to evaluate their real influence other than as a demonstration of what is possible.

The French, Spanish and German governments support such projects, but their budgets remain small. French cooperation is about support to local authorities and proposing a wide range of technical transport solutions that are

adaptable to the specific circumstances of each town (for example high-capacity buses, tramways with rubber-tyred wheels, light or heavy metro systems).

The GEF has also supported projects for promoting energy efficiency in Egypt, Palestine and Syria (US$10 million in all) and developing photovoltaic energy in Morocco (US$5 million), solar heating in Tunisia (US$7.3 million with participation from Belgium Funds) and a solar power station in Egypt (US$20 million).

In Lebanon, projects in 2002 aimed at reinforcing energy efficiency in construction (FFEM, 1 million euros), UNDP/GEF on adopting thermal regulation for buildings (US$500,000), a multisector project for improving energy efficiency (UNDP/GEF, US$5 million) and a more general project for restructuring of the energy sector, particularly in terms of liberalizing the sector and supporting a reduction in prices and improved energy efficiency (EU, 2.85 million euros).

Through various programmes (regional and national MEDA, Save, Alterner, Synergy changed to Coopner, Life-Third-Countries), the European Commission supports some interesting projects but is very limited by a lack of resources:

- a pilot programme for rural electrification with photovoltaic energy in northern Morocco;
- support for national energy-efficiency agencies;
- between 2000 and 2003, one to three projects per year funded in the Mediterranean by the SYNERGY and COOPNER programmes;
- six 'Regional MEDA' projects launched in 2000 and 2001 (for example urban energy and the environment, training in energy policies, photovoltaic pumping of water). Of these, the 'application of solar energy in the Mediterranean Basin' project is an example of an integrated approach. Its aim is to spread to the southern Mediterranean the concept of Guaranteed Solar Results (GSR), used successfully in many solar installations in Europe and making it possible to contractually guarantee the technical and economic performance of solar water heaters. This project should eventually contribute to the development of local small and medium-sized industries and networks of craftsmen, following a process similar to that under way in the northern Mediterranean.

Among the projects put forward in Johannesburg, a regional initiative MEDREP (Mediterranean Renewable Energy Programme) was launched for promoting renewable energy in the Mediterranean region. The programme, bringing together many partners, is supported by the Italian Ministry of the Environment. It aims to develop a renewable energy market system through financial instruments, and strengthen policy frameworks and private sector infrastructures. Within this framework, a Mediterranean Renewable Energy Centre (MEDREC) has been set up in Tunis.

Source: Plan Bleu, European Commission

Energy efficiency projects need to overcome obstacles related to the *scattered nature* of the actions, the size of the projects and the multiplicity of financial sources which are not always well adapted to funding energy efficiency projects. Traditional donors have, till now, seldom supported the kind of project which is justified, at least partially, by factors other than financial profitability. Another problem is related to the generally small size of energy efficiency projects, that are poorly adapted to the usual funding procedures. What is needed is to group such projects together (for example 'low consumption' lamps and small-scale co-generation) so as to obtain an overall project that is likely to interest local or international banks.

Many proposals uphold the idea of creating a *support instrument* for setting up project funding. Such a public-private structure (specially created or included in an existing body) could provide aid for designing and regrouping projects. It could benefit from preferred access (rapid set-up, simplified procedures) to the right to draw from various existing public funds (according to well defined criteria) and private funds that could be implemented within the framework of a renewed partnership. The potential of the flexibility measures set out in the Kyoto Protocol, for example, could be exploited.

The Kyoto Protocol provides an opportunity to build and test new forms of mutually beneficial partnerships on the Mediterranean scale through the *Clean Development Mechanism* (CDM). This mechanism enables the so-called Annex 1 countries, committed to stabilizing or reducing their GHG emissions, to acquire emission credits by contributing, at least-cost, to reducing the emissions of developing countries that are not committed to the Protocol. Although the detailed methods of implementing clean development mechanisms are complex[58] and not yet finalized, this is an area where cooperation between the Mediterranean countries should be developed to help promote energy efficiency and renewable energies. The benefits are mutual, that is by funding such projects in the SEMC, for example, the European countries could acquire (at least-cost because of their lower energy intensity) emission rights while contributing to the development of their southern shore neighbours and the protection of the Mediterranean eco-region. In return, the SEMC would benefit from technological transfers, relax their immediate financial constraints and reduce their medium-term energy and environmental costs.

Most of the SEMC have identified projects for reducing greenhouse gas emissions that might be implemented within the framework of the CDM. Most of these are renewable energy and energy efficiency projects, and the CDM could cover the additional costs of the projects compared with coal- or gas-burning plants. But given the scattered nature of energy efficiency projects,

the CDM is particularly appropriate for the development of renewable energies (more particularly wind power). One study[59] has shown that in terms of the costs of GHG emission reduction, the EU would be well advised to develop CDM-renewable energy projects in the Mediterranean, since it would allow it to reduce its costs significantly by substituting CDM interventions for expensive domestic actions in the Mediterranean. Up to 2030 the savings that might be made through investment in CDM-renewable energy projects in the SEMC would be about 1.8 thousand million euros for a total investment of about 1.2 thousand million euros (1999). The additional installed renewable energy capacity would be about 18,000MW by 2030, corresponding to approximately 11 per cent of the electricity produced from renewable energy sources.

To facilitate the implementation of the CDM potential in the Mediterranean and thus to prevent the CDM from mainly favouring the large carbon-producing countries (China, India and Brazil, which have greater greenhouse gas-saving potential than the SEMC), a *Mediterranean Carbon Fund* (MCF), uniting all CDM initiatives and projects, could be created. This fund could be managed by the above-mentioned regional structure, which would organize and facilitate the bringing-together of initiatives in the SEMC in exchange for carbon emission credits.

However, the CDM mechanism, despite its recognized effectiveness, is likely to resolve only a small part of the energy problems encountered by the Mediterranean countries. It will apply mainly to the development of wind power. It may have no impact on other major areas (heavy transport infrastructures, urban planning and housing), which will govern energy demand in the medium and long term (with the number of dwellings expected to double between now and 2010 and an increase in passenger and freight transport of more than 5 per cent per year in the SEMC). *More international aid targeted on energy efficiency and renewable energy* could catalyse the emergence of more sustainable national energy strategies.

The EU's role in Mediterranean energy cooperation

Within international cooperation, *Euro-Mediterranean cooperation* plays a particular role given the complementarity between the two shores: the significant potential for renewable energy is in the southern-rim countries while the northern-rim countries possess most of the technology. For Europe the security of its supplies also depends on its Mediterranean neighbours (considerable gas and oil reserves in the southern-rim Mediterranean countries, the security of transportation of hydrocarbons from the Gulf, southern Russia and the Caspian Sea). Least-cost environmental and social economic development of its southern shore is also a fundamental challenge for Europe. For the hydrocarbon-producing SEMC, Europe represents a vital outlet (they export 50 per cent of their oil and 90 per cent of their gas to other Mediterranean countries). For the other SEMC, the possibility of exporting renewable energy sources may not be insignificant in market terms ('green' certificates).

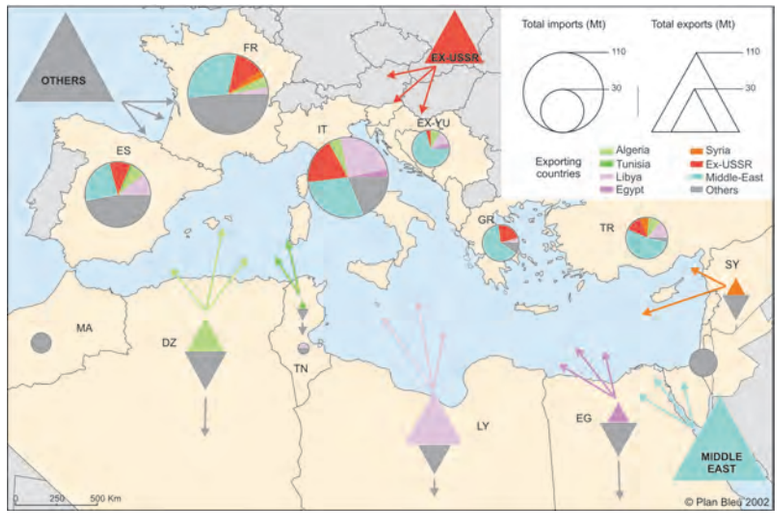
It is therefore natural that energy figured among the six priorities of the Euro-Mediterranean Partnership launched in 1995 in Barcelona, which stressed its structural importance (particularly alongside transport, water and the environment). Since then, there have been several Euro-Med forum where 27 energy ministers have met to promote dialogue on energy questions and orient regional cooperation. Although the developmental objective of energy efficiency and renewable energy policies is specifically mentioned in the guidelines for this cooperation, it nevertheless seems that most of the efforts and thinking have focused on *liberalizing* the energy sector in the SEMC (institutional and regulatory framework reforms, restructuring the energy industry, privatization and the introduction of competition), on modernizing infrastructures, and on pursuing interconnectivity. Here again, the process seems focused mainly on energy supply without considering the possible conflicts with developing the alternatives of energy efficiency and renewable energy. There is no doubt that restructuring supplies can contribute indirectly to improving energy efficiency, but it may also produce price distortions unfavourable to managing energy demand.

This new and original Euro-Mediterranean dialogue building on energy is an opportunity to pursue the energy efficiency and renewable energy objectives more vigorously by readjusting budgets in their favour (national and regional MEDA). But to do that, the projects should be undertaken by the countries themselves and included in coherent national strategies (the importance of which was discussed above) that guarantee the sustainability of actions, through the implementation of the regulatory, institutional and financial mechanisms needed for pursuing them, for longer than just the duration of projects. The *Euro-Mediterranean partnership* (particularly the bilateral actions) could well play an even more significant role for the emergence of policies more directed towards energy efficiency and renewable energies. In this way, the EU would be faithful to its Kyoto commitments and its strategies in the eastern European countries would be more clearly directed at improving energy efficiency. From this point of view, the path from the baseline scenario to an alternative proactive scenario as regards energy efficiency and renewable energy, might look something like the following:

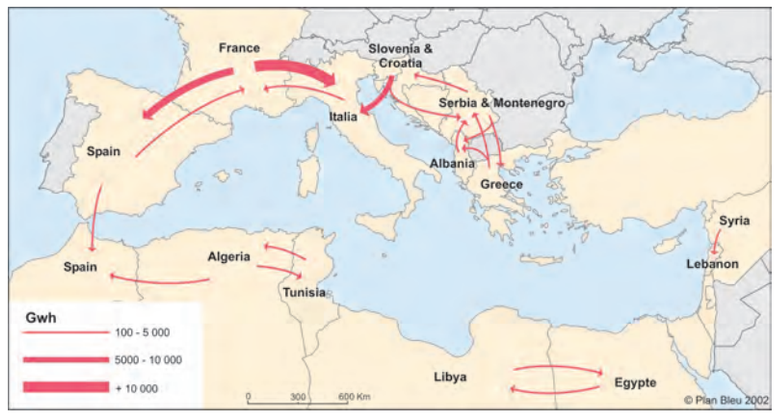
- Providing aid to countries to develop national energy efficiency and renewable energy strategies (for example institutional support for an energy efficiency

Figure 2.16 Map of the Euro-Mediterranean energy trade (gas, oil, electricity), 2000

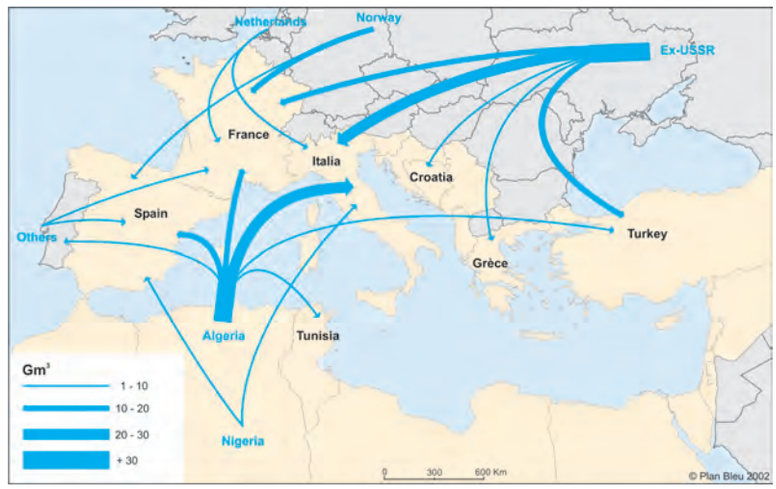
Oil trade



Electric trade



Gas trade



Source: data from OME, 2002

plan) and for using the experiences of other Mediterranean countries (Tunisia, Morocco, Egypt, Italy, France and Spain, etc.).
- Setting energy efficiency objectives in all projects funded by the EU (indicators) and making more use of pre-feasibility studies in the initial stages of energy investment projects, in order to establish whether some of the proposed infrastructures could be avoided or deferred by less expensive measures of energy efficiency or renewable energy.
- Exchanging experience and training in this specific area (agency networking, training courses), particularly with more demonstration projects.
- Setting up financial systems adapted to the characteristics of the projects (small size, many actors); ODA could facilitate the provision of funds for financing the immediate 'additional costs' of energy efficiency and renewable energy projects.
- Setting a minimum quota for funding in the energy efficiency/renewable energy field, which might be a way of guaranteeing that priority is transformed into practice and not systematically put below liberalizing markets and interconnecting projects.
- Exploration of the potential for 'green' exchanges of energy between Mediterranean countries.

The challenge: An alternative scenario to 2025

To sum up, potentially, there is a path to significantly improving the prospects for energy efficiency and renewable energy and, fortunately, this is already being followed by some Mediterranean countries. But it calls for an all-out effort by all actors, in particular public authorities, to:

- develop national energy efficiency and renewable energy strategies that have quantified objectives and include all the sectors and actors concerned;
- reinforce financial resources earmarked for energy efficiency agencies and the funding of investments;
- implement favourable institutional and regulatory frameworks;
- gradually reform energy taxation and implement innovative cross-subsidy mechanisms;
- reinforce regional cooperation (exchange of experiences, technology transfers, funding mechanisms).

The benefits of such an orientation can be illustrated quantitatively by means of an alternative scenario, proposed below, which would differ from the baseline scenario through:

- *exploitation of potential energy savings* of approximately 20–25 per cent (depending on the country) of total energy demand, a potential that it should be possible to exploit over 25 years, given currently available technology;
- *faster development of renewable energy sources*, with renewable energy sources[60] providing 14 per cent of primary energy (11 per cent would be other than large hydropower) and 40 per cent of electricity production (24 per cent if large hydropower is excluded) by 2025, compared with 4 per cent of primary energy and 21 per cent of electricity production (8 per cent if large hydropower is excluded) in the baseline scenario.

These objectives have been differentiated by country, depending on their current energy structure and their energy potential, and quantified by the OME. The findings are shown by country groups in the Statistical Annex (Tables A.19 and A.21). Compared with the baseline scenario reduction of an average of 0.7 per cent per year from now to 2025, *energy intensity* in the Mediterranean countries in the alternative scenario would fall roughly twice as rapidly (–1.3 per cent per year).[61]

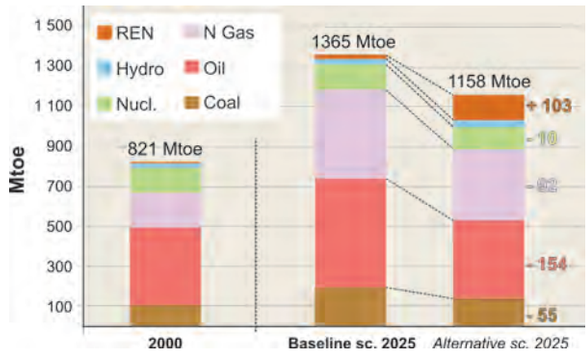
The total feasible *energy savings* in this scenario compared with the baseline scenario could reach 208Mtoe per year by 2025 in the entire region, about half of the projected growth in demand between 2000 and 2025. Approximately 60 per cent of this potential is in the SEMC and 40 per cent in the NMC. Figure 2.17 compares the energy supply structure of the two scenarios in 2025. In the alternative scenario, the share of oil is 34 per cent (40 per cent in the baseline scenario), which, with a reduced total demand, would lead to a *stabilization of oil demand* in 2025 at the 2000 level, compared with the baseline scenario projection of a 40 per cent increase in demand (150Mtoe) between 2000 and 2025. It also projects a saving of 92Mtoe in the demand for natural gas, compared with the baseline scenario. This is equivalent to half the present demand and would reduce the need to import and transport hydrocarbons, with its related environmental risks.

The alternative scenario would reduce the average *dependency index* of the Mediterranean countries by 20 percentage points compared with the baseline scenario in 2025. Generally speaking it would go from 34 per cent for the whole basin to 18 per cent between 2000 and 2025, compared with 38 per cent in the baseline scenario in 2025.

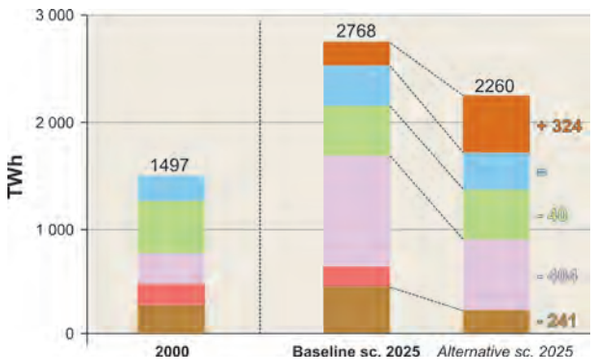
It would also enable very substantial *financial savings*. Assuming a linear exploitation of the savings potential over the next 25 years, the cumulative primary energy saving in the alternative scenario over the period would be around 2600Mtoe[62] for all Mediterranean countries, or the equivalent of US$455 thousand million[63] (or US$18 thousand million per year on average over the period). Of course this figure is very approximate, and the costs of implementing energy-demand management policies

Figure 2.17 Feasible energy savings with the alternative scenario, 2025

Primary commercial energy demand – MED



Electricity demand – MED



Source: Plan Bleu and OME data

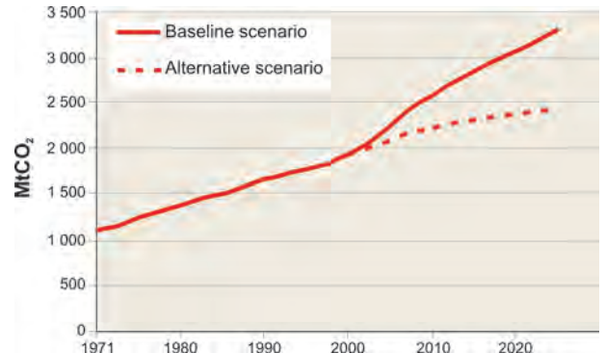
Note: MED – all Mediterranean countries together

would have to be deducted, but these are generally much smaller. By reducing the costs of energy services, this scenario reveals a considerable potential for economic growth.

The impact on *employment* is harder to assess. However, to give an order of magnitude, Morocco estimates the number of jobs likely to be created at 11,500 between now and 2011 as a result of increasing the share of renewable energy in total energy supply from 0.2 to 10 per cent.

The *environmental* impact in such a scenario would also be considerably smaller than in the baseline scenario. Gaseous emissions in 2025 would be 25 per cent lower than in the baseline scenario, both in the north and the south, or 858Mt of CO_2 emissions avoided by 2025. This corresponds to 45 per cent of current emissions. The share of the Mediterranean countries in the world's CO_2 emissions by 2025 would be less than 7 per cent (9 per cent in the baseline scenario) and would enable the four EU-Med countries to get closer to their Kyoto Protocol targets. This would also contribute to an improvement in urban air quality. Many energy supply infrastructures could be avoided or deferred, and their impact and related environmental risks would be reduced accordingly. Thus, in the alternative scenario, which is optimistic but not utopian, 154 power plants[64] could be avoided by 2025 compared with 400 additional power stations to be built in the baseline scenario.

Figure 2.18 Total CO_2 emissions according to the two scenarios



Source: OME, 2002

Obviously, these orders of magnitude have no predictive value. They simply illustrate quantitatively the considerable potential benefits of a possible alternative strategy that also reduces vulnerability to several geo-political, socio-economic and environmental risks. This alternative scenario clearly shows the need to act as early as possible. Given the strong inertia of energy systems and the irreversibility of some infrastructures, today's choices are critical. Other, even more proactive scenarios could be considered. They would question more profoundly some highly energy-consuming development and urbanization patterns of the Mediterranean countries.

***

Energy supply in the Mediterranean countries over the next 25 years presents a real *challenge* in terms of environmental, socio-economic and geo-political risks. To meet this challenge and accelerate the energy transition towards more sustainable supply modes, there is room for manoeuvre, which is already being explored by some Mediterranean countries, through strong national public policies that promote a fragile combination between managing demand and a more diversified, less polluting and less expensive energy supply.

Progress with *supply* has been achieved through the progressive development of gas, which is gradually replacing oil. However, the transition towards a larger share of renewable energies could be accelerated by more active public policies. Only the renewable energies can minimize the risks of growing energy dependence and the impacts on global warming without presenting new technological risks. Their potential in the Mediterranean is enormous and underexploited, although it could significantly (and at least-cost in many cases) improve the living conditions of millions of people, particularly in rural areas. The countries most advanced in this transition are investing in the future and will be winners in the mid-term from all points of view, economic, social and environmental, while also benefiting from technological progress.

However, such efforts on the supply side could be in vain if they are not accompanied by a search for energy efficiency on the *demand* side, which, again, will in the medium term be of most benefit to the countries that are most advanced in this field. The potential for savings is considerable. An alternative scenario has enabled us to illustrate some orders of magnitude of the possible savings for the whole Mediterranean Basin: nearly half of the additional energy demand and CO_2 emissions projected for 2000 to 2025 in the baseline scenario could be avoided. These figures are obviously very approximate but indicate the scale of the benefits available, which would open the way to a more sustainable energy future even without exploiting the major technological innovations that will be necessary between now and 2025. However, despite some progress, the considerable benefits of energy efficient strategies at all levels are not yet fully appreciated. Actions do not match the challenges and encounter obstacles that are more institutional and cultural than technical. Such strategies call for perseverance and determination but also an exploitation of knowledge.

In addition to purely national policies, *Mediterranean cooperation* has a major role to play. Faced with such challenges, not all Mediterranean countries are at the same level of awareness and action. Without a complementarity, well understood by both the most advanced and the less advanced countries, the technological and institutional gaps could increase, in the energy field as well as elsewhere, and efforts could become too thinly spread. Cooperation in the Mediterranean in terms of energy efficiency and renewable energy offers real possibilities for synergies with mutual benefits on the way to more sustainable development in the region.

Notes

1 Defined as the ratio between a country's total primary commercial energy consumption and its GDP.
2 IEA, *World Energy Outlook*, 2000.
3 In 1998, the US consumed 7930koe (*World Development Indicators*).
4 Measured directly at the end users.
5 This contribution may be more significant depending on the reality of applying the European Directive for promoting renewable energies.
6 Turkey alone is planning a considerable increase in its coal production: 40Mtoe between 2000 and 2025 for electricity production, mainly low-grade lignite.
7 In the SEMC the index drops from –57 per cent to 10 per cent between 2000 and 2025. In producing countries this index increases.
8 IEA, *World Energy Outlook*, 2001 (before the Iraq war). At the beginning of 2005, IEA prepared a new report that integrated the considerable rise in oil prices that has occurred since 2003.
9 European Commission (2000) *Livre vert*, p38.
10 IEA, *World Energy Outlook*, 2002.
11 From a 2004 survey (data communicated by the Syrian Ministry of Local Administration and Environment).
12 Lahbabi et al, 1996.
13 Max Planck Society, Smog over the Mediterranean, *News Release*, 25 October 2002.
14 Other greenhouse gases (under 20 per cent) emitted by the energy sector consist mainly of CH_4, from gas pipeline leaks or coal mines.
15 Also less NO_X and almost no SO_X.
16 Estimates based on emission coefficient averages used by the International Energy Agency, or 3.9 tonnes of CO_2 emitted per toe of burned coal; 2.8t CO_2/toe of oil and 2.3t CO_2/toe gas, (*World Energy Outlook*: 235; 354–357).
17 Or about 520Mt C.
18 In this regard flexibility tools such as the Clean Development Mechanism (described below) will have an important role to play.
19 In France they represent about half of the surface area occupied by industry and less than 0.13% of the total
20 Estimates on the basis of the power stations' average operating time being 6600 hours per year.
21 Grenon M., *Plan Bleu*, 1993.
22 The electricity intensity, defined as the ratio of electricity consumed to the GDP, has risen even more strongly than the energy intensity in most countries. In the NMC it has gone from 0.19kWh per $GDP95 in 1971 to 0.23kWh per $GDP95 in 2000, and in the SEMC it has nearly tripled over the same period, going from 0.23 to 0.60kWh per $GDP95.
23 EEA, Environmental signals 2001
24 Lahbabi et al, 1996.
25 Save Programme of the European Commission, project SA/263*98/Fr.
26 Enertech, 1998.
27 The alternative scenario, developed below, assumes exploiting about 80% of this potential by 2025.
28 Montgolfier, 2002.
29 Study carried out by the ESHA (European Small Hydraulic Association).
30 National Strategic Plan for the Development of Renewable Energies – CDER – October, 2001.
31 Information communicated by ADEME.
32 MED2010 Project, co-funded by the European Commission, coordinated by the Mediterranean Energy Observatory.
33 Including 2,970,000m² in Greece, 660,000m² in France, 440,000m² in Spain and 400,000m² in Italy – Source: information communicated by ADEME.
34 The 'Applications of Thermal Solar Energy in the Mediterranean Basin' project, the European Commission/ ADEME.
35 EEA, 2003.
36 ADEME's renewable energy budget was first increased to about 45M euros per year in 1999, then to 78M euros in 2002, 15M euros of which went on R&D.
37 IEA, OCDE, 2001, Turkey 2001 Review.
38 For example, the EU quantifies investments required for doubling the share of renewables in the EU's energy consumption between 1997 and 2010 at 165 thousand million euros.
39 Grenon M., *Plan Bleu*, 1993.
40 Charpin J-M., Dessus B., Pellat R., 2000.

41 This is especially true in the countries where the price of energy is high; targeted communications should then be enough for the development of the market for well-functioning machines.
42 Lahbabi et al, 1996.
43 In 1998 the US devoted 33 per cent of their R&D budget to renewables compared with less than 12 per cent to nuclear.
44 IEA, 2002.
45 FIDEME (French Investment Fund for the Environment and Energy Resources) is an own-funds financial action fund. The action is done through the intermediary of a joint venture capital mutual fund, one-third of which is met by ADEME and two-thirds by banks. In 2002 the fund was worth 45M euros, aiming through a leverage effect at triggering investments of around 300M euros in the energy efficiency and renewables sectors (the needs of which between now and 2005 are put at 850M euros).
46 FOGIME (French Guarantee Fund for Energy Resource Investment), created by an initiative of the SME Development Bank and ADEME, later joined by EDF and Charbonnages de France, is intended to promote investments made by small and medium-sized companies for energy efficiency or renewable energies, by backing loans contracted by them from banks up to a 70 per cent ceiling.
47 Cornut B., ADEME, 2001.
48 Or, in the opposite direction, enhance the environmental benefits of certain energy sources (for example a tonne of CO_2 avoided).
49 A European Directive is trying to reduce the spread in excise duties of fuels by setting a minimum rate of taxation.
50 IEA, Energy prices & taxes, 2001a.
51 This is the budgetary neutrality principle that generally goes along with the option of a tax incentive.
52 Including all production, transport and distribution costs.
53 Where, in any case, price elasticity is low, substitution being difficult.
54 EEA, Energy and Environment in the European Union, 2002.
55 The projects concern oil and gas production, oil and gas pipelines, LNG refineries and factories, electricity power stations, electricity transport and interconnections, the distribution of electricity and natural gas and renewable energy projects (OME).
56 i.e. around 1.7 per cent of the total ODA granted during that period.
57 Chatelus M., *Plan Bleu*, 2000.
58 Because what is required are procedures and institutions capable of observing the savings effectively made in the countries that receive the investment.
59 A research project supported by the European Commission, coordinated by the OME, which analysed the potential of the CDM renewable-energy projects in the SEMC with the POLES model to 2030.
60 Hydro+REs excluding bio-mass (see Statistical Annex, Tables A.19 and A.21).
61 Decrease of 1.7 per cent per year in the NMC and 1.4 per cent per year in the SEMC (Table A.18 in Statistical Annex).
62 208Mtoe × 25:2 = 2600Mtoe.
63 At the average price of US$175 per toe, corresponding to US$25 per barrel of oil.
64 Of 500MW, operating an average of 6600h per year.

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Chapter 3

Transport

The Mediterranean has always been an area of trade and high mobility. Although transport can provide extraordinary freedom (through the private car) and economic development,[1] it is also, in addition to the continuing toll of accidents, the cause of ever-increasing pressures on the environment through land being taken up by infrastructures, air quality being degraded by emissions of pollutants into the atmosphere, noise nuisance and discharge of pollutants into the sea.

This fundamental contradiction has a strong resonance because of the region's particular characteristics. Narrow coastal zones are criss-crossed by infrastructures that make them completely artificial; cities, poorly adapted to the car, lose their quality of life; mountain passes and valleys become corridors for lorries, and the environmental integrity and attractiveness to tourists of the sea itself is threatened by accidental or intentional pollution by regional and global maritime traffic. Thus the very identity of the Mediterranean is directly threatened by the development of transport.

While other regions of the world are beginning to take notice of this contradiction (in particular the European Union, the development of transport in the southern and eastern Mediterranean, particularly that resulting from the liberalization of trade, is proceeding with no effective implementation of vital regulatory environmental and social measures.

The *Blue Plan*'s baseline scenario to 2025, developed below, shows a growth in transport by land and sea that is strongly governed by the needs of trade and tourism. Above all, it projects significant impacts on the land and the environment despite substantial technological progress and an embryonic partnership between north and south.

Such developments are far from inevitable. Indeed, the area could develop along the lines of an alternative scenario, with an increase in traffic slightly below that in the baseline scenario, with substantial benefits in terms of environmental and social impacts. To move to such a scenario, people will have to adopt a more integrated transport system that combines:

- a rationalization of transport taxes and subsidies in environmental terms and the promotion of alternatives to road for land transport;
- the effective implementation of international maritime safety conventions and a genuine regional partnership based in particular on the concept of a multi-modal Euro-Mediterranean corridor.

This chapter aims to warn on the risks associated with the baseline scenario, give an order of magnitude of the benefits of, and explore ways of achieving, the alternative scenario.

A boom in transport benefiting the road sector

A first approach might be to examine the issue of transport using traditional analytical indicators of transport development (such as increase in car ownership) and studies of traffic flows. But from the point of view of environmental impacts and economic analysis, the key requirement is to study what modes of transport (plane, road, sea, rail) are being used. Moreover, the logic of modal split depends markedly on the type of traffic considered, for example domestic, international, or intercontinental sea traffic. Indeed, the intensity of traffic flows, in terms of frequency and volumes, has a direct influence on each mode. Above all there are major differences depending on whether one is considering passenger or freight transport. The following paragraphs will therefore be based on a geographic breakdown of both passenger and freight transport. The data for 1970 to 2000 show:

- an increase in transport that is much greater than that in the economy or population, largely dominated by road for land transport and transit traffic for maritime transport;
- a concentration of traffic at some points (road traffic through the Alps and the Pyrenees and transfer hubs, particularly for airplanes and ships).

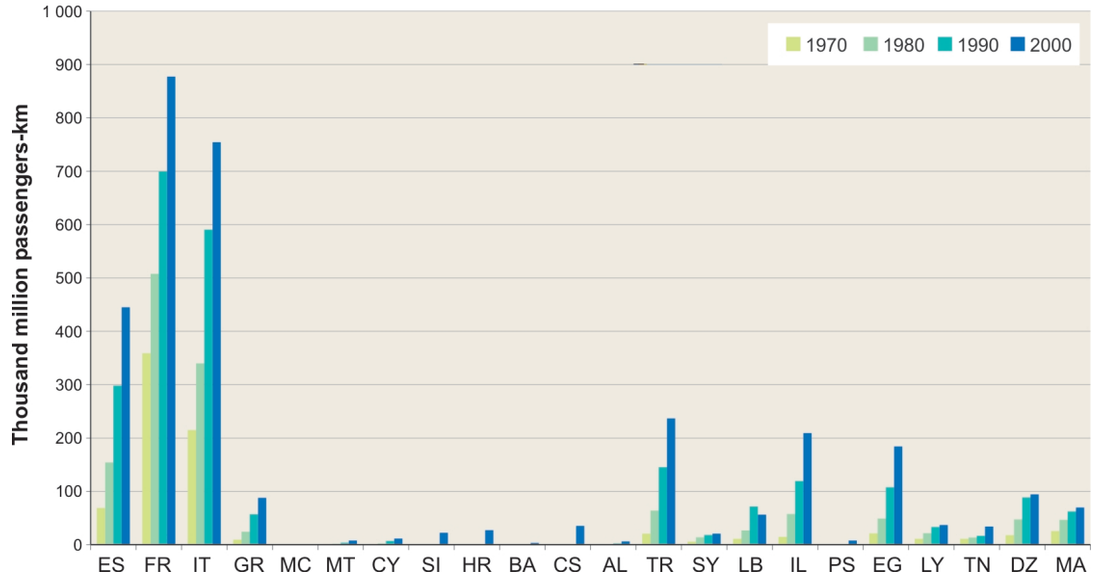
Passenger transport

Analysis of the development of all modes of passenger transport requires caution, since the data submitted by countries often confuse international and national traffic. Moreover, they are not continuous, particularly for road transport. Passenger transport data for air and rail are available for 1970 to 2000 from all countries. However, road transport data between 1970 and 2000 have had to be estimated by *Plan Bleu* for some countries, for which only the size of the vehicle fleet is known.

Despite these data problems, the link between economic activity and the level of traffic is clear: the richer the country, the more passenger traffic there is. Traffic in the four Mediterranean countries[2] of the EU (France, Italy, Spain and Greece designated 'four EU-Med') in 2000 accounted for 67 per cent of all passenger traffic in the Mediterranean Basin. Moreover, the development of transport reflects the political and economic events that have marked the Basin. Wars resulted in a sharp drop in traffic in the eastern Adriatic and Lebanon. On the other hand, the boom in passenger traffic in Turkey appears to be a consequence of strong economic growth.

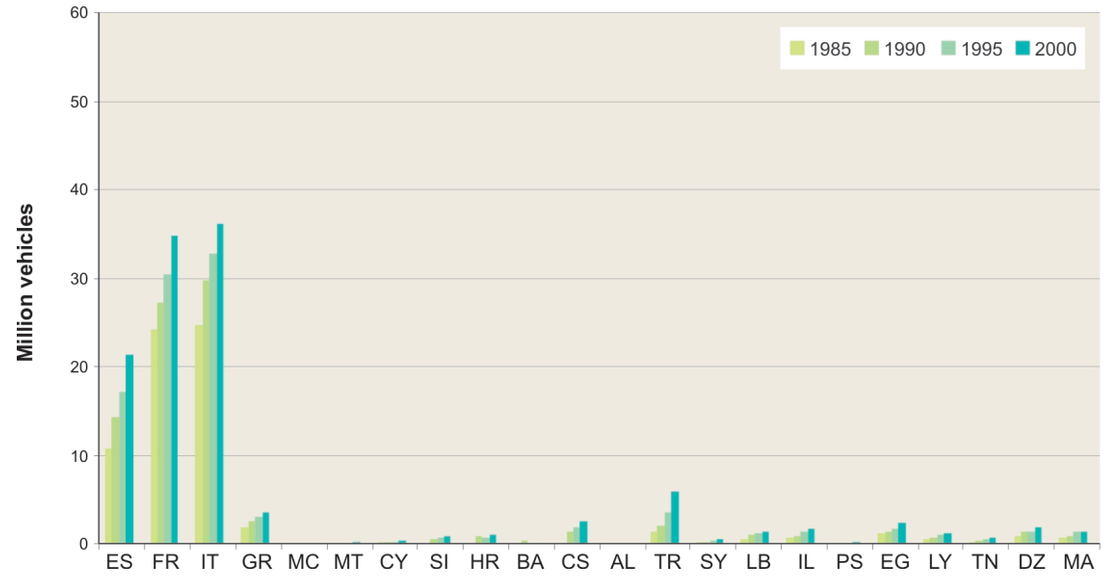
Generally speaking, the annual increase in passenger traffic between 1970 and 2000, for all modes except sea, was much larger (4.9 per cent per year) than that of population (1.4 per cent) and the economy (2.9 per cent),

Figure 3.1 Passenger traffic (air, rail and road), 1970–2000



Source: National Statistical Institutes, IRF, 1999; UIC, 2002; OACI, 2001

Figure 3.2 The car fleet in the Mediterranean, 2002



Source: MOTORSAT database 2002 (http://perso.club-internet.fr/motorsat), IRF, 1999

in both the northern Mediterranean countries (NMC) (0.5 per cent for population, 2.7 per cent for the economy and 4.4 per cent for traffic) and the southern and eastern Mediterranean countries (SEMC) (2.4 per cent for population, 4.6 per cent for the economy and 6.6 per cent for traffic) (Figure 3.1).

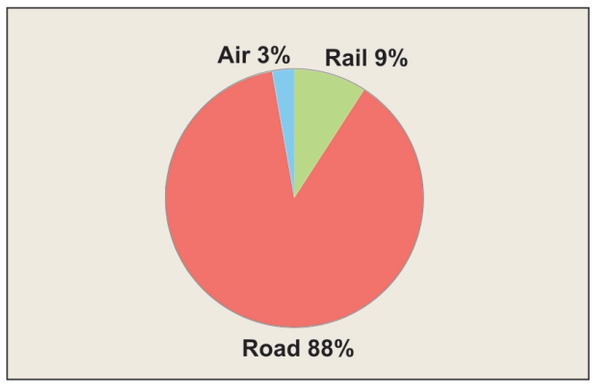
Although most of the data do not distinguish between domestic and international passenger traffic, it is important to do so since they use different transport modes. To enable this, the relationship between car fleets and the resulting traffic has been calculated for the Mediterranean countries where data are available and extrapolated to countries with similar geography and economies where only car fleet data are known (Serbian data were used for the eastern Adriatic countries, French values for Monaco, Greek for Cyprus, etc.).

Domestic passenger traffic: The dominance of road

The general increase in *car ownership* between 1984 and 2000 (4.1 per cent per year overall, 3.8 per cent in the NMC and 4.5 per cent in the SEMC) has resulted in an increase in car use to the detriment of rail (Figure 3.2). The increase in car ownership was 32 per cent greater than *Plan Bleu*'s 1985 projection for the European Union, 18 per cent less for the eastern Adriatic, Turkey, Malta and Cyprus, 172 per cent less for Maghreb and 166 per cent less for the Mashrek.

In countries where the development of *car traffic*[3] is regularly recorded, the data confirm these trends (3.7 per cent per year increase in road passenger traffic between 1984 and 2000, 2.7 per cent per year for rail). This preference for the car is shown by the way the modal split is dominated by road (Figure 3.3).

Figure 3.3 The modal split of domestic passenger traffic in the Mediterranean countries, 1999



Source: MOTORSAT database 2002 (http://perso.club-internet.fr/motorsat); UIC, 2002; OACI, 2001

Note: In this diagram all rail traffic was considered to be domestic; and 20 per cent of road traffic in Spain, France, Italy and Monaco, and 10 per cent of road traffic for the other countries was international.

Despite the dominance of road, *rail* continues to play a role, mainly in Egypt (47.3 per cent of domestic trips in 1999) and in the eastern Adriatic countries (23 per cent in the same year). *Maritime traffic* also plays a significant role in Italy, Greece and Spain (where more than 50 per cent of passenger trips by sea in 2000 were domestic). *Air traffic*, on the other hand, plays a significant role only in France and Spain (5 per cent in 1999).

There are many reasons for these developments, but essentially they result from:

- demographic and societal changes: household sizes are decreasing, car ownership is increasing, resulting automatically in a huge rise in transport by car;
- urban sprawl: cities are expanding considerably, increasing the distances between daily functions (home, work, leisure, etc.). In most of the big cities, it now takes an average of half an hour to go from home to work (see Chapter 4).[4]

International passenger traffic

There are no up-to-date statistics on origins and destinations for sea and road travel. The data given in this section therefore relate to trips by country and include all origins and destinations.

The driving force behind these trips is tourism and migration (see Part 1). The traffic is therefore mainly by air, with sea in second place.

Air traffic

The increase in air traffic remains high (7.3 per cent per year between 1984 and 2000), although this figure is lower than the comparable increase in the EU.

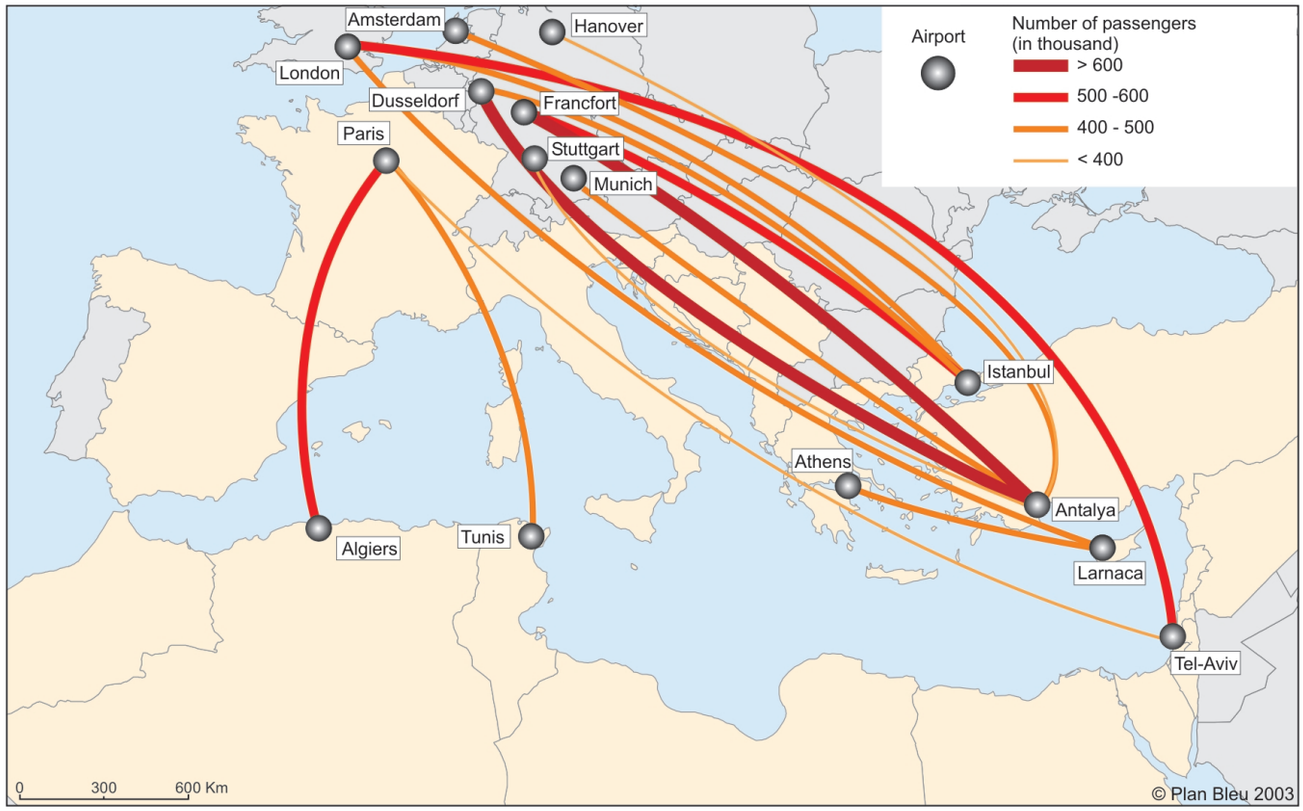
The link between air travel, tourism and emigration/immigration is clear. In 2001 more than 102 million passengers, arrivals and departures combined, passed through the airports of the non-EU Mediterranean countries (Figure 3.4). This was highly concentrated, with the main airports of only seven countries handling 75 per cent of this traffic. Nearly all flights were for tourism and emigration or immigration.

The liberalization and deregulation of air transport explains the fall in prices and the strong growth in this sector. But in the Mediterranean it has also contributed significantly to the development of mass tourism and the equipping of large airports at tourist destinations (including Palma, Antalya, Malta, Cyprus and Djerba). It also favours a concentration of traffic at 'hub' airports (Palma, Nice and Malta, for example).

This concentration has two essential consequences:

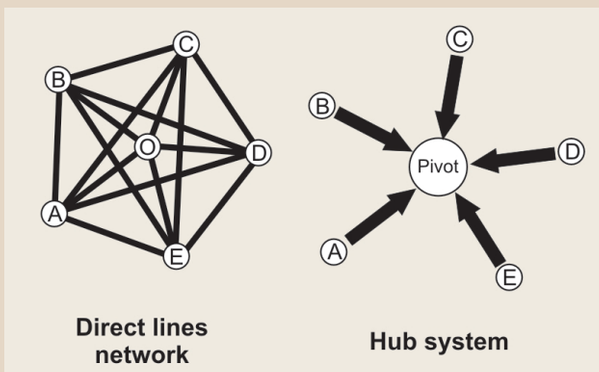
- Long-term planning of airport investment is more difficult, since traffic at a hub is not determined exclusively by local factors. It basically depends on the shape of company networks and often bears no

Figure 3.4 Air passenger traffic between the SEMC and the EU, main regular connections, 2001



Source: Airport International Council (2002) World Report, May–June

Box 3.1 The hub system



Source: Pavaux, 1995

Compared with direct-line networks, control of a hub (or star-like network) considerably reinforces the power of the carrier that has set up there, in the sense that it is very difficult for a potential competitor to penetrate a hub network either in a radial direction or on a 'crossover' route joining two peripheral cities (for example A and C in the above figure).

relationship to the transport generated by the region served by the airport. This results in the building and development of airports with no relation to national planning for the area.

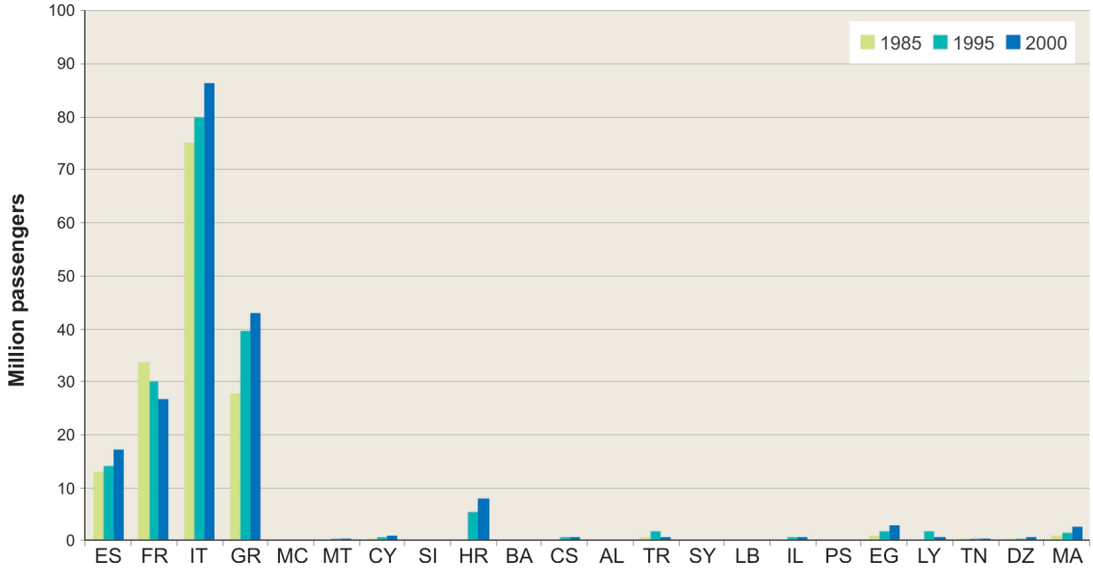
- There is increased congestion at many hubs. The concentration of traffic by one or two carriers at a hub tends to increase traffic at the busiest times, since rush-hour traffic then includes a dominant proportion of transit passengers, with a considerable increase in the frequency and number of flights and the associated noise and pollution.

Maritime traffic

After a phase of relative stagnation in the 1980s, maritime traffic in the Mediterranean countries of the EU (except France) saw a clear increase in the early 1990s. In the SEMC, where there is little travel by sea (slightly under 5 per cent of the traffic in the NMC in 2000), growth has nevertheless been spectacular (5.5 per cent per year between 1985 and 2000 compared with 1.3 per cent per year in the NMC) (Figure 3.5).

Generally, in the entire region, the growth in passenger traffic by sea remains well below that in GDP (1.5 per cent per year compared with 2.7 per cent for GDP).

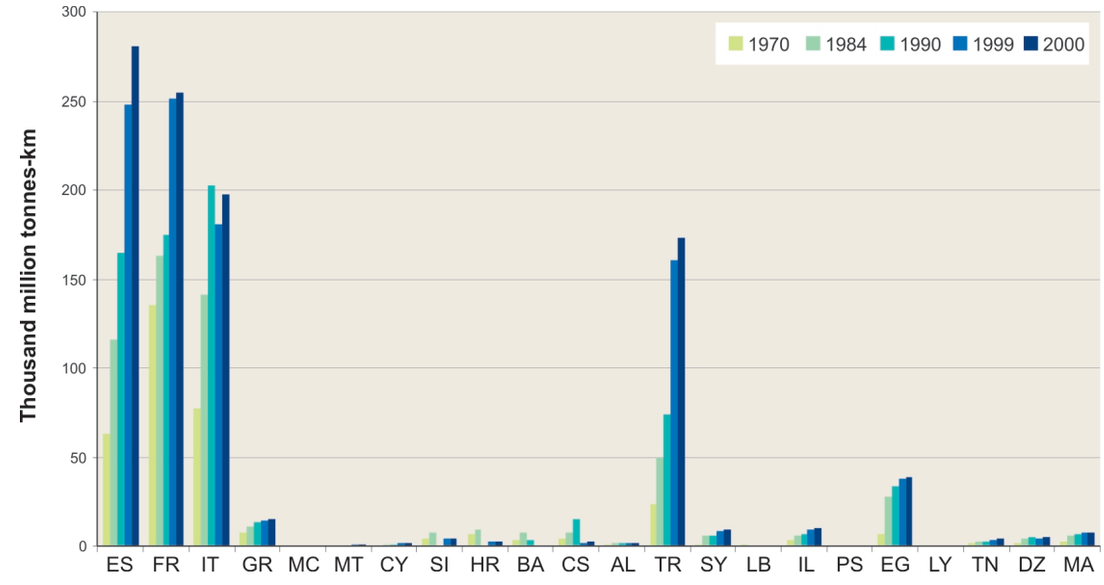
Figure 3.5 Port passenger traffic, 1985–2000



Source: Dobler (EcoMar) (2002) ; Eurostat New Cronos (2002) (http://epp.eurostat.cec.eu.int); Spécial trafic ports du monde (1997)

Note: The data are not expressed in passenger-km since there is no origin-destination matrix for maritime routes. Transit traffic is not taken into account because of lack of data. Moreover, for the sake of comparison with land-traffic data, national statistics are factored in, thus including non-Mediterranean port traffic in France, Morocco, Spain, Turkey and Egypt.

Figure 3.6 Freight traffic (air, road and rail), 1970–2000



Source: National Statistical Institutes, IRF, 1999; UIC, 2002; OACI, 2001

Note: Road traffic has been assessed on the same bases as passenger road traffic.

Box 3.2 High speed vessels

Data for some Mediterranean countries (including Malta, Croatia, Lebanon, Albania and Israel) show that passenger transport by sea between 1984 and 2000 grew nearly as fast as that by road (by 9.5 per cent per year in the above-mentioned countries with 11.5 per cent for road). A good proportion of this vitality in coastal transport is attributed to the High Speed Vessels (HSV) that have made it possible to halve the time required to reach many destinations on the Dalmatian coast or to cross the Straits of Otrante.

Some see, thereby, an end to the relative isolation of the Mediterranean islands and a modal switch from air to sea for short- and medium-haul links. This does not, however, seem very realistic. It also does not appear particularly desirable from the point of view of the environment and marine safety:

- *Not realistic*, because the operating profit of these vessels is extremely sensitive to the price of fuel, given the power of the engines needed to reach speeds of 40 knots. The very high cost of speed will limit the growth of HSVs for freight transport. Many experts believe that they will remain restricted to tourist services to the major islands for a targeted tourist clientele ready to pay higher prices, wishing to travel with their own car and fearing long crossings on more conventional car ferries.
- *Not desirable*, since HSVs continue to raise as-yet unresolved safety and environmental protection problems, in particular increased collisions between these craft and cetaceans.

Other international passenger transport modes

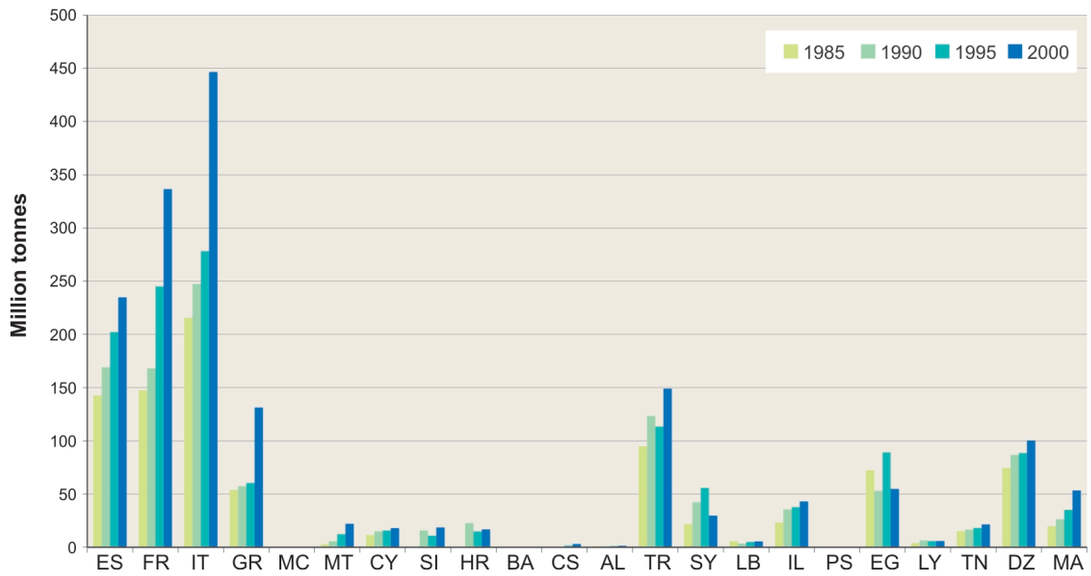
The lack of a unified *rail system* prevents it from playing a significant role at the international level, even between France and Spain and Italy.

Private cars play an important cross-border role for tourism between Spain and France and to a lesser degree Italy and France, but a lack of data makes it impossible to give details of their share of international passenger traffic.

Freight traffic

Freight traffic by *air*, *road*, *rail* (but not sea), like passenger traffic, increased faster than the economy and the population (3.8 per cent per year between 1970 and 2000 in the whole of the Mediterranean, 3.2 per cent in the NMC and 6.4 per cent in the SEMC) (Figure 3.6). Even more than for passenger traffic, this reflects differences in living standards (France, Spain, Italy and Greece alone account for 71 per cent of the traffic), and political and

Figure 3.7 Maritime freight traffic, 1985–2000



Source: Dobler (EcoMar) (2002) ; Eurostat New Cronos (2002) (http://epp.eurostat.cec.eu.int); Spécial trafic ports du monde (1997), the United Nations Statistical Yearbook (2002)

Note: For the same reasons as for passenger traffic, non-Mediterranean port traffic is factored in. Transit traffic (non-stop Black Sea and Suez–Gibraltar links) has been calculated by assuming that the transit traffic/global traffic relationship observed by Blue Plan 89 has remained constant. There is, in fact, no up-to-date work resulting in the quantification of traffic on the major maritime routes in the Mediterranean.

economic developments (in particular the annual average growth of 6.8 per cent in freight traffic in Turkey between 1970 and 2000).

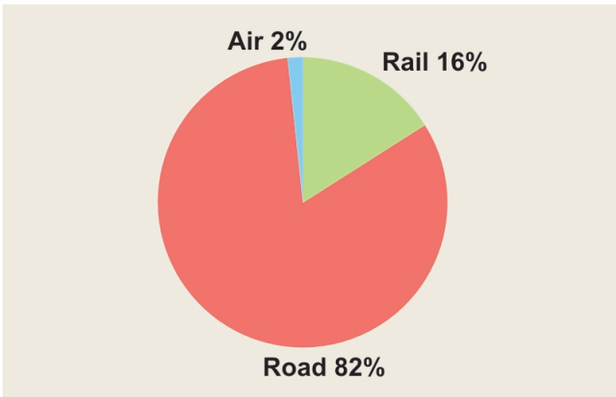
Like road and air, the growth of freight traffic *by sea* was faster than GDP (4 per cent per year between 1985 and 2000 in all of the Mediterranean, 4.7 per cent in the NMC, but only 3 per cent in the SEMC) (Figure 3.7). As with passenger traffic, it is important to distinguish domestic traffic, which is closely linked to growth in GDP, from international traffic, which is totally dependent on trade flows.

While domestic freight traffic is increasingly dominated by road in all countries (despite resistance from rail in a few areas), international traffic has three distinct components related to trade flows: trade between the four EU-Med, trade between the EU and the other Mediterranean countries, and trade in transit through the Mediterranean.

Domestic freight traffic dominated by road

Road is the dominant mode in the four EU-Med and many SEMC, accounting on average for 82 per cent of all freight traffic (83 per cent in the NMC and 76 per cent in the SEMC) (Figure 3.8).

Figure 3.8 The modal split of domestic freight traffic (excluding maritime) in the Mediterranean countries, 1999



Source: UIC, 2002; OACI 2001, National Statistical Institutes

Note: The external part of the report's road cargo has been deduced (imports + exports)/GDP.

However, *rail* is putting up stiff resistance in countries where there is a tradition of rail freight and the possibility of combined rail/sea transport.

Recent developments in the four EU-Med show a high GDP growth elasticity[5] for domestic rail freight traffic with especially high values in Spain and Italy and to a lesser degree in France where this elasticity is close to one. Recent studies suggest that this elasticity itself is growing with the growth of economic activity. Despite this relative success of rail, road haulage dominates in each country.

Even though rail investments have recently been considerable in Spain, there were unprecedented efforts during the 1980s to build a full motorway system. Although far from finished, road investment in Greece is considerable and expansion of the rail network is limited by physical constraints. In France and Italy the motorway systems are older even if their network is still being completed or their capacity adapted.

The *road situation has become critical* in all these southern European countries, with growth in congestion and pollution, particularly around the Mediterranean coast where road investment has become very difficult. Local freight traffic adds to longer-distance national traffic, and all freight traffic competes with passenger traffic, which is concentrated on the same roads in the same areas.

In the other Mediterranean countries, the approaches are similar: the flexibility of road freight remains the easiest and fastest response to growing economic needs without, however, proper development of rational solutions for the logistical organization of flows. For example, the first two official counts in Syria in 1993 and 2000 showed an increase in road traffic on some sections of the Latakia–Damascus motorway of more than 80 per cent, with around 6000 trucks a day travelling between Latakia and Homs in 2000.[6] Alternatives are limited and exist only where there is a rail line or waterway, such as the Danube or the Sava in the eastern Adriatic countries. The average annual increase in rail freight between 1970 and 2000 in Syria was 9.5 per cent compared with only 3 per cent in Israel, 1.8 per cent in Turkey and 1.3 per cent in Tunisia.

Except in the four EU-Med and the eastern Adriatic countries, where large-scale projects remain to be fully realized, there is no genuine rail network in the Mediterranean worthy of the name (Box 3.3). Railways can only develop gradually, and require a search for national or regional opportunities, between neighbouring countries, that can be combined with sea and road transport. Rail interconnections in the Mediterranean will only work in the very long term, although rail could prove effective in some places, for example crossing the Alps or the Pyrenees.

There remains the possibility of sea transport within national waters for servicing Mediterranean coasts, and, in some cases, alternative, less congested inland routes are being sought. Neither of these has yet led to any significant developments.

International freight traffic

International freight traffic, resulting from international trade, is essentially by sea and road, both of which have seen considerable growth over the past 30 years (4.9 per cent per year for road between 1970 and 2000, 4 per cent for sea) in contrast to rail (a reduction of 0.1 per cent)

Box 3.3 Railways in the SEMC

The first railway in the Middle East was opened in 1854 between Alexandria and Kafar Zayat in Egypt. Networks have been built in Morocco, Malta, Algeria, Tunisia, Turkey, Syria, Lebanon, Iraq and Libya (only Cyprus has never had railways). The most important route was the Hijaz line linking Damascus with Medina via Amman, built at the beginning of the 20th century (between1900 and 1905). These lines were designed by the colonizing countries for reasons that were more strategic rather than economic. With the different colonial powers having different technical standards, the rail gauge of the 32,000 kilometres built before the First World War varied from one country to the next: 1m in Tunisia, Algeria and Iraq, 1.05m in Lebanon, Syria and Jordan, and 1.055m for part of the system in Algeria and Libya. Standard gauge was only really adopted from the beginning in Egypt, Morocco and part of the Algerian network.

Today, most of the SEMC have committed to a programme for standardizing their lines in order to reach a standard gauge of 1.435m by 2010–2015. Despite this undeniable progress, most networks remain single track: in 1997, of 33,682km of track, only 2766km were double and 2457km electrified. The different gauges contribute to reducing the speed of commercial shipments. But above all, competition from roads, and to a lesser degree air, have reduced rail to a minor role in these countries. It is true that rail traffic between 1984 and 2000 increased by 4.3 per cent per year, while air, sea and road traffic increased on average by 6.8 per cent, 2.5 per cent and 4.2 per cent per year respectively, but rail traffic volume has been 5–10 times lower than road traffic since the early 1980s.

Dissatisfaction with rail has even been expressed in some countries simply by abandoning the system. For example the line linking La Valette to Rabah has not worked since 1932, and this effectively sealed the fate of the Maltese system. Two important countries have virtually abandoned their rail systems: Libya where not a single train has run since 1965, and Lebanon where the 399km of track, seriously damaged during the civil war, has never been repaired.

Despite these setbacks, governments have announced their desire to see rail playing a greater role in future. With this in mind, the Union of Arab Railroads was founded in 1979. At their 1997 council of ministers meeting, the dotted rail routes shown in the figure were chosen as priorities.

This would require the laying of 20,000km of new track. In 2000, 35,325km of track were in service in the whole SEMC. Not one of these routes is among the projects currently funded by the Euro-Mediterranean Partnership.

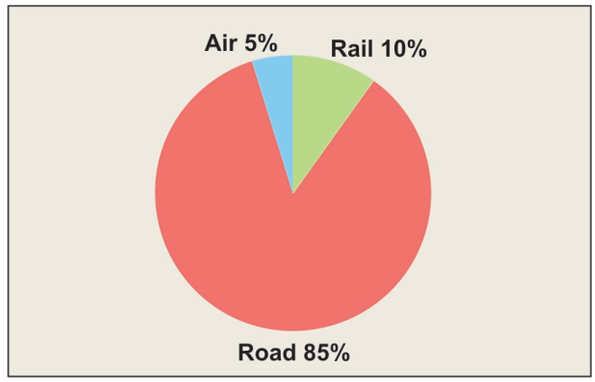
Actual and planned rail network in the SEMC

Source: Arab Union of Railways

Note: Existing routes are solid lines and projected ones dotted.

(Figure 3.9). The highest rate of growth during the same period was in air freight (10.6 per cent per year) but this still accounts for only a relatively low fraction of the total.

Figure 3.9 Modal split of international freight traffic (excluding sea) in the Mediterranean countries, in 1999



Source: UIC, 2002; OACI, 2001, National Statistical Institutes

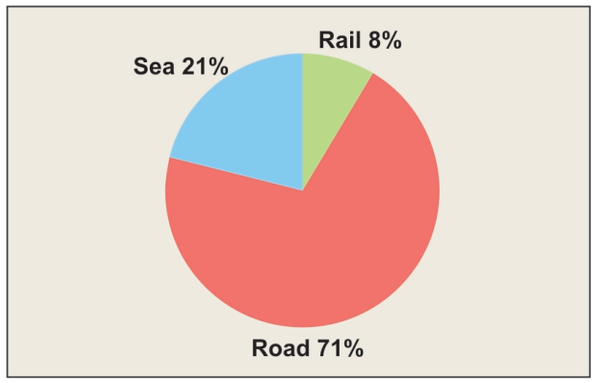
Note: To split road cargo between international and national, the same method was applied as for domestic traffic.

Analysis of international freight traffic, discussed below, must differentiate transport between the four EU-Med from that between the EU and the SEMC, both of which demonstrate the weak competitivity of land-based transport. Moreover, particular attention will be given to international trade through the Mediterranean Sea.

Trade within the four EU-Med countries

As the countries that account for most of the value-added produced and traded in the Mediterranean, the associated flows of freight are particularly important and occur essentially between Spain, Italy and France, with a growth in trade between Greece and these three countries emerging during the past few years. Road traffic dominates, with 71 per cent of the trade in 1998 (Figure 3.10).

Figure 3.10 Intra-southern Europe trade in 1998



Source: Comext database (http://fd.comext.eurostat.cec.eu.int/xtweb)

Statistics for the EU show a rapid growth in trade that goes mostly by road, although rail traffic between France and Italy accounts for about 25 per cent of the land-based trade between these two countries. Trade by sea is far from insignificant in terms of tonnage, but is limited mainly to some bulk products.

Box 3.4 Traffic across the Alps and the Pyrenees

Between 1990 and 2000 the total volume of freight between Spain and France across the Pyrenees increased by 80 per cent, and that between France and Italy across the Alps by 33 per cent.

Although all transport modes benefited from this increase (road: 140 per cent between France and Spain, 77 per cent between France and Italy; sea: 41 per cent between France and Spain; rail: 32 per cent between Spain and France; and 13.5 per cent between France and Italy), road accounted for 80 per cent of the growth in trans-Pyrenean traffic and 77 per cent for trans-Alpine traffic.

In 2000, the modal split was:

- **trans-Pyrenean trade**: 150.6 million tonnes, 80 million of which was by road, 66 by sea and 4.6 by rail, or 53 per cent by road, 43 per cent by sea and 4 per cent by rail.
- **trans-Alpine trade**: 51 million tonnes, 49.8 million of which was by road and 10.2 by rail, or 79 per cent by road and 21 per cent by rail.

For the residents of the Pyrenean valleys this means a 130 per cent increase in the number of heavy lorries driving over the Perthus and Biriatou passes over the past ten years (a daily average in 2000 of 9500 over the Perthus pass and 7500 over the Biriatou pass) and a 47 per cent increase in heavy lorry traffic for the residents of the Riviera and Alpine valleys, distributed between the Fréjus, Montgenèvre and Ventimiglia tunnels (average daily traffic in 2000: 326 lorries through Montgenèvre, 2900 through Ventimiglia and 4254 through Fréjus).

This continuing growth in road traffic has led the French, Italian and Spanish governments to study possible alternatives:

- **Alpine traffic**: although the Lyons–Turin rail link is going to be brought into service by 2015 and the 45km of single track that still exists in Liguria can be doubled, this will not come close to meeting the growing needs for rail transport. With this in mind, serious discussions about a new high speed rail project have begun at the latest Franco-Italian summit conferences.
- **Pyrenean traffic**: at the Franco–Spanish summit of October, 2001, it was decided to create two working groups, one on short-sea shipping, the other on developing rail freight in the medium and long term. The 20-year scenario envisaged includes plans for nearly doubling the volume of freight, by 100 to 120 million tonnes, with 20 per cent of the additional tonnage going by rail and 25–30 per cent by sea.

In the light of these analyses, consideration is now being given to modifying and developing the road tunnel from Somport (Franco–Spanish agreement of April, 1991) and a combined high speed/freight line along the Mediterranean.

In both cases, the question of improving existing crossings that are not yet used for freight remains (Pau to Saragossa and Nice to Cuneo), and has not yet been resolved by the authorities involved.

Source: Data from Observatoire franco-espagnol des trafics dans les Pyrénées and Office Fédéral du développement territorial de la Confédération Helvétique in 'Trafics de transit circumméditerranéens', Bulletin GIR Maralpin, no 25/26, 2000

The contribution of combined sea/road transport became much more significant for Greece's external trade following the closure of transit roads through the former Yugoslavia during the various wars there. These inter-modal routes appear to have been adopted and maintained after the end of hostilities. This new trend has been confirmed by the spectacular increase in maritime freight traffic in Greece (6.8 per cent per year between 1984 and 2000) and the corresponding collapse in rail traffic in the eastern Adriatic countries (by 17.9 per cent per year between 1984 and 2000 in Albania, and by 12.6 per cent in Serbia and Montenegro, 11.5 per cent in Croatia and 4 per cent in Slovenia between 1990 and 2000).

Trade between the EU and the other Mediterranean countries

Trade between the EU and the other Mediterranean countries, in terms of both volume and value, is much less important than that between the EU Mediterranean countries, especially Spain, France, Italy and Greece. However, it is still growing rapidly (see Part 1) and is dominated by sea transport. This growth may eventually be threatened by the poor speed and efficiency of transport systems in the SEMC, particularly when compared with those in central and eastern Europe.

The situations are highly dependent on and influenced by traditional links between countries. Two groups of countries need to be considered:

- *Trade between the* EU *and Maghreb*: highly polarized between Spain and Morocco, and Tunisia and Italy, with French trade apparently more equally distributed, although Algeria has a preferred position. This trade is very much influenced by a few bulk products (fertilizers and chemical products for Morocco and Tunisia, oil and gas for Algeria). For general trade, in the west of the region, road traffic from Morocco has risen sharply, crossing the Straits of Gibraltar and often continuing overland north across the Pyrenees to other European countries. Nevertheless this road alternative to sea transport is not yet well developed. The trend is rather for the development of *roll-on roll-off* for freight (loading lorries onto ships).
- *Trade between the* EU *and the eastern Mediterranean*. Turkey has experienced a strong phase of expansion, which has resulted in an intensification of trade with the EU. Of the other eastern Mediterranean countries, Egypt, Lebanon and Israel also have a high level of trade with Europe, although this is partly counterbalanced by important trade with the Arab countries and Africa and with the US and Asian countries.

Trade with Turkey can be either by land or sea. There have been notable developments of ingenious inter-modal links, using roll-on roll-off sea transport for a large part of the route, as shown by the example of the 'bridge-head' established in Trieste to promote trade and continued transport overland to the heart of the EU. International trade has not yet been fully re-established with the countries of the eastern Adriatic except for Slovenia. Rail and the Danube link play only a limited role.

The lack of competitiveness of land transport systems

The Euro-Mediterranean 'system' of freight transport is therefore characterized by predominantly maritime traffic with international road traffic involving mainly Turkey and the EU and a small contribution from rail. This is currently not very competitive because of the low volume of EU–SEMC trade and the complexity of the administrative and banking operations of the transport systems. It costs as much to send goods from Tunis to Marseilles as it does to Rotterdam, and more to send a container from southern Europe to Maghreb than to Japan or the US.[7] The use of combined transport by developing port areas on the northern and southern shores was put forward as a solution in the early 1990s. However, the eastward EU enlargement turned this type of analysis upside down, and the strategy of strengthening the competitiveness of Mediterranean transport systems currently seems to concentrate on improving the ports of southern Europe. These would be the only ones able to benefit from the huge increase in freight traffic demand in Europe and could, as an indirect consequence, bring back to the Mediterranean traffic (including for the SEMC) that has naturally tended to concentrate in the north-eastern quarter of Europe.

Even this 'modest' strategy is, however, regarded sceptically by many operators, since the SEMC market alone does not and is unlikely to justify large investments in transport infrastructures. For other reasons (essentially improving intra-community north–south relations) investment is planned in the southern European ports, and these may contribute to developing 'short-distance' Mediterranean links. But they will not change the present situation significantly. Apart from improving a few nodal

points such as Algesiras–Tangiers, Trapani–Tunis and Igumenitsa– Brindisi, investment is generally limited to improving the profitability of port infrastructures and maritime companies between the two shores. Moreover, although investment in infrastructures is an indispensable condition for the development of inland traffic from ports, it is still insufficient in the light of the benefits of the inter-modal system that it could support. It is proving difficult to develop effective and complete transport systems (providing continuous service quality from one end to the other, complete coverage, adequate speed, integrated prices, etc.) with a well-adapted network and satisfactory connections with more local networks throughout the region.

Box 3.5 The logistical difficulties of a German investor in Tunisia, Leoni Tunisie

Leoni Tunisie SA is a subsidiary of a German corporation specializing in electronic components for car manufacturers, in particular Daimler-Chrysler. It was founded in 1977, employs 2400 people and invests more than 3.5 million euros every year in Tunisia.

Demand-pull production obliges the Leoni Tunisie logistics system to achieve first class results. Leoni therefore subcontracts all its logistical requirements to an international company with a subsidiary in Tunisia and has tailored its production cycle in such a way that this company uses its trucks to between 95 and 98 per cent of capacity.

A full production cycle including transport lasts nine days: raw and intermediate materials come from Europe, Asia and the US and are collected at Leoni's head offices in Germany. Seven trucks leave Germany for Tunisia every week. The trailers are checked by German customs in Leoni's factory after which the logistics company takes charge of the shipment. It drives them to Genoa or Marseilles in 2–2.5 days, then loads them without a driver on a roll-on roll-off ferry that delivers them to the port of Radès 20–24 hours later. There the trailers are taken by trucks and delivered 2–3 hours later in Sousse. Within 24 hours, the components are assembled, checked on site by Tunisian customs officials and sent back the next day by the same route. Eight trucks carrying between 320 and 350 tonnes of finished products leave Tunisia each week. Leoni is particularly satisfied with this transport chain since, as a major exporter for Tunisia, it benefits from off-shore status regarding customs dues and special treatment in Tunisian ports and is the envy of many small companies.

However, the demands of 'just-in-time' production are so great that they threaten Tunisia's position. Instead of the current nine-day cycle, customers are now demanding six days. The internal production processes have been rationalized to such an extent (for example assembly in 24 hours) that the only possible time savings are those made possible by transport. In 2002 then, Leoni chose to invest 12 million euros in Romania, creating 1700 jobs, rather than to expand its plant in Sousse. Leoni's directors were motivated not by the salary levels or the political context (from this point of view Tunisia is more competitive) but by the logistical advantage offered by Romania, which enabled a saving of one day in each direction and 1000 euros per trailer. According to Leoni Tunisie's directors, if Tunisia is not in a position to offer air or faster boat links, the relatively cheap manpower is no longer enough to maintain its attractiveness to foreign investors.

Source: World Bank, 2002

Transit trade through the Mediterranean

The Mediterranean Sea accounts for only 0.7 per cent of the world's seas but handles 30 per cent of maritime trade traffic and 20–25 per cent of hydrocarbon traffic. Its shipping lanes are of major strategic importance for Europe and America. The redistribution of rapidly increasing world trade plays a growing role, to such an extent that these transit flows account for nearly 40 per cent of the whole Mediterranean traffic (Box 3.6).

Sea transport has been able to adapt and to retain its market share of long-distance trade in the face of competition from road and air, despite transit difficulties through the eastern Adriatic countries for trade between the EU, Turkey and the Middle East and Central Asia.

Gas and oil account for huge amounts of intra-Mediterranean trade (see Chapter 2). The region remains one of the main transit areas in the world for both oil and container traffic. Fixed petro-chemical port facilities governed these flows until recently, although this could change as a result of the Middle East crisis and also with the opening of land routes for conveying products from central Asia through Turkey. The trade in essential chemicals and bulk agricultural freight comes second to gas and oil in volume and also results in specific flow patterns, as does the trade in textiles and perishables from south to north.

This marine traffic is increasingly 'containerized', with more and more goods being packaged in containers and no longer stored individually in holds. *Containerization* became dominant in Europe in the 1970s, and subsequently on the major east–west shipping lanes. It is gradually becoming universal. In 1999 traffic between Europe and Asia accounted for 8025 million TEUs (twenty-foot equivalent units). Containerization is spreading to all products and is gradually replacing conventional transport. The size of ships has increased in consequence. By 1995 the biggest container carrier could ship 3000–3500 TEUs, and we are starting to see the first 8000 TEU (ships 340m long).

Since the early 1990s the Mediterranean has also seen *new international maritime 'hubs'* with the very rapid development of several container ports such as those of Gioao Tauro in southern Italy, Malta and a whole batch of ports

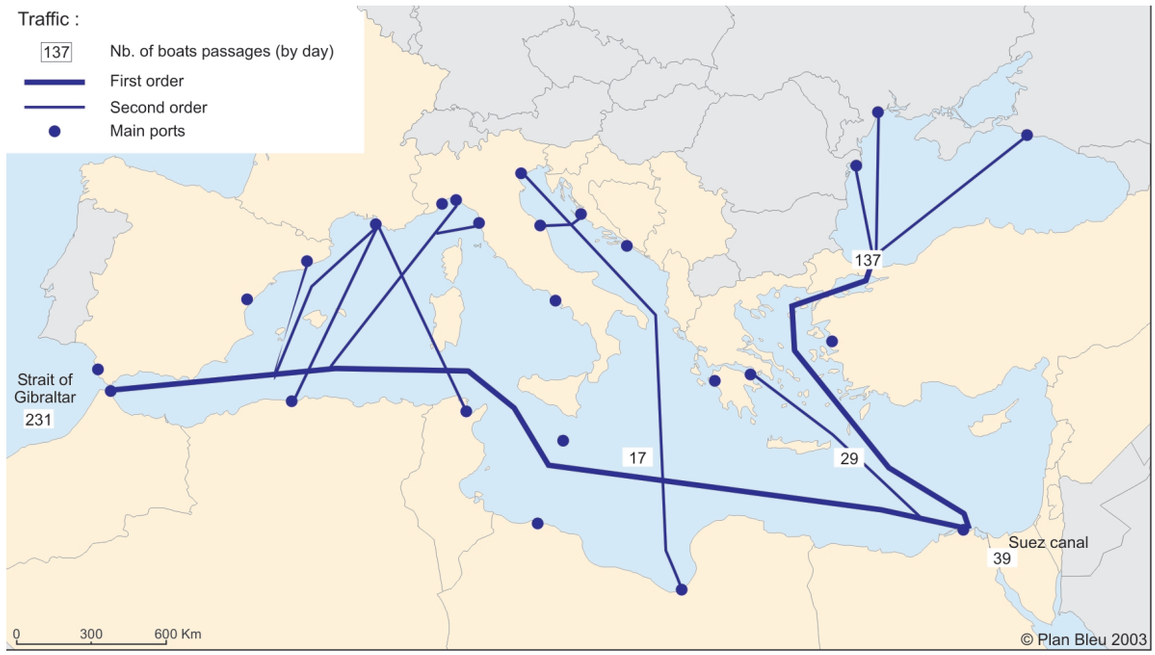
Box 3.6 Maritime traffic in the Mediterranean

The main maritime routes into the Mediterranean are Gibraltar, Suez and the Bosphorus. The most important intra-Mediterranean shipping lanes are those linking Greece with Egypt and Libya with Italy.

Of the total of 412 million tonnes of oil imported into Europe in 1999, 121 million came by intra-Mediterranean routes, and 278 through Gibraltar, Suez or the Bosphorus (the remaining 13 million tonnes correspond to trans-Atlantic trade).

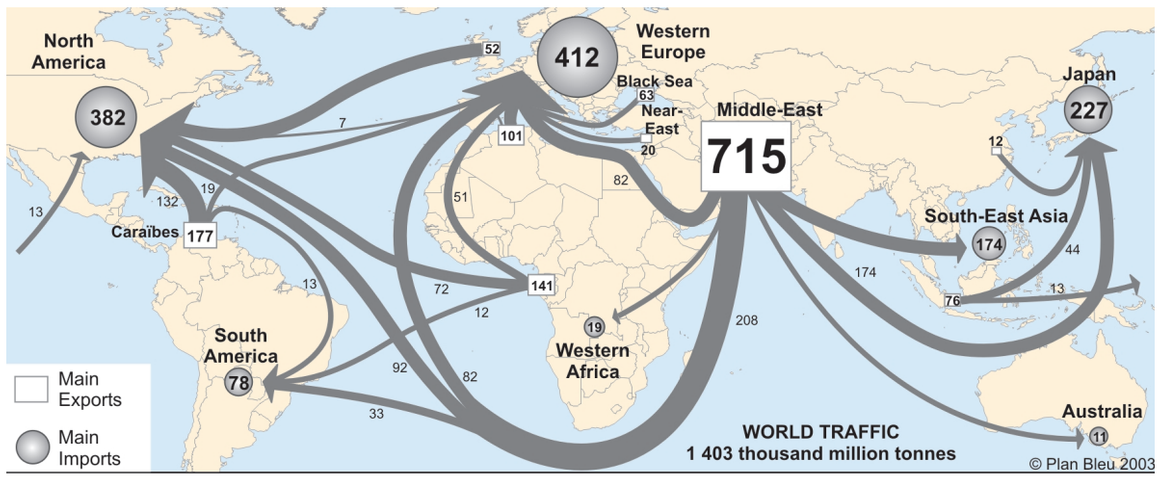
The same is true for container traffic that amounted to 1560 million TEUs (twenty-foot equivalent units) for the intra-Mediterranean in 1999 compared with 8025 million of Europe–Asia trade through Suez, Gibraltar or the Bosphorus.

The main maritime routes in the Mediterranean



Source: REMPEC (2002) from Lloyd's Register of Shipping (2001), London

Maritime oil traffic – main trade inter-zones (in million metric tonnes)



Source: IMO News (2000), no 3

that serve as hubs for the great shipping companies of southern Italy. Such growth rates have never been seen before, following the earlier example of Algesiras, with sites also being sought in the western section of the Mediterranean, nearer to Gibraltar, that offer opportunities not only for redistribution towards northern Europe but also towards Africa. There are also comparable developments at the exit of the Suez canal, to reorganize container carrier distribution networks for the whole of the Mediterranean, and even ports in the Black Sea. Limassol, Port Said, Piraeus and Haifa have profited from these new moves to reorganize maritime traffic on a global basis for trade, the shipping costs of which have been reduced to very low levels. This unusual phenomenon has benefited all Mediterranean ports, even those without strong inland industrial development.

Traffic projections to 2025

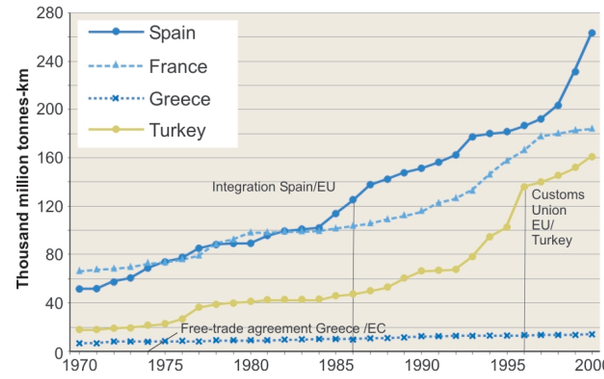
The main driving force for this *increase in traffic*, by all modes and to all destinations (with a traffic/GDP elasticity sometimes greater than two, or even higher in some countries such as Turkey) seems to be a global liberalization of trade and specialization of economies as well as changes within industry and logistical structures (particularly the pooling of stock-taking points). This has already been observed within the framework of the North American Free Trade Agreement (NAFTA). The Mediterranean is no exception. A *Plan Bleu*[8] study concludes that including Morocco in the Euro-Mediterranean free trade zone would result in a doubling of the passenger car fleet by 2020 compared with what would have occurred without free trade.

A look at past traffic changes in some Mediterranean countries seems to show that every advance in international free trade was preceded by changes in the productive and logistics systems of the country involved, leading to an increase in traffic and then a levelling off, followed by a new rise due to the acceleration of world economic growth (Figure 3.11). Such a trend seems limitless and not very sensitive to the 'dematerialization' of economies.

Apart from the move towards free trade, two other factors also contribute to the growth and concentration in freight traffic:

- The appropriateness of road transport to new production patterns and the nature of the goods transported (more perishable, fragile and individualized goods such as chemical products and foodstuffs, cars and machines and less coal, iron or steel) demand for door-to-door transport in relatively small quantities, which excludes modes adapted to bulk such as rail and water (rivers, canals). Furthermore, cutting-edge technologies make it possible to decentralize production within a 'just-in-time' framework, with frequent, small-volume deliveries that reinforce the preference for road transport. On-line buying is increasing these trends with home-delivery of products replacing travel by buyers. Several studies in the EU are confirming these trends.
- The lack of internalization of the environmental and social costs of road traffic, which is resulting in an increasingly favourable price structure for road freight transport and priority being given to road infrastructures by many countries and donors. Between 1987 and 1998, the four EU-Med countries invested 0.2 per cent of their GDP in rail; between 1984 and 2001 they invested 0.67 per cent in roads.

Figure 3.11 Trade opening and road freight traffic in some Mediterranean countries, 1970–2000



Source: World Bank; IRF, 1999 and National Statistical Institutes

The key factor for changes in *passenger traffic* is the increase in the number of people living in *suburbs*. In French suburbs, for example, between 1980 and 1995, daily average distances travelled increased 3.5 times faster than in city centres.[9] This concentration of people in suburbs is being accompanied almost everywhere by two other changes, which also generate more traffic:

- *the development of hypermarkets*: this type of city and suburb supply system is very cost-effective for the company, and is essentially based on road haulage. But the last stage of delivery is usually ensured by the customers themselves, who need a car to get to the sales point and, of course, pay the associated costs. One of the most significant consequences of this phenomenon is the sharp fall in nearby business activity, destroying urban life. Energy consumption and the disturbances engendered by this kind of organization are very considerable compared with proximity shops;

- *changes in packaging*: shifting to a 'consumer' society has led to big changes in the packaging of goods. New packaging is often characterized by large volume (blister layers, boxes, voluminous protective coverings, etc.). Liquids are more often than not sold in throw-way packages. All this leads to an eruption in the volume of household waste, which results in large transport flows in urban areas. In France, for example, the 29.5 million tonnes of household waste produced in 1997 led to a transport activity of 800 million tonne-km.

An important factor that may help to slow the demand for transport is the 'non-material' content of future growth, in other words the share of services in relation to trade in physical goods. In the Mediterranean a *dematerialization of the economy* is underway; except in Egypt and Algeria, services increased their share of GDP in all countries between 1990 and 1999. This is coupled with a dematerialization of physical production, that is a reduction in the amounts of heavy goods produced and a general reduction in the weight of products (particularly important in the southern and eastern Mediterranean because of the weakness of national industries and the resulting need to import a major share of manufactured goods). It is therefore possible that traffic/GDP elasticities may eventually diminish. The baseline scenario does not, however, take this possibility into account, partly because the SEMC are just opening up and are looking for strong economic growth, and partly because retrospective analysis of traffic/GDP elasticities does not show any such shift in any Mediterranean country. Such shifts may be possible with policies of the type proposed by the EU in its White Paper, but there is no sign of such policies in the southern or eastern Mediterranean.

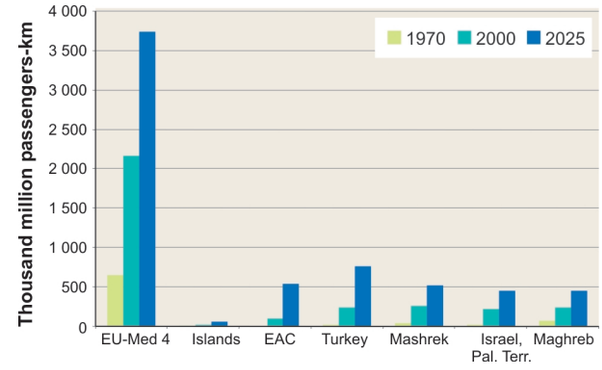
The consequences of all these changes on the baseline scenario are of two types:

- First of all, trade will increasingly concentrate along a smaller number of routes. The flexibility of road delivery is well matched to company practices that involve managing stocks en route and pooling stock-taking points. The increase of traffic on these routes will be much higher than elsewhere. An example is given by the concentration in north–south corridors in the Alps and the Pyrenees and the major airline hubs.
- Roads will maintain their dominant position in land transport. Except in France, Italy and Spain, which are trying to maintain rail freight traffic, the other countries do not have domestic rail systems that can really compete with roads. A few major international links could probably be re-established, but these isolated projects cannot prevent roads from playing a major role in the growth in land transport. This near-monopoly of roads makes it even more important to search for alternative sea routes.

Taking into account all these general changes, the baseline scenario for traffic to 2025 uses the same 'traffic/GDP' elasticities as those observed for the 1970–2000 period[10] and the same modal split as that observed in 2000. These assumptions lead to the following baseline scenario projections presented by major country groups (the figures on traffic include national and international traffic for each country) (Figures 3.12 and 3.13).

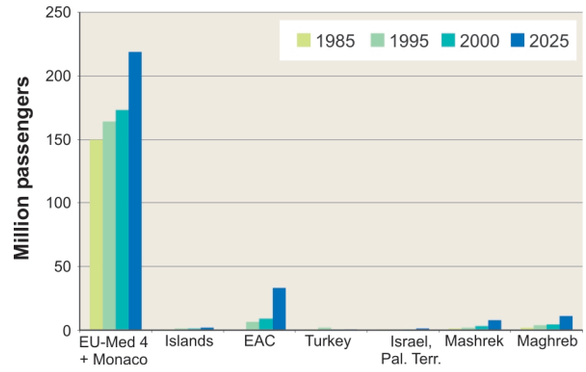
Passenger traffic

Figure 3.12 Passenger traffic (rail+air+road), baseline scenario, 2025



Source: Plan Bleu

Figure 3.13 Passenger port traffic in 2025, baseline scenario



Source: Plan Bleu

Note: This only includes data relating to recorded port traffic. The projection has been made following the same method as for land traffic.

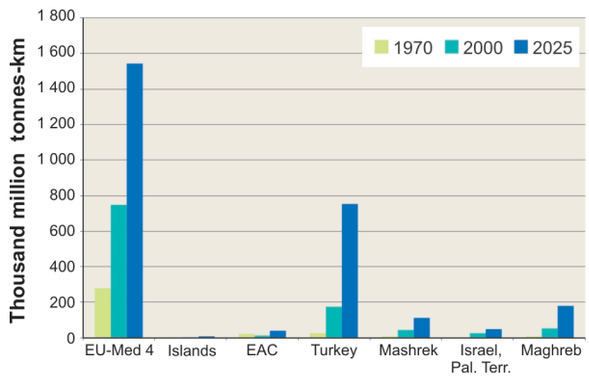
According to the baseline scenario, the general demand for transport continues to increase at a steady rate in both the NMC (4.6 per cent per year between 2000 and 2025) and the SEMC (7.6 per cent per year) and still at a *greater rate* than the *population* (0.1 per cent per year in the NMC and 1.3 per cent in the SEMC) and the *economy* (2.5 per cent per year in the NMC and 4.2 per cent in the SEMC).

From environmental and safety points of view, the projected modal patterns are the least satisfactory way of fulfilling this mobility demand. Thus for the whole of the Mediterranean in 2025 *roads* are projected to account for 85 per cent of the traffic (84 per cent in the NMC and 86 per cent in the SEMC), air 8 per cent (10 per cent in the NMC and 5 per cent in the SEMC), with rail remaining steady at 7 per cent (6 per cent in the NMC and 9 per cent in the SEMC). Maritime traffic is projected to grow more slowly (by 0.9 per cent) than the economy in the EU but at a very steady rate in the eastern Adriatic (especially Croatia) and the SEMC (especially Morocco at 4.7 per cent).

This must, however, be qualified since *rail* will generally keep up with air and road in relative terms (an average annual increase between 2000 and 2025 of 2.2 per cent compared with 2.6 per cent for air and 2.9 per cent for road). The relatively good maintenance of the share of rail is even clearer in the SEMC (annual increase of 3.4 per cent for road, 3.2 per cent for air, mostly as a result of tourist-related international traffic, compared with 3.2 per cent for rail). The 'performances' of the Mediterranean countries vary considerably from one to the other and do not always match with the north shore/south shore distinction. For example, the use of rail in Egypt is projected to increase by an annual average of 3.1 per cent compared with only 1.4 per cent France. Economic and political constraints play a large part in traffic fluctuations, for example in Bosnia-Herzegovina, where the high annual rate of increase in rail and air traffic (11.7 per cent) is because it is starting from very low levels as a result of war. The same applies to Croatia for road transport (6.8 per cent).

Freight traffic

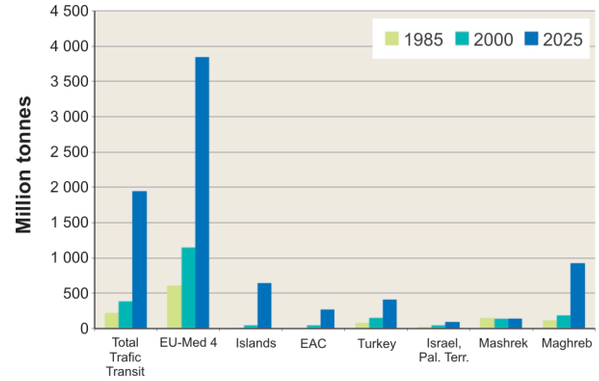
Figure 3.14 Freight traffic (air+rail+road), baseline scenario, 2025



Source: Plan Bleu

Note: The same method as for passengers was used for evaluating road traffic in the countries that do not measure vehicle flows.

Figure 3.15 Maritime freight traffic, baseline scenario, 2025



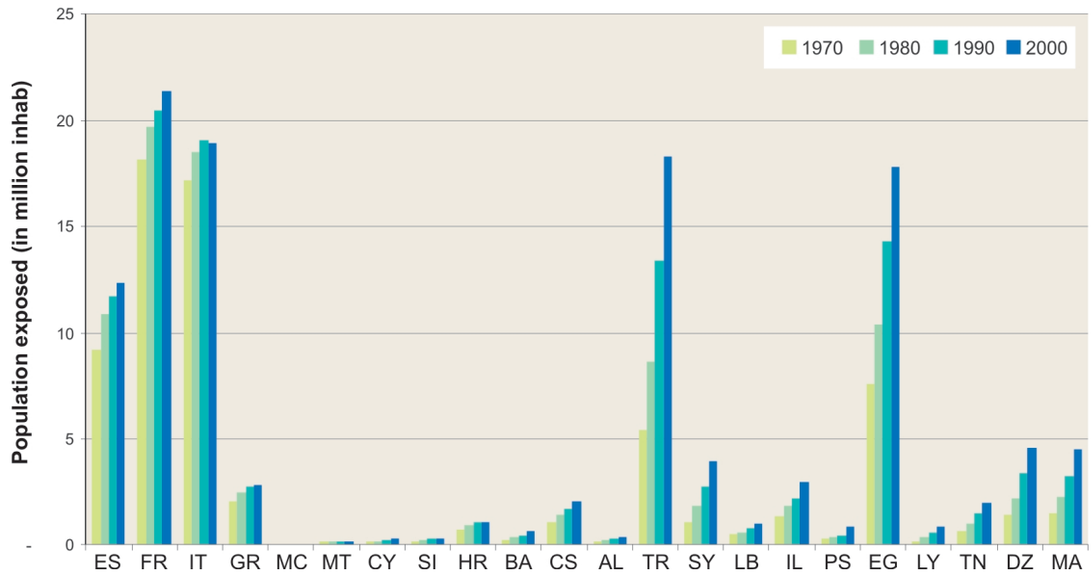
Source: Plan Bleu

Note: For this traffic, the elasticity of international trade (national for the port traffic of each country and global for the transit traffic) was used and reduced according to the same coefficient as the GDP elasticity for land traffic. The 2000–2025 growth rates of trade have been deduced from the GDP elasticities of IFRI's projection paper 'Le commerce mondial au 21ème siècle'. The growth rate of world trade was linked to the growth assumptions for world GDP of the baseline scenario, i.e. 3.8 per cent per year between 2000 and 2025 (see Part 1 of the report).

As with passenger traffic, freight traffic is projected to increase *more rapidly than the economy or the population* (by 3.8 per cent per year between 2000 and 2025 for the whole Mediterranean, 3 per cent in the NMC and 5.4 per cent in the SEMC), with the least 'sustainable' modes continuing to carry most of the freight. The baseline scenario has roads taking 85 per cent of the traffic (84 per cent in the NMC, 89 per cent in the SEMC) and air 3 per cent (4 per cent in the NMC and 2 per cent in the SEMC) compared with only 12 per cent for rail (19 per cent in the NMC and 9 per cent in the SEMC). The rate of increase in total traffic will be comparable to that between 1970 and 2000 (3.2 per cent per year in the NMC and 6.4 per cent in the SEMC) and rail freight will retain its share. However, the NMC will see a clear-cut *recovery of rail* with an annual increase of 2.4 per cent compared with a 0.5 per cent per year reduction between 1970 and 2000.

Stimulated by transit traffic (increasing by 6.6 per cent per year between 2000 and 2025), *sea freight* is projected to continue to grow more rapidly than the economy (5.6 per cent per year). The share of sea transport in Italy and Greece in particular is projected to increase compared with the other modes. The same applies to the eastern Adriatic countries (especially Croatia). This means that the inter-modal road–sea transport links opened because of the Balkan wars will maintain their market share. This contrasts with a stagnation in freight traffic in the SEMC (probably related to the reduction in conventional traffic). There is also a strong projected

Figure 3.16 The population exposed to road noise over 55 decibels, 1970–2000



Source: Plan Bleu from European Environmental Agency data

Note: An estimate based on a 1998 evaluation by the EEA of the percentage of the population in the EU exposed to road noise over 55 decibels. Based on the traffic intensity of GDP in each Mediterranean country, the percentage of the population exposed in each has been deduced. Changes are related to the rate of urbanization.

increase (13.5 per cent per year in Malta) in trans-shipment ports, the optimum location of which will be on the major international sea routes.

This analysis of the driving forces and magnitudes of the passenger and freight flows will serve as a framework for evaluating the impacts of the Mediterranean transport system up to 2025.

The large impacts of land and air transport

Transport in the Mediterranean today often results in a waste of natural resources, a reduction in living standards (air, space, noise), considerable loss of human life and high costs for countries, companies (congestion) and individuals (the share of transport in household budgets). Many of these problems could be avoided with policies that will be discussed further below.

Significant environmental and social impacts

Environmental impacts

Noise pollution

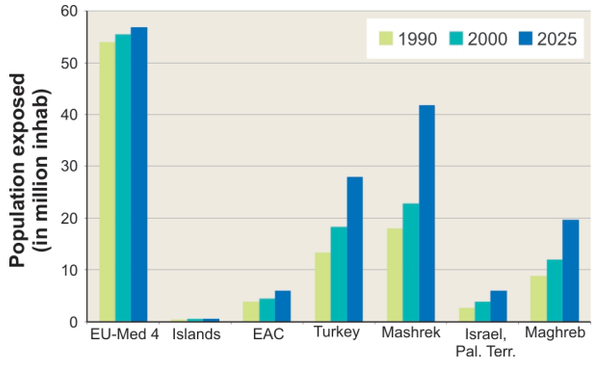
Traffic is one of the major sources of noise pollution. Road traffic is the main cause of exposure to noise (Figure 3.16) except for those who live near airports. Noise-related environmental disputes in Europe are increasing. Nearly 32 per cent of the population lives in a noise environment of more than 55 decibels from road traffic (and nearly 12 per cent more than 65 decibels), 9 per cent from rail and 3 per cent from air traffic. In the SEMC, large suburban areas, for example in Cairo and Algiers, are also experiencing a large rise in noise level. This is all the more worrying since noise is increasingly seen to be a serious public health problem.

Some epidemiological studies have shown the extent of the problem in Europe. The same is likely to be the case in the SEMC, but general data are not yet available.

Noise pollution is a real problem. In the EU Mediterranean countries, more than a quarter of the population is affected (including 36 per cent in France and 33 per cent in Italy). Some other countries are already reaching a very high level (45 per cent in Malta, 51 per cent in Israel). This is all the more worrying since the numbers exposed are increasing rapidly (1.8 per cent per year between 1970 and 2000 in the Mediterranean, 0.7 per cent in the NMC and 3.5 per cent in the SEMC).

Changes in this indicator suggest that the problem is likely to get considerably worse in southern and eastern countries (Turkey, Maghreb and the Mashrek) while remaining high in the north. By 2025, 32 per cent of Turks (compared with 27 per cent in 2000), and approximately 35 per cent of French, Italians and Egyptians, will be

Figure 3.17 People exposed to road noise above 55 decibels, baseline scenario, 2025



Source: Plan Bleu

Note: The forecast has been made by projecting to 2025 the 1970–2000 elasticity of the variation of exposed populations/urbanization rates.

subjected to road noise of more than 55 decibels (Figure 3.17). The lack of any prospects for technological solutions to these problems by manufacturers does not give much hope of reversing the trend.

Atmospheric pollution

Atmospheric pollution is mainly the result of transport-related *gaseous emissions*. Indeed, transport:

- accounts for 70 per cent of nitrogen oxides (NO_x) emissions in the major European urban areas;
- is entirely responsible for peaks in ozone pollution;
- is the main source of emissions related to hydrocarbon combustion (volatile organic components [VOCs], benzene, etc.);
- is also the source of 30 per cent of CO_2 emissions and about a third of particulate emissions, especially those resulting from diesel.

Gaseous emissions may be classified as primary pollutants, present in the atmosphere in the state in which they are emitted, or secondary pollutants, which result from chemical transformations in the presence of components known as precursors. Because of the availability of data and coefficients of emission per passenger-km and tonne-km, information is provided for emissions of CO_2, VOCs and NO_x (Figures 3.18, 3.19 and 3.20). VOCs and NO_x are suspected of being the cause of the increase in death rates from cardiovascular and respiratory diseases resulting from atmospheric pollution (see Chapter 4) and account for much of the emissions related to transport.

Figures 3.18, 3.19 and 3.20 show time-series of transport-related gaseous emissions.

The increase in CO_2 emissions (4.3 per cent per year between 1970 and 2000, 3.7 per cent in the NMC and 8 per cent in the SEMC) is due to the lack of any significant technological improvements. On the other hand, there has been a significant drop in VOC emissions (0.6 per cent per year between 1970 and 2000, 1.8 per cent in the NMC but an increase of 2.1 per cent in the SEMC) mainly due to improvements in road vehicle engines. And it is because of less progress in improving road vehicles that NO_x emissions have remained relatively constant, increasing by 1.6 per cent between 1970 and 2000 for the whole of the Mediterranean, 0.8 per cent in the NMC and 3.4 per cent in the SEMC.

This 'emission profile' in the Mediterranean results in a combination of two situations:

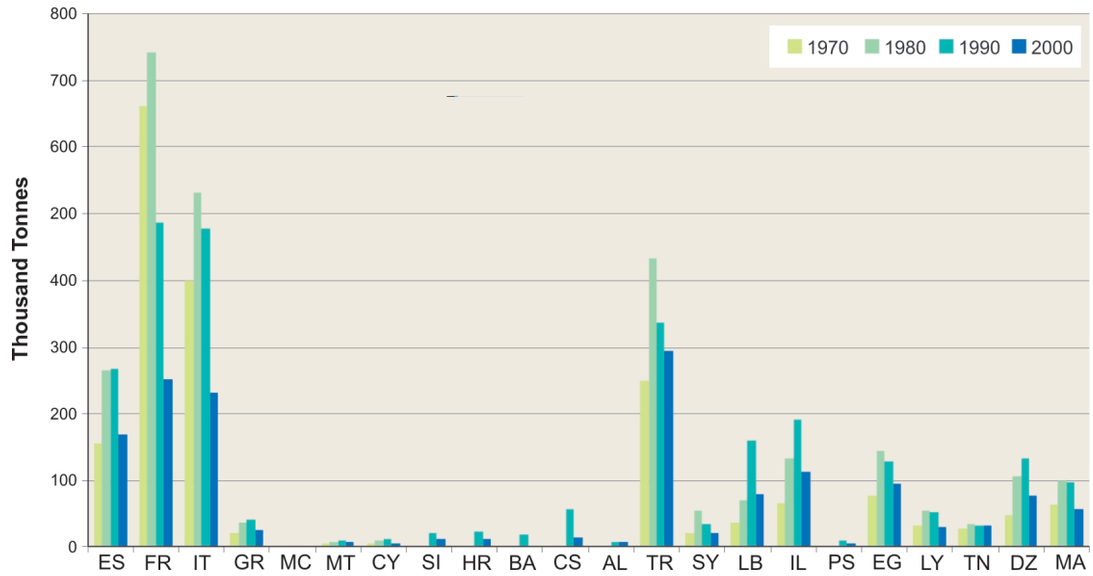
- in the *northern countries*, concentrations of particulates have generally fallen. NO_2 concentrations have remained stable. However, limit values, above which short-term harmful effects to humans may occur, are rarely exceeded. Thus for nitrogen dioxide, the average concentrations on the French Mediterranean coastline are roughly 50 micrograms per cubic metre while the quality targets set by European directives is put at 135;
- in the *southern and eastern countries*, measuring networks are still embryonic. However, initial results show concentrations similar to those recorded on the northern shore which are also decreasing for particulates and are remaining constant for nitrogen oxides (see Chapter 4).

Despite these relatively low concentrations and the reductions in emissions, a recent epidemiological study,[11] carried out jointly by France, Austria and Switzerland, estimates that 6 per cent of the overall *mortality* in these three countries, or 40,000 deaths per year, may be attributable to atmospheric pollution. Half of these deaths are related directly to emissions from road traffic, or twice the death toll from road accidents in these countries.

In the SEMC, quantification of the impacts is not as complete, but the few isolated surveys available show an alarming situation. In Algeria, diseases related to air pollution were the second most important cause of hospitalization in 1990.[12]

Different transport modes have different impacts; public urban transport and rail are the least-polluting modes in terms of VOCs and NO_x, but they are clearly declining slightly everywhere in the Mediterranean. The introduction of catalytic converters for light vehicles and

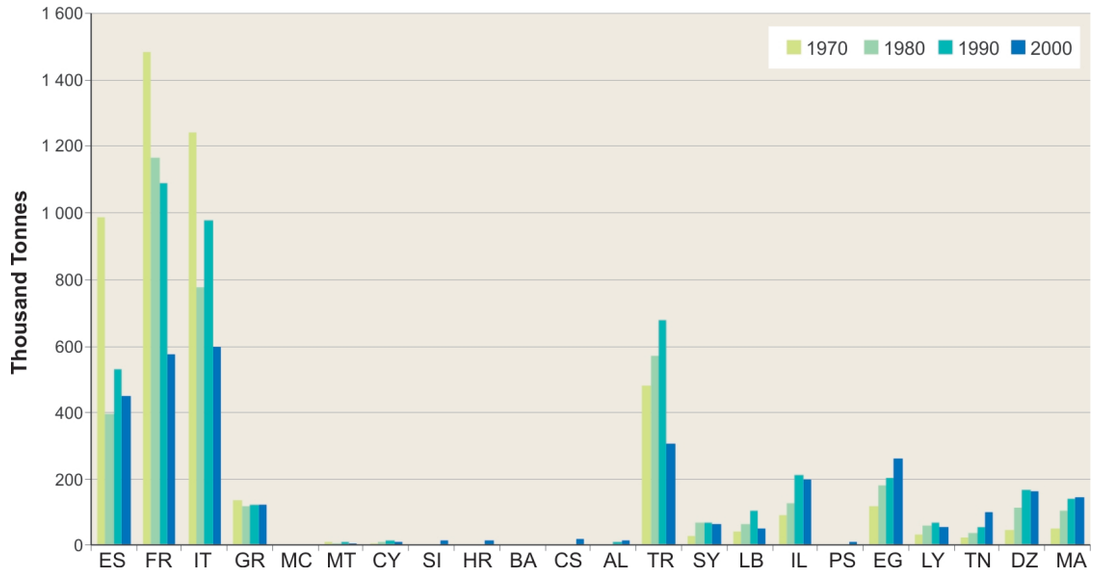
Figure 3.18 VOC emissions, 1970–2000



Source: Plan Bleu

Note: VOC and NO_x evaluations used the passenger-km and tonne-km emission coefficients of the Austrian Ministry of the Environment quoted by the European Environmental Agency in its publication, 'Are We Moving in the Right Direction? Term 2000'. To adapt them to the Mediterranean situation, we used them as they were for the four EU-Med countries and Monaco, with a deferred reduction of five years for Malta, Cyprus, Slovenia, Croatia, Bosnia-Herzegovina, Israel and Serbia-Montenegro, and ten years for all the other countries. In the case of Turkey, Tunisia and Lebanon, the results were matched with the official estimates of the countries.

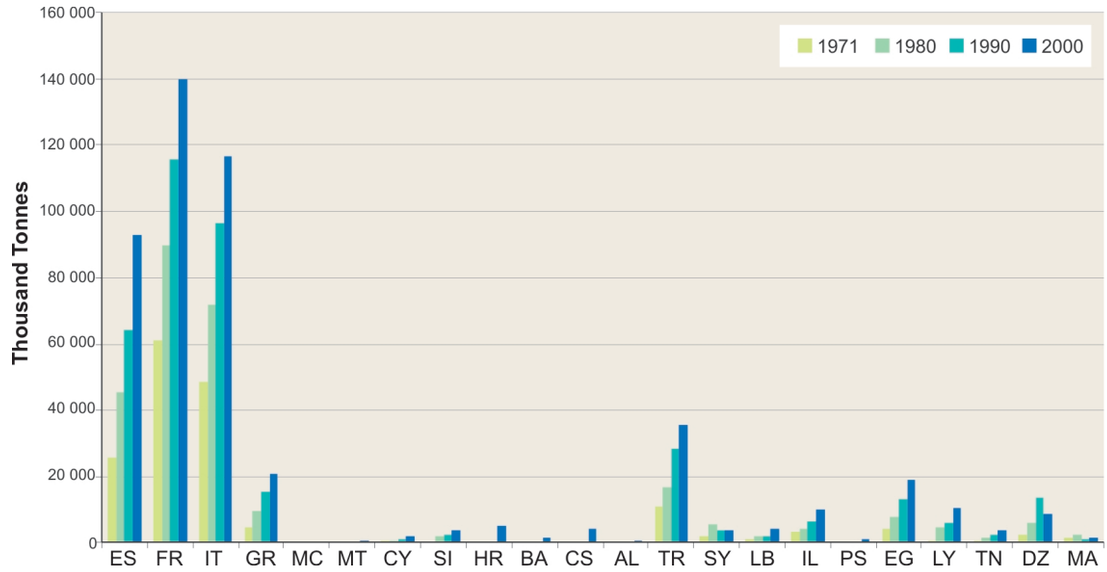
Figure 3.19 NO_x emissions, 1970–2000



Source: Plan Bleu

Note: Same remark as for calculating VOC emissions.

Figure 3.20 CO_2 emissions, 1971–2000



Source: Plan Bleu

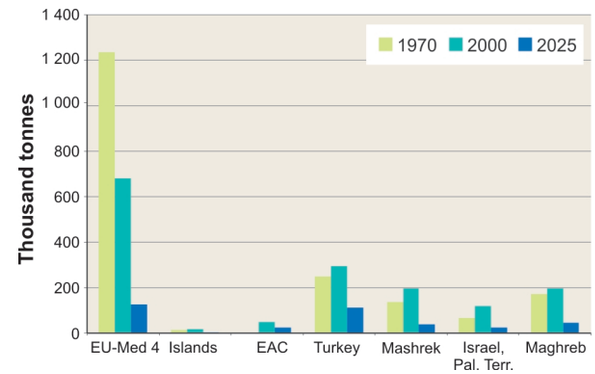
Note: Estimates from the IEA database

electrifying the rail network (in Morocco, for example) have resulted in a considerable drop in emissions per passenger since the beginning of the 1990s.

In future, the trend lines for VOC and NO_x emissions are projected to converge, and fall dramatically (by 5.6 per cent per year for VOCs and 4.5 per cent for NO_x) (Figures 3.21 and 3.22). Any continuing difference between VOC and NO_x emissions would be increasingly attributable to air transport, for which the improvement in emission control is expected to be less rapid than for road transport (NO_x coefficients for air transport will be reduced by 3.9 per cent per year between now and 2025 and those for road transport by 8.6 per cent per year) resulting in a clear increase in the share of air transport in NO_x emissions.

But the fall in emissions does not mean the end of atmospheric pollution problems. First, there is no linear relationship between emissions and concentrations, and *synergistic* effects between pollutants, even at low doses, may continue to have significant impacts on health. Secondly, with traffic becoming more concentrated on a few routes and the fact that emission coefficients relate to *average* traffic conditions, it is not impossible that, even if total emissions fall, there may be *local* increases in concentration, particularly in urban areas. Moreover, CO_2 emissions are projected to continue to increase (by 1.9 per cent per year), increasing the Mediterranean share of the world total of CO_2 emissions (Figure 3.23, see also Chapter 2).

Figure 3.21 VOC emissions, baseline scenario, 2025



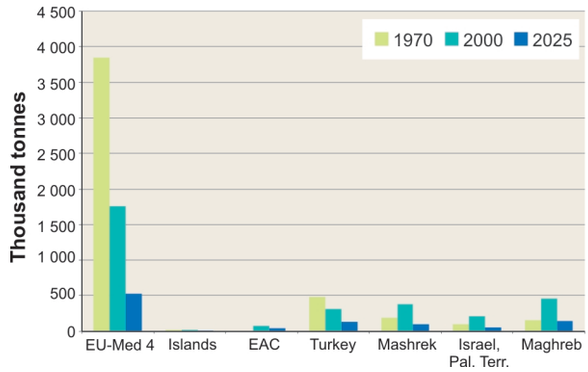
Source: Plan Bleu

Note: The traffic-emissions 2000 coefficients were divided by ten.

Energy consumption

In addition to noise and air pollution, the transport sector is also the biggest consumer of energy in Europe (in 1996 it accounted for 30 per cent of total energy consumption). Consumption is increasing continuously (by 3 per cent per year). Road transport is responsible for nearly 75 per cent of the total energy consumption of the transport sector.

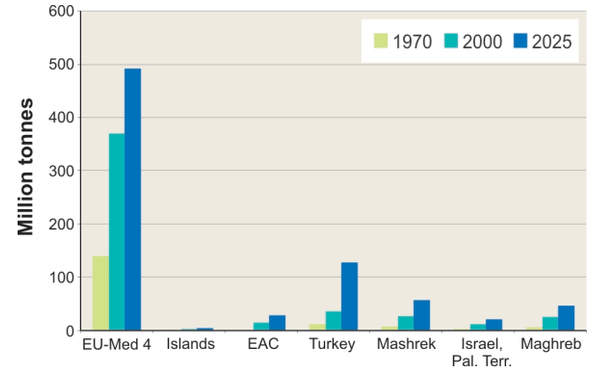
Figure 3.22 NO_x emissions, baseline scenario 2025



Source: Plan Bleu

Note: The average annual reduction in emission coefficients observed from 1984 to 2000 have been extrapolated to 2025.

Figure 3.23 CO_2 emissions, baseline scenario 2025



Source: Plan Bleu

Note: The CO_2 emissions of each country calculated by the IEA in 2001 were carried over to the total in 2000 CO_2 emissions calculated in Chapter 2, Energy. This percentage was then applied in 2025 to the total CO_2 emissions estimated in Chapter 2.

Different transport modes have very different energy consumption levels. Energy consumption per passenger in a private car is twice that in public transport. Although fuel consumption per vehicle has dropped, the total energy intensity of passenger transport[13] in Europe has not changed since the early 1980s. This is related to changes in fleet composition (more powerful vehicles, older vehicles) and modes of use (decrease in vehicle occupation rates). In the SEMC the trend is less clear, probably because of the rate of use of vehicles, which is still high. However, it is the attitude of people to their cars that is fundamental.

Individual buying behaviour, partly urged on by manufacturers, tends towards cars that are, most certainly, safer and more reliable but also more powerful (4x4). Although very considerable technical improvements in the energy performance of engines have been made by manufacturers, consumption by vehicles has increased because of greater power and the addition of accessories and safety systems (catalysers, airbags, power steering, etc.), which add weight. An additional hundred kg consumes 0.3–0.8 litres more fuel per 100km, and emits 11–29 grams more CO_2 per km. Consumers are also tending towards ever faster models (in Maghreb in 2001, the manufacturers offering the heaviest and most powerful ranges recorded the strongest increases in sales, and the models sold in that market are all 'tropicalized', that is equipped with air-conditioning and components adapted to the hot climate). Speed has an environmental cost. An increase in maximum speed by 10km/hr means a real consumption increase of 0.2–0.3 litres per 100km. Air-conditioning also continues to sell strongly, including in the north, leading to higher consumption, typically 7 per cent of annual average consumption, additional NO_x emissions and emissions of chlorinated and brominated compounds. Converting fleets to diesel also has a high impact (because of particulate emissions). Over 20 years in France, for example, between 1975 and 1995, the share of diesel in the fleet owned by households increased from 2 to 30 per cent. In Algeria in 2000 the share was 27 per cent, and Morocco 49 per cent.[14]

As regards *vehicle use*, studies show that one in every two car trips in Europe is for less than 3km, one in every four is less than 1km and one in every eight is less than 500 metres, including the search for a parking place. These short trips, generally in town with a cold motor, result in high consumption and pollution. Vehicle consumption is also very dependent on acceleration/deceleration phases, so that, on average, when used in urban situations, nearly 60 per cent of the energy produced by the engine is used to overcome the inertial forces due to the vehicle's mass. Traffic regulation is still a theoretical concept in most Mediterranean urban areas, even in the northern countries. Exceeding speed limits also leads to more emissions and energy consumption.

The quality of *vehicle maintenance* is also important. In France, for example, of 30,000 vehicles examined by the French Agency for the Environment and Energy Management (ADEME)[15] between 1991 and 1993, 51 per cent were badly tuned. This means 0.5Mtoe per year of additional consumption. From this point of view, mandatory technical checks that are currently aimed mainly at safety should also include the environment. In France only one of the 52 potential leak points for CO and CO_2 emissions is subject to technical control. Only Turkey, Italy and Israel require their vehicles to undergo environmental checks during technical surveillance tests.

As regards *freight transport*, the trend to lower energy intensity has been clear since the early 1970s both in Europe and in the SEMC. The two main causes of this movement have been the penetration of diesel and technological improvements. This has, however, affected different countries in very different ways because of the characteristics of the vehicle fleet in each country, the occupancy rate of vehicles and traffic fluidity. Moreover, in Europe since the early 1980s, energy efficiency gains have levelled off, whereas in the SEMC, energy performance per tonne transported continues to improve (see Chapter 2).

Impacts on land

The building of transport infrastructures leads to an *irreversible loss of land* that is not insignificant. Nearly 30,000 hectares in Europe were covered by roads between 1990 and 1998. In some north European countries, nearly 4 per cent of the national territory is covered by transport infrastructures. Roads take the lion's share and account for 93 per cent of land uptake. Rail uses 3.5 times less land per passenger conveyed.

Although the amount of land used for transport infrastructure is clearly increasing in some countries (Malta, Spain and Egypt in particular) the total increase in land occupied remained modest between 1984 and 2000 (1.6 per cent per year for the Mediterranean, 1.7 per cent in the NMC and 1.4 per cent in the SEMC) (Figure 3.24). In no country except Monaco does land occupation by transport infrastructures exceed 3 per cent.

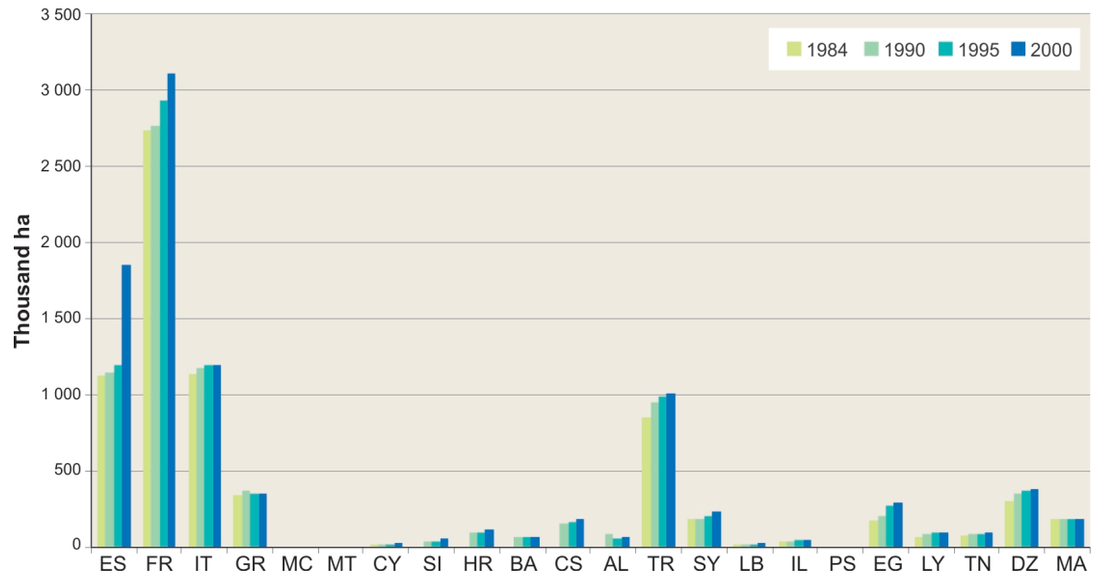
This increase in land area occupied by infrastructures is therefore of concern mainly from the point of view of indirect impacts.

Land-take can have several consequences:

- more demand for building materials (especially aggregates, which are often extracted directly from river beds);
- very many pollutant emissions, particularly during construction (dust, toxic effluents from the application of coated materials for road construction, waste from bottom-dredging when building ports, etc.);
- irreversible 'artificialization' of some exceptional areas (for example harbours and parking lots on the coast);
- accelerated random urbanization (roads and motorways along seashores).

It is the *sealing* of soils that is the greatest concern. The rainfall regime in the Mediterranean shows wide variations that directly influence the water regime and

Figure 3.24 Areas occupied by land transport infrastructures, 1984–2000



Source: Plan Bleu

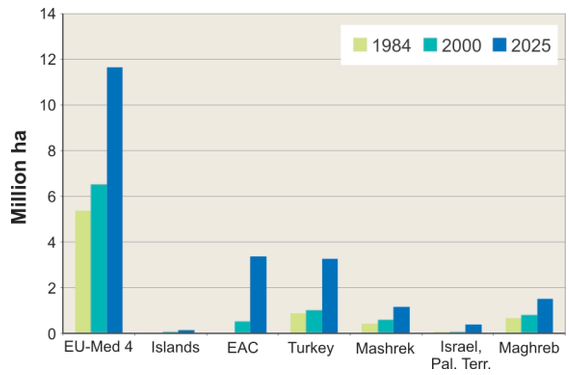
Note: These findings have been obtained by multiplying road and rail line information supplied by the International Road Federation and the International Union of Railroads by the coefficients of ground-occupancy used by the EEA ('Are we moving in the right direction?', TERM 2000). Airports were excluded, since their spatial expansion on the scale of a country is not significant and not necessarily related to national traffic. The covered surface of ports is dealt with in Chapter 6, Coastal areas.

turns many river beds into torrents at the end of the summer. By sealing soils, the construction of transport infrastructures, and the urbanization that goes with this, reduces the expansion areas for flooding and increases the flow velocity of floods, particularly on the mountainous coasts throughout the basin. Thus every autumn in northern Italy there are serious flooding problems, and in 1994 the French *département* d'Alpes Maritimes recorded disastrous floods. Such sealing also reduces the infiltration of rainwater into the ground, which results in slowing or even compromising the recharging of water tables. In Israel, for example, nearly 0.4 per cent of the country's surface area is already sealed.[16]

Infrastructure construction also threatens nature conservation and *biodiversity*, through emissions of pollutants from vehicles, noise, fragmentation of land, collision risks and reductions in species habitats.

The increase in land-take is expected to continue (3.3 per cent per year for the 2000–2025 period) (Figure 3.25). Some countries (notably Greece and Israel) or regions (the eastern Adriatic) may well record considerable annual increases (more than 4.5 per cent per year) for the rail and road investments necessitated by reconstruction or steep increases in traffic. Total land-take for infrastructures in the SEMC by 2025, however, is projected to remain below that in the NMC in 1996.

Figure 3.25 Areas occupied by land transport infrastructures, baseline scenario, 2025



Source: Plan Bleu

Note: Areas have been estimated on the basis of surfaces/traffic elasticity for 1984–2000.

Social impacts

The dominance of the car also has a major impact in terms of the numbers killed in *road accidents*, which account for the largest proportion of transport-related accidents (Figure 3.26). In the EU, for example, there are about 50 times more people killed every year in road than in rail accidents (44,000 for road compared with 936 for rail, or 11.1 deaths per million passenger-km for road compared with 3.4 for rail). The death rate for air accidents is even lower, 916 deaths worldwide per year, or 0.4 deaths per million passenger-km.

The number of deaths per year fell by nearly 50 per cent in the NMC between 1984 and 2000 with most of the improvement attributable to the EU countries. Taking into account the increase in traffic and the number of passenger-km, the number of deaths has dropped by 75 per cent during the same period. These good results are due mainly to the safety measures adopted by the countries (road layout and vehicle design, policing, prevention, etc.). The toll nevertheless remains heavy: 24,000 road deaths in the NMC in 2000. Within the EU, some countries (particularly Greece) have accident rates four times higher than others.

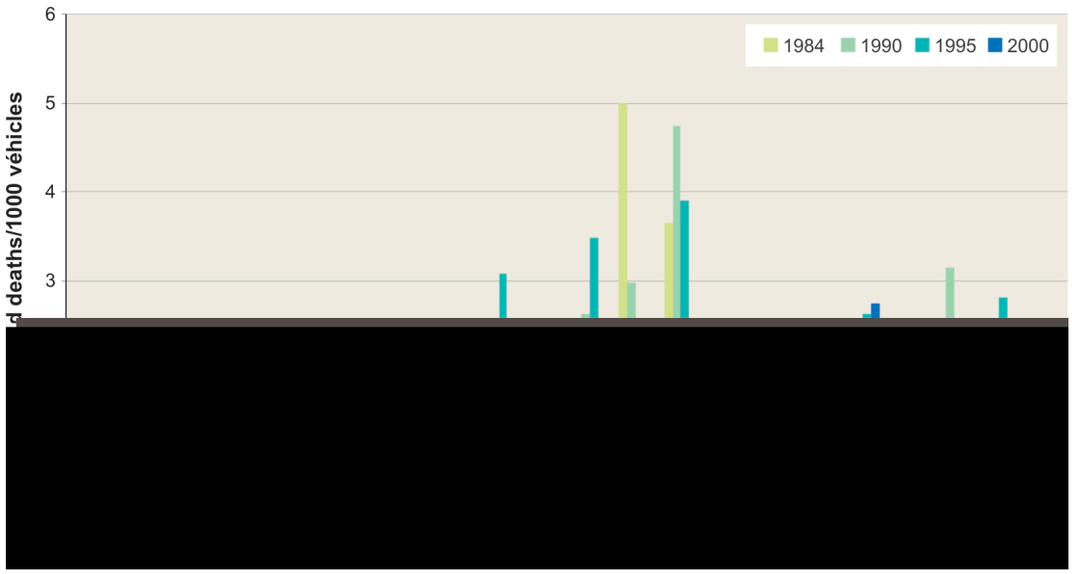
In most of the SEMC (except for Turkey, Syria, Lebanon and Israel), the number of road deaths continues to increase although the number of deaths/1000 vehicles is falling (by 2.7 per cent per year between 1984 and 2000). This relative drop is explained by the very high road accident death toll in these countries in 1984. With a vehicle fleet only one-tenth of that of the NMC, there were 80 per cent more road deaths. Turkey has a large percentage of the SEMC car fleet but succeeded in improving road safety by 10 per cent per year between 1984 and 2000.

The total number of road deaths is expected to continue to increase (by 0.6 per cent per year between 2000 and 2025) with a 4.5 per cent per year reduction in the NMC and 2.8 per cent per year increase in the SEMC (Figure 3.27). Without strengthening road safety policies, the toll could become a veritable slaughter in the SEMC with 50,000 deaths projected for 2025, 19,000 of which would be in Egypt alone. However, the increase in terms of number of road deaths/1000 cars is more moderate (0.4 per cent per year for the whole region, a 1.4 per cent increase in the NMC and a 0.1 per cent reduction in the SEMC).

This road-dominated system leads to a *dispersion of services*: ever-increasing distances between work, school and shops, and homes (see Chapter 4). This can eventually lead to greater social disparity since access to these services becomes more of a problem for the poorest (those unable to afford a car). The problem is becoming all the more acute since access to public transport is also becoming more difficult as investments are concentrated on roads.

This *increasing of distances* between the different functions of daily life are explained by the sociological and demographic factors that govern motoring: demographic development has replaced people who never acquired the habit of driving when they were young with

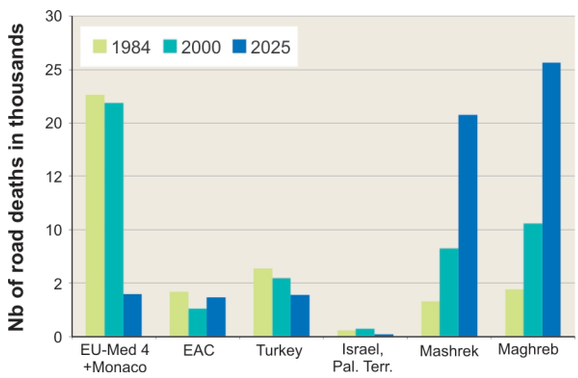
Figure 3.26 Number of road deaths per 1000 vehicles, 1984–2000



Source: National Statistical Institutes, Eurostat and IRF, 1984–1999.

people who are used to driving and only give it up late in life, the gap in status between men and women is closing, and incomes are increasing. Other factors are more directly related to public policies and contribute to fragmented cities that are more dependent on the car, with dense areas that always carry intense traffic and outlying areas that act as the source of very high traffic flows. Some of the factors that directly and significantly govern transport are regulation of the use of urban spaces, pricing and taxation, and questions of location and urban structures (see Chapter 4).

Figure 3.27 Number of road deaths, baseline scenario, 2025



Source: Plan Bleu

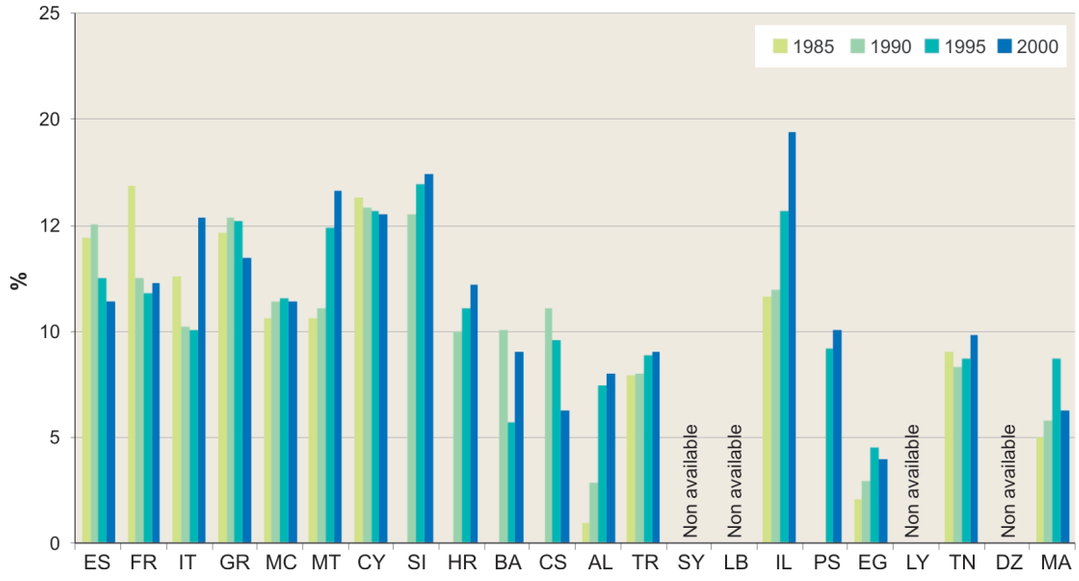
Note: The projection was made by applying the annual average growth rate in number of deaths per 1000 vehicles from the period 1984–2000 to that of 2000–2025.

The main result of this increase in the travel required to satisfy daily needs added to increasing mobility for tourism, leisure, etc. is the *rising share of transport in household budgets* (Figure 3.28).

The share of transport in household budgets varies considerably between countries (from 19 per cent in Israel to 4 per cent in Egypt in 2000). Income per capita is not the only factor, since there are considerable differences between countries with similar standards of living. In 2000, for example, Spanish households spent 11.4 per cent of their income on transport compared with 15.3 per cent in Italy. But the general trend, which is obvious in both the north and the south, is for rising household transport budgets. The average increase for the whole of the Mediterranean between 1984 and 2000 was 3.7 per cent per year (3.9 per cent in the NMC and 3.3 per cent in the SEMC).

In future this increase may well level out in the EU (0.6 per cent per year is projected for 2000–2025) and in the islands (1 per cent). On the other hand, the increase is expected to remain very high in the Balkans (3.4 per cent per year) and to a lesser extent in the eastern Mediterranean (1.7 per cent). However, similar disparities can be expected in 2025 as in 2000 since developments

Figure 3.28 Share of transport in household budgets, 1985–2000

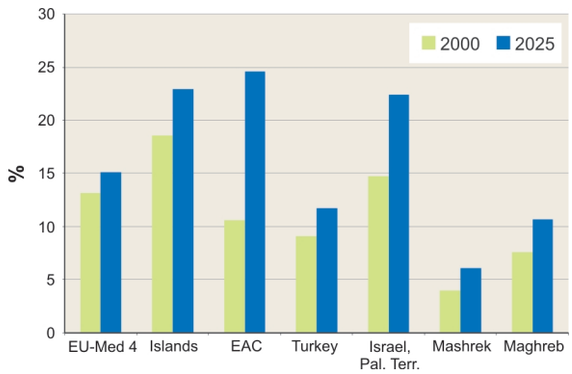


Source: Plan Bleu

Note: Data come from national statistical yearbooks. The Turkish series was reconstituted from household surveys from 1987 and 1994 based on a linear increase. Algeria conducted a survey in 2000 but does not yet have a time series. The same applies to Lebanon for which the World Bank (WDI) only reports 1998.

seem to be related more to the physical and technical characteristics of each country's transport systems than to differences in living standards (Figure 3.29). But throughout the Mediterranean the indicator remains high and increasing, compared with the rest of the world.

Figure 3.29 Share of transport in household budgets, baseline scenario, 2025



Source: Plan Bleu

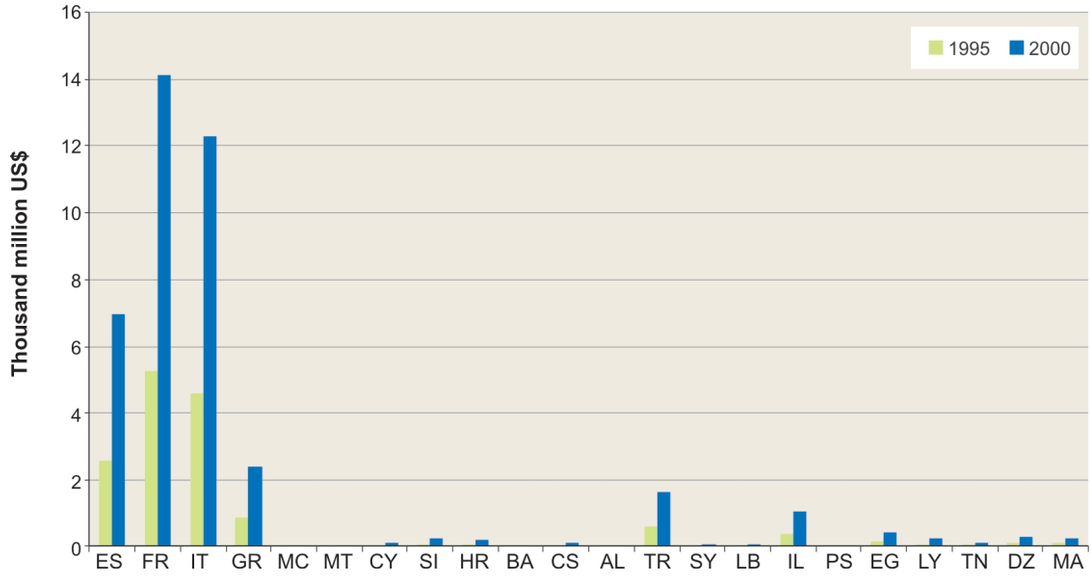
Note: 'Percentage of household expenditure on transport/passenger road traffic' elasticities for 1984–2000 were applied to 2000–2025 projections of road passenger traffic.

Another important consequence of increased road traffic is *road congestion*, which has costs in terms of lost work time, extra pollution, premature wear and tear on vehicles, user stress, accelerated wear of some roads, etc. An INFRAS/IWW[17] study, the findings of which were published in 2000, put these costs at 35 thousand million euros in the EU in 1995.

These costs for the whole of the Mediterranean were estimated to be about US$41 thousand million dollars in 2000 (Figure 3.30). Here again the differences between countries are enormous (US$14 thousand million in France in 2000, US$1.6 thousand million in Turkey and US$0.4 thousand million in Egypt), but the trend is a general and very rapid increase (16 per cent per year between 1995 and 2000). These costs already accounted, in 2000, for between 0.3 per cent of GDP in Bosnia-Herzegovina and 1.7 per cent in Greece.

The general increase in congestion costs is projected to continue, both in absolute terms and as a percentage of GDP (Figure 3.31). By 2025 the problem may well become significant since the costs for the whole Mediterranean are estimated at US$185 thousand million but will mainly concern the EU, Slovenia, the islands, Israel, and Serbia-Montenegro. Only those countries may have

Figure 3.30 Costs of congestion, 1995–2000



Source: Plan Bleu

Note: Based on the 1995–2000 INFRAS/IWW estimates for the four EU-Med countries, the percentage of GDP absorbed by congestion costs was calculated for these countries and applied directly to estimate the costs for Malta, Cyprus, Slovenia and Israel, increased by 55 per cent for Monaco and reduced by 20 per cent for Croatia, Bosnia-Herzegovina, Serbia-Montenegro and Turkey and by 40 per cent for all other countries.

more than 1.4 per cent of their GDP absorbed by congestion costs. For the other countries, this proportion may well increase between 2000 and 2025 by between 25 per cent (Syria) and 85 per cent.

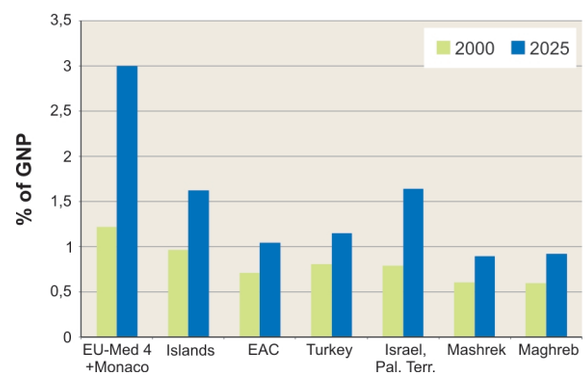
The sum of all these effects suggests that the explosion in land and air travel will impose *increasing environmental and social costs* on all Mediterranean countries, north and south, which will be harder and harder to bear, especially insofar as this increased transport benefits road and air travel to the detriment of rail. Reversing these trends is all the more difficult in that the transport sector (like all service sectors) has played a significant role in economic growth over the past 15 years (see Part 1).

Inadequate responses

Four main policies are being used in the Mediterranean to try and staunch the rise of the above problems:

1 decoupling economic growth from transport demand through national spatial planning policies and controlling urban travel (discussed in Chapter 4);
2 improving the eco-efficiency of each mode, providing as much or more transport but with less social and environmental damage;
3 changing the modal split by switching all or some traffic to less-polluting modes;
4 improving road safety.

Figure 3.31 Congestion costs, baseline scenario, 2025



Source: Plan Bleu

Note: The increase projected by INFRAS/IWW for Europe to 2010 was applied to all the Mediterranean countries.

Controlling transport demand by national planning and good urban planning

The most important measure is proper planning of urban passenger and freight transport. Two countries have started using this kind of measure on a large scale: France (with P*lans de Déplacements Urbains*, PDU) and Italy (with Urban Traffic Plans, UTP).

In both cases, local authorities are required to direct urban passenger and freight transport on the basis of:

- reducing car traffic, with a parallel development of public transport and economical and non-polluting modes, and promotion of car-sharing in companies;
- developing and using the main transport networks in each urban area in a way that optimizes the use of the networks by each transport mode;
- reducing the impact of freight transport and delivery on traffic and the environment.

It is difficult to draw conclusions about these experiences because they are relatively recent and because their impacts are difficult to dissociate from urban management as a whole (see Chapter 4).

Favouring less-polluting modes

The atmospheric pollutant emission coefficients per passenger-km of *rail* are far less than those of road and air. One passenger-km by train emits 0.02g of VOCs and 0.08g of NO_x, compared with 0.5 and 0.6g respectively for cars and 0.07 and 0.7g for planes. The ratios are more or less the same for tonne-km.

Rail also occupies less ground area, for a given network length, than roads (on average a linear rail kilometre uses 3.5 times less ground area than a linear road kilometre). But rail is not the only 'sustainable' substitute for road transport. Coastal shipping and combined rail/road/sea freight transport, are possible ways of diversifying transport by 2025. However, there are only a few very localized examples of the latter in the Mediterranean.

Favouring rail traffic

There are three types of situation in the Mediterranean:

1. Spain, France and Italy, which are vigorously constructing high-speed lines (LGV);
2. the eastern Adriatic countries, which have old, already organized rail networks that could again play a relatively large role with some significant investments, but are, instead, prioritizing roads;
3. the other Mediterranean countries, which, with the exception of Egypt for passenger transport, do not have a strong tradition of rail and whose networks remain very underdeveloped. The special case of Turkey should be noted, however; its network has been vigorously developed over the past ten years.

It is therefore mainly in Europe that there is any chance of a significant modal switch from road to rail during the next 25 years.

The priority objective set by the EU (60 per cent of infrastructure investment by EU countries to 2010 to be earmarked for rail, 30 per cent for roads and 10 per cent for other modes[18]) is to build a European network of LGVs. The north-western Mediterranean countries very quickly adopted the innovative technology of the High Speed Trains (TGV); in 2002, there was 1354km of LGV track under construction and nearly 9000km planned, and industries to produce rail equipment adapted to this technology have been established. S*pain*, F*rance and* I*taly* are among the dozen countries provided with this equipment (Box 3.7). However, the rail networks of the Mediterranean Basin were long thought to be doomed to marginalization, even to disappear. Uneven topography and difficult construction conditions explain why until around the mid-1980s the search for economies won out over the determination to establish high-speed lines adapted to freight. Even today there are limits to the capacity and speed of trains: 75km per hour between Ventimiglia and Genoa, 85km between Barcelona and Port-Bou, 105km between Madrid and Barcelona, 78km

Table 3.1 Plans for investment in rail infrastructures in the north-western Mediterranean

Country	Amount (thousand million euros)	Period	Reference	Annual investment (thousand million euros)	Rate per capita (euros)	In % of GDP
Italy	62	2001–2010	General transport plan 3/2001	6.25	109	0.59
Spain	38	2000–2006	Infrastructure Plan 2000/2006	5.34	136	1.03
France	18.2	2000–2010	CIADT 18/12/03	1.8	31	0.14

Source: Plan Bleu

between Cannes and Saint-Raphael and 96km between Marseilles and Toulon. Correcting the shortcomings of these networks is difficult and expensive; moreover, building LGVs requires the projects to meet certain imperatives: the existence of large traffic flows between destinations a few hundred kilometres apart; the will to find free slots on saturated lines to develop piggyback transport; and the promotion of a non-polluting but sometimes noisy mode of transport. Despite these difficulties, the TGV is beginning to dominate in France, Italy and Spain.

Box 3.7 The development of high-speed rail lines (LGV) in Italy, Spain and France

Italy was the world's second country (after Japan) to begin building LGVs in the mid-1980s. A first line was put into service between Rome and Milan and a second between Rome and Florence. An extension of the latter to Naples was to be completed in 2004, then later through the Apennines to Bologna and Milan. Changes in the initial Rome–Florence section should increase speeds. The result of these operations will mean an appreciable increase in speed, although this will remain modest compared with Italy's neighbours. The Italian approach is to combine the exploitation of conventional and new lines to maximize flexibility and capacity, with many connecting lines between the two networks to enable freight trains to use both. This will require expensive additional construction and explains why the Italian LGV network will not be completed before 2015. However, even when completed, this new system will not relieve the roads leading towards the eastern Adriatic countries and Spain. Indeed nothing is planned for the Ventimiglia–Milan route or the Milan–Lecce route (which still takes ten hours). However, the Italian industry, Eurostar Italia (ETR), has delivered high-performance tilting trains, so there is room for manoeuvre for modal shifts which remains to be explored.

In **Spain**, the difference in gauge between the Iberian peninsula and the rest of Europe (1.67m as against 1.43m) has long impeded the development of rail transport. The construction of a new network using European standards based on LGVs, for freight and passengers, seemed essential to give rail a real boost.

The first line, put into service in 1992, preceded this overall programme. It was built between Madrid and Seville on the occasion of the world exhibition. This is the only operating European-standard line. An ambitious programme has been designed to provide as much national coverage as possible. The new network will be focused around Madrid, with a series of routes linking Madrid to the main provincial cities, with many branch lines since, in contrast to France, Germany and Italy, there is no inter-operationality between the old and new networks, which would require the use of variable-gauge rolling stock. Two cross-country lines are planned connecting Grenada with Algesiras and Almeria with Barcelona, joining the Madrid–Barcelona line at Tarragona.

The first project underway, the Madrid–Barcelona –Perpignan line, should come into service by 2005. By then, Spain will have a 1300km LGV line from Seville providing proper access to European rail systems. Later, this line will be completed with international standardization of the gauge of the Pau–Saragossa line, due in 2006, and a twin tunnel reserved for freight through the Pyrenees to be implemented by 2020.

The trains to be used on the Spanish network will have an average commercial speed of 239 kmh.

The **French** situation is paradoxical: although one of the pioneers of the TGV, after bringing the LGV line linking Paris and Marseilles into operation, the public authorities seem to be hesitating about completing the network towards Italy and Spain. Initial studies on extending the LGV between Aix and Fréjus were only begun in 2001. And the Languedoc branch (Manduel–Perpignan) is still awaiting funding.

Thus even in Italy, France and Spain, a modal switch from road to rail using the TGV (depending on the freight/passenger mix) is unlikely to be implemented before 2010/2015. In particular, the concentration of traffic flows on a few lines (essential if rail is to compete with road) requires an institutional environment that enables such networks to emerge, that is one that enables negotiations between rail operators and governments. This modal switch may occur sooner for higher value-added products, particularly using sea containers within the framework of an inter-modal rail–sea system. Support will then be needed for a high-performance 'core network' that would enable a new kind of rail operation relying on the major corridors. Such a scheme again requires a redefinition of the 'rules of the game' for rail transport. The current hesitancy of the French, Italian and Spanish governments towards rail makes it unlikely, for the time being, that such winning strategies will be developed.

In *Turkey*, the re-opening of the rail routes in the eastern Adriatic countries and significant investment in rolling stock should help to maintain the current healthy state of the main operating company. But this will only make sense if the Turkish governments make a break from the 'road-dominant' culture which marked public investment policies during the 1990s, when roads accounted for nearly 25 per cent of capital public expenditure[19] compared with just 4 per cent for rail.

In the *Near East* the situation is in limbo until the Israeli–Palestinian conflict is resolved and the possible re-opening of the Lebanese network (Box 3.8).

Box 3.8 The prospects for re-opening the Lebanese rail system

The civil war dealt a fatal blow to the operations of the Lebanese rail system, which consisted of three main lines: Tripoli to Sidon (130km), Beirut to the Syrian border (60km) and Tripoli to the Syrian border (40km). In 2000, the Lebanese government decided to refurbish the rail link joining Tripoli to the north-eastern border with Syria. Two phases are planned: the operation of a single track along the present route beginning at the end of 2003 and of a second track by 2005. This project is being funded within the context of the national budget (about 20 million euros). The contractor (the Office for Railroads and Public Transport, a public agency under the aegis of the Ministry of Public Works and Transport, which enjoys a 50 per cent state subsidy) is planning to issue a call for tenders for operating the line within the context of a public–private partnership. Although the main motive behind this project is to give the port of Tripoli a rail link that should help to develop inland areas, this first rail operation, after decades of neglect and delay, could produce a 'snowball' effect for Lebanese railways in general.

In the *Maghreb* countries, objectives converge around an improvement of rail transport. The network in Morocco has been greatly modernized and strengthened during the past five years, and the government has announced an extension of the system to the north and south. In Tunisia efforts are focused on greater Tunis and there are plans for public transport with dedicated lanes to complete the existing light metro line. In Algeria, the government invested more than 95 million dinars in rail between 1990 and 2000 without, however, preventing a fall in rail traffic (from 2.7 thousand million tonne-km of freight in 1990 to 2.0 in 2000, and from 3 thousand million passenger-km to 1.1). With the lifting of the embargo in 1999, the Libyan government is once again planning to build a line between Sfax and Tobruk. However, neither the priorities of the national transport policies nor the future projections of the Arab Maghreb Union (UMA) show any sign of a large-scale programme to develop a Maghreb network serving all the countries of the UMA, even in the long term.

In summary, while waiting for the implementation of the LGV network, maintaining the market share of rail, even in Mediterranean Europe, requires *determined policies* that aim to reorganize and significantly improve the performance of rail. Beyond aiming to maintain the status quo, political decisions are needed, aimed at giving freight priority over passenger transport and providing investment to increase the capacity of the rail system. Between 2000 and 2025 rail will barely achieve a market share of more than 4–5 per cent, which, compared with current trends, would constitute an important recovery and maintain a credible alternative to road transport.

Favouring combined rail/road/sea/river freight transport

A modal switch to combined transport is particularly important in the western Mediterranean and even more so in Mediterranean Europe, which generates and whose ports receive most of the area's freight traffic. Outside Mediterranean Europe, maritime traffic is mainly in transit. In the eastern Mediterranean, political crises have postponed structural investments in transport to the distant future, although there are some projects, such as the rail project proposed by Israel and the Palestinian Authority within the framework of the Regional Economic Development Working Group (REDWEG) project, described below.

For Europe, a comparison between northern European ports and those in southern Europe show how far there is to go in the Mediterranean before combined freight can be developed further. For example, the share of road in carrying freight from ports in 1999 in the north (Benelux, UK and German Atlantic coasts and the English Channel in France) was less than 60 per cent compared with 80 per cent in Mediterranean Europe (Mediterranean France, Italy, Greece and Spain). The difference results mainly from the use of combined water/rail transport.

Mediterranean Europe has some big *rivers* (the Rhone and the Po). The Rhone in particular is navigable by large ships. That is why many analysts have long been suggesting the following uses of these rivers:

- *In the Rhone basin*: cancelling the tax levied when passing through the Port of Marseilles; improving the navigable sections to end the near-mandatory use of a pilot for sailing upstream; and recognizing the international nature of the Rhone to enable ship-owners to benefit from tax exemptions for fuel. As far as capacity is concerned, the Rhone offers considerable potential up to Lyons (current traffic is only about 10 per cent of capacity). The Rhone can accommodate river- and sea-going vessels of 2500 tonne dead-weight up to Lyons, which opens significant possibilities for combined sea/road/rail transport with the opening of the multimodal Saint Exupéry complex in Lyons.
- *In the Po basin*: major initial improvements are needed to make navigation possible up to northern Italy's main economic zone (Milan and the Lombardy region, which generates nearly one-third of Italy's imports and exports). The navigable sections of the Po only accept ships of 1250–1450 tonnes, but international traffic calls for the ability to accept ships of at least 1500 tonnes.

Beyond these two river routes, which offer the only real possibility of large-scale combined rail/road/sea transport in the Mediterranean, there are some examples of successful combined transport (Box 3.9).

Box 3.9 Examples of successful combined transport

Italy is without doubt the leader in combined transport. Its geography, the distances between north and south, and a population of more than six and half million people living in islands, have resulted in this possibility being exploited. Italy uses combined sea/road/rail transport at both national and international levels.

At the domestic level, it supplies the islands of Sicily and Sardinia and ports along the Adriatic and Ionian Seas (between Venice and Catanzaro). Competition between this form of combined transport and road transport has long been nearly impossible. Only ships able to do 24–28 knots could hope to compete with trucks. But such speeds were impossible for freighters. With the entrance of operators already active in other modes (such as Benetton and the Chargeurs Réunis) combined sea/road transport has become a reality, and completing the LGV network will add rail to the combination in a few years' time.

At the **international** level, the ports of Brindisi, Ancona, Ravenna and Trieste are the mandatory landing points for road traffic from Greece, Turkey and the Middle East. Regular services are also developing on the west coast between Genoa and Barcelona, and the Grimaldi shipyard in Naples is becoming a leading operator as a storage and handling hub between Tunisia and the Mediterranean-to-Rhine corridor. Political turbulence in the former Yugoslavia and the Middle East resulted in road transport being so unsafe that combined sea–road transport took its place.

For this traffic, the **Greek** maritime companies play the dominant role with the Italians usually reduced to the role of maritime agents, handling companies in ports and managing unloading–reloading to rail or road (combined transport companies such as Combinare). Most traffic is concentrated in the ports nearest the Greek coast (Bari, Brindisi), but Ancona and Venice have grown following the introduction of super-fast vessels. Turkish haulage contractors have also entered this market through a road hauliers association (UND), which started by fitting out two ships in 1990 and now owns 12, devoted exclusively to this traffic.

Thus with a few minimal improvements, there is genuine room for manoeuvre for combined road/rail/sea/ river transport in the western Mediterranean. However, there seem to be few prospects in the rest of the Basin although some inter-modal links have occasionally emerged, particularly as a result of the cutting of the land and river routes in the former Yugoslavia.

The effectiveness of coastal shipping

Coastal shipping as an alternative to road freight transport is based on the idea of 'seaside highways', parallel to coasts (similar to what combined transport has already made possible in Italy) or as direct links (Mediterranean or Atlantic). It assumes high-frequency traffic, which depends on fast ships and maximum efficiency at ports (high-grade infrastructures and precise regulations, that do not slow transit speeds too much). It also requires the active participation of road hauliers who must adopt international integration and occasionally new packaging techniques (for example containers and unaccompanied trailers).

The need to satisfy all these requirements probably explains the failure of several attempts to open 'short-sea' routes in recent years (notably between Toulon and Savona and Sète and Palma) (Box 3.10).

Box 3.10 The Franco-Italian short-sea shipping project

Marseilles ship-owners had already launched the 'coastal métro' concept in 1995, before the accident in the Mont Blanc tunnel in 1999 gave an even more direct impetus to an alternative link between France and Italy by sea rather than through the Alps. In 2002, based on the transport potential of the inland areas of Marseilles, southern France and the Italian peninsula, five shipping companies (CMA-CGM, CMN, Marfret, SNCM and Sud-Freight) founded the Société des Autoroutes Maritimes du Sud. With 880,000 euros of aid from the European Marco Polo programme, the Marseilles project provides a link between Fos and Savona and aims to capture 2 per cent of the road traffic passing through Ventimiglia. The launch was, however, postponed in early 2004 because of a lack of public funding.

A greater supply of SSS (short-sea shipping) between the western Mediterranean ports could provide a wide range of services:

- regular services between ports (roll-on roll-off, with or without loading lorries onto ships);
- river–sea services between coastal and inland ports (river ports) of the Rhone and Po basins;
- transhipment of local traffic linked to intercontinental deliveries (containers).

Achieving this would require:[20]

- rationalizing and harmonizing administrative and pricing procedures at loading/unloading points (sea and river ports);
- implementing dedicated ticket-offices similar to those being introduced in the rail sector, enabling customers to have a single agent organizing door-to-door transport; this has succeeded for rail and should be transposable to short-sea services;
- providing financial support (as often enjoyed by combined transport in general and particularly com-

bined rail/road in Europe) to enable survival beyond the early years of operation that are financially difficult even when large customers (in terms of volumes transported) use the service from the beginning. Current allocations of EU resources (for example the PACT and Marco Polo programmes) are generally considered to be insufficient;

- research and development to design and try out technical options (at both interface and navigation-equipment levels), that might enable the economic performance of these very specific maritime services to be improved.

Freight transport projects are included in trans-Pyrenees and trans-Alpine traffic scenarios.

Previous developments of transport policy frameworks towards pricing for the use of infrastructures that includes realistic internalization of externalities are required as for other alternative rail and water transport modes.

The scope for an increase in short-sea transport is huge. In 1997, despite an increase of 4 per cent between 1990 and 1993 and 18 per cent between 1993 and 1997, it accounted for only 6 per cent of the tonnage transported between EU countries (compared with 84 per cent by road), and 33 per cent of the tonnage of non-community traffic (45 per cent by road).

Increasing the eco-efficiency of transport modes

The results of the improvements in engine technology declared by car manufacturers can be measured by analysing pollution emission curves. However, this improvement must be interpreted in the light of the very advanced age of the car fleet in the southern countries (83 per cent of the fleet in Morocco and Algeria is more than ten years old) and the slow rate of fleet renewal. Moreover, these positive effects can be offset by the purchasing choices and vehicle-use patterns of consumers on the northern shores and limited purchasing power on the southern shores.

Technological improvements do not apply only to engine performance; they can also involve the use of motor vehicles in urban areas (small vehicles) and traffic organization (for example forecasting traffic peaks). Generally speaking, in Europe, these technological improvements have been swamped by increased traffic.

There are technical limitations to the potential for *clean fuels* (for example LPG and electric vehicles) and also environmental and economic limitations (bio-fuels). Lead-free fuels and catalytic converters are promoted in most Mediterranean countries (in the EU-Med countries and also in Tunisia, for example, with a law passed in August, 2001). LPG is very effectively promoted in Algeria where, thanks to its attractive price (a third of that of petrol) and a partial subsidy by the state for installing gas tanks, demand increased by 730 per cent between 1995 and 2001. Favouring clean fuels also penalizes the most polluting fuels. In Lebanon, an experiment was conducted in 2002, banning diesel engines for vehicles that carry fewer than 12 passengers (the measure was subsequently repealed).

In many SEMC, for example Turkey, Lebanon and Tunisia, the use of *collective taxis* or private cars for commercial transport results in a significant decrease in emissions per passenger-km, because of the higher occupancy rate of passenger vehicles. Moreover, this informal transport provides a significant source of occasional income. But the attractiveness of this kind of solution must be considered in the light of the need for improvements in conventional urban passenger transport. In the NMC there is no policy for promoting car-sharing, common in the US for example.

Improving road safety

The frequency of road accidents can be reduced by active road safety policies in both the north and the south. However, the cost of some of the policies and the infrastructures that would be needed to implement them means that some can only be considered in the northern-rim countries.

In the SEMC

There appear to be five priorities for improving road safety.

1 *Statistics*. In most SEMC, the recording of accidents is of poor quality. The lack of standard recording and filing databases that enable the storage and analysis of accident data in time and space precludes a proper understanding of the way the situation is developing.

2 *Coordination*. Road safety is at the crossroads of many institutions and social and economic actors: ministries (transport, national planning, education, health), car manufacturers, etc. A common framework must be created if progress is to be made. Some countries are beginning to implement such frameworks, for example in Algeria, where a National Prevention Council for Road Safety was set up in 2000.

3 *The road environment*. Road networks in the SEMC still have many high-risk sections; traffic signals and street marking are still inadequate and there are frequent obstacles on the road (for example animals, plants).

4 *Road traffic regulations*. Regulations in a number of SEMC have been improved since the mid-1990s, for example the mandatory use of seat belts nearly everywhere and speed limits. But their application still remains too theoretical. The lack of policing and above all the small fines imposed is the main

reason for dangerous driving behaviour continuing. The implementation of technical vehicle verification centres (such as those in Algeria and Morocco[21]) will certainly have an effect on the level of accidents, since, in contrast to the north, vehicles in the south are sometimes the cause of accidents (for example 13 per cent in Algeria compared with 1 per cent in France in 1998).

5 *Training and information*. Training in driving schools is very uneven. A reform of qualifications for driving school instructors seems to be a prerequisite of any serious attempt to improve the situation. There are also too few campaigns for raising awareness of violence on the road.

In the EU Mediterranean countries

Accident rates in the four EU-Med countries seem to have changed little during the past decade or so. Traditional policies to reduce law-breaking (making excessive speed a crime in 1999 and installing radar speed trap on roads in France in 2003) are measures with a proven effectiveness However, the emphasis of accident prevention has now been shifted to the interaction between the road and the driver through the 'intelligent road' concept. Several avenues to 2025 have already been identified:

1 *Traffic management*. This is a matter of knowing what is happening in real time on the network in order to be able to react and forecast. There is greater use of systems that provide immediate information about what is happening and what is likely to happen on the major roads (the motorway networks): vehicle speed, traffic flows and 24-hour forecasts.

2 *Information on traffic conditions*. Motorway system managers are increasingly installing systems for broadcasting information to the authorities and to drivers. These use local sensors, radar and video cameras, making it possible to direct traffic around accidents very quickly and prevent chains of accidents.

3 *Navigation information*. On-board computers on which drivers can programme their route with a series of maps.

4 *Driving aids*. The aim is to automate driving by fitting roads with systems that take the place of the driver. Two recent projects illustrate what may be in store: the HAS project in the US (1997) aimed at equipping the San Diego freeway with a system that uses magnetic studs every metre to control driving automatically and double the carrying capacity of the road without incident, and the *Prometheus* project on 55km of a Dutch motorway near Amsterdam, at a cost of 1.22 thousand million euros, with the same objective.

These various approaches give an indication of possible improvements in land transport systems. However, they seem to have resulted in only minimal benefits (maintaining the share of rail at the current level, isolated examples of combined transport and coastal transport, and little progress in road safety). The measures that have been taken appear to have been too sectoral and scattered in time. The alternative scenario described below assumes the integration and simultaneous adoption of these different measures in a coherent way to achieve sustainable transport development and much greater progress.

Reducing pollution and the risks of maritime transport

Without an overall and up-to-date matrix of origin/destination data, it is impossible to give a precise picture of the actual maritime traffic in the Mediterranean. By default then, it is the Mediterranean-flag fleet that will be described in the following paragraphs even though this fleet sails in many seas. This will provide an indirect indicator of the state of the fleet circulating in the Mediterranean and what is being done to make traffic safe.

The Mediterranean merchant fleet has characteristics that are poorly matched with the requirements of sustainable development. As with land traffic, maritime traffic is increasing significantly. This is already leading to major environmental impacts that risk becoming much more severe unless there is a substantial improvement in safety.

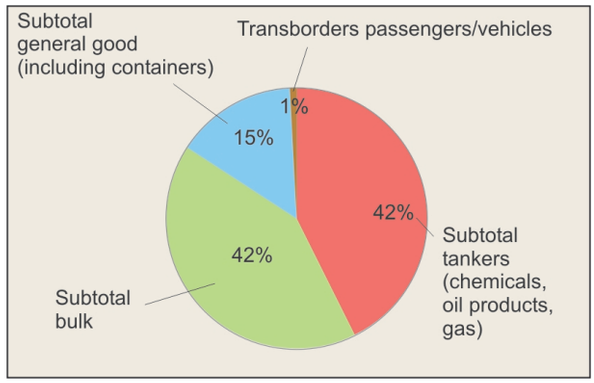
An unsafe and poorly controlled Mediterranean merchant fleet

The fleet licensed under Mediterranean flags[22] carries a large proportion of *environmentally dangerous substances*. In 2001 nearly 42 per cent of the Mediterranean merchant fleet carried hydrocarbons and chemical products, with the possibility of pollution from routine operations and accidents (Figures 3.32 and 3.33).

As a second risk factor, the fleet includes many ships with *open-shipping registrations*, which are or may be 'at risk'.

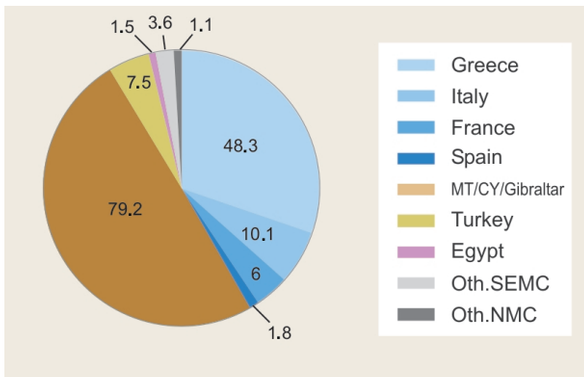
Open-shipping registrations (Malta, Cyprus and Gibraltar), that allow the licensing of shipping companies with almost no formalities or prior checks, generate considerable savings for ship owners in terms of manpower and lack of inspections of their vessels (given the disproportion between the sizes of the countries that hold these registers and those of the fleets flying their flag). Between 1987 and 2001, the deadweight (transport capacity) of the Mediterranean merchant fleet increased by 27 per cent, but the open shipping registrations by 123 per cent. Moreover, it was

Figure 3.32 The Mediterranean-flag merchant fleet, breakdown by freight type, 2001



Source: Dobler (Eco-Mar), 2002

Figure 3.33 The Mediterranean-flag merchant fleet, breakdown by country, 2001 (million TDW)



Source: Dobler (Eco-Mar)

Note: TDW – deadweight tonne (the maximum capacity of transport authorized for ships)

the open registrations of the flag countries least endowed with maritime administrations and with almost no national ship owners that recorded the biggest increase in dead-weight. For example Gibraltar (with limited tonnage) and Cyprus experienced growth rates of about 30 per cent while Malta recorded a huge increase in registrations of 542 per cent in 14 years. Given its population size and resources, it is unlikely that Malta will ever be able to carry out all the technical and social inspections required by the size of the fleet registered under its flag.

The fact that Malta (as well as Cyprus) is now a member of the EU poses a problem concerning the political practices promoted by the European Commission for the eradication of 'sub-standard' ships. Until now such ships have been relatively scarce under the national flags of EU countries. However, with the entry of Malta and Cyprus, the situation may change completely since 80 million dead-weight tonnage (TDW)[23] of open registry will be added to the 67 million of the traditional marine country flags. The EU intends to tackle these deficiencies by improving inspections of ships entering its ports. This response may prove inadequate since, even in Europe, most states monitor less than half of the ships that put into ports and, once the deficiencies are noted, a ship is rarely held for very long at the quay given the financial stakes involved. Moreover, most of the Mediterranean countries do not have a sufficiently large (and qualified) maritime affairs administration to reduce the deficiencies in the supervisory checks required by the flag status.

The *high average age of the fleet* constitutes another risk. It is very worrying to find fleets under Mediterranean flags with an average age of often more than 20 years (19.7 years world average): 23 years in Egypt and Slovenia and also Greece, 24 years in Turkey and Algeria, 27 years in Albania, 29 years in Croatia, 33 years in Lebanon, 34 years in Serbia-Montenegro and 43 years in Syria. An analysis by type of ship shows an average age of 55 years for the four Turkish 'cruise ships' and 68 years for the two Maltese 'passenger-freight ships'. The risks to the environment from these old ships are confirmed by the organization of the Paris Accord Memorandum[24] that classifies all the world's flags every year according to the social and environmental risks involved. The lists published by this organization are drawn up according to the number of detentions for non-conformity with international rules following inspections carried out in the ports of Europe and North America. In 2002 Algeria, Lebanon, Syria, Turkey, Libya and Morocco figured on the black list as posing a very high risk, Egypt was classified as high risk, followed by Malta and Cyprus as medium risk. The grey list included flags considered dubious in the eyes of the Memorandum's inspectors and thus likely to require special attention. In the Mediterranean, this is the case for Gibraltar, Italy and Spain.

Controlling operational and accidental pollution

Operational pollution

Operational pollution from ships by hydrocarbons includes emissions of several kinds of hydrocarbon and hydrocarbon mixtures generated on ships, including oil tankers, during routine operations. The expression encompasses ballast waters[25] (slop), tank washing residues, sludge and bilge waters.

In the Mediterranean, in contrast to what happens in most of the world's oceans, the international waters are regulated. The MARPOL 73/78 convention states that the Mediterranean is a 'special area' and as such, any discharge into the sea beyond territorial waters of 12 nautical miles of *hydrocarbons or hydrocarbon blends* from a tanker (or any other ship of a certain size) is forbidden.

Despite this, sludge and residues are still being emptied into the Mediterranean, mainly because of the lack of adequate reception facilities in some ports and terminals. Sea monitoring can be done with remote sensing, and satellites and could be further developed and coupled with monitoring of seaways near the busiest passage points. However, the quantities of residues from de-sludging have been falling steadily since the mid-1970s, to an estimated 100,000–150,000 tonnes of hydrocarbons (Figure 3.35 below),[26] although the WWF reckons that annual emissions are 12 times greater.[27] This is certainly due to developments related to the MARPOL convention, which has required the inclusion of separate ballast tanks in ship construction since 1979. However, diesel and engine-oil residues are continuing to grow.

For *other polluting products* carried or used by ships (chemical tankers in particular), the Mediterranean is not a special area, and, apart from the ban on dumping less than 12 nautical miles from shore, there are no rules.

One of the immediate answers to the problems of operational pollution remains equipping Mediterranean ports with recovery and liquid and solid waste-treatment systems. According to a study carried out by a professional organization of Greek ship owners in 1997, 54 of the Mediterranean's 123 ports studied were equipped with this kind of system.[28] There is still the problem of funding the use of these systems, even where they exist they are often underused, since their cost remains relatively high. EU Directive 2000/59/EC of 27 November, 2000 makes it mandatory for Member States to include the costs of using these systems in port charges. In the Mediterranean, non-members of the EU are waiting to see the results of this initiative before committing to such procedures.

Accidental pollution

Since 1977, under the Mediterranean Action Plan, the Regional Marine Pollution Emergency Response Centre (REMPEC)[29] has methodically recorded *accidental* pollution by compiling reports on accidents that have or could have caused marine pollution by hydrocarbons. Between August 1977 and December 2000, 311 accidents of this type were recorded, 156 of which were followed by an escape of hydrocarbons. Only two accidents recorded in the Mediterranean between 1981 and 2000 led to emissions of more than 10,000 tonnes: 18,000 tonnes from the Cavo Cambaos in 1981 and an unspecified amount from the Haven in 1991. The number of accidental emissions recorded per year increased from 2 in 1982 to 11 in 1991, 1992 and 1993, while the quantity emitted fell from 36,500 tonnes in the 1980s to 21,700 tonnes in the 1990s. But behind this apparent improvement, the *nature of the spilled products* is of increasing concern. Between 1996 and 1999, the proportion of persistent hydrocarbons (heavy diesel and crude oil) was 75 per cent, compared with 65 per cent between 1981 and 1995. Moreover, given the sensitivity of the region for tourism, the costs of a disaster of the Prestige or Erika type in the Mediterranean are certain to be far greater than anything that has occurred in the oceans.

For pollutants other than hydrocarbons, REMPEC has recorded at least 79 accidents between 1988 and 1997 involving ships carrying noxious substances (minerals, sulphur, chemical products, LPG, ether, glycol, etc.). The total discharge of such pollutants is difficult to assess, but REMPEC's accident files record four 'incidents' in 1996 that resulted in the spilling of 1500 tonnes of phosphate, 2703 tonnes of chromium ore and 7600 tonnes of phosphoric acid. That may seem negligible, but with the expected increase in traffic and the size of ships (the development of container-carriers), and the Mediterranean's geophysical and geographic characteristics, ecological disasters are increasingly likely.

Observed trends and scenario to 2025

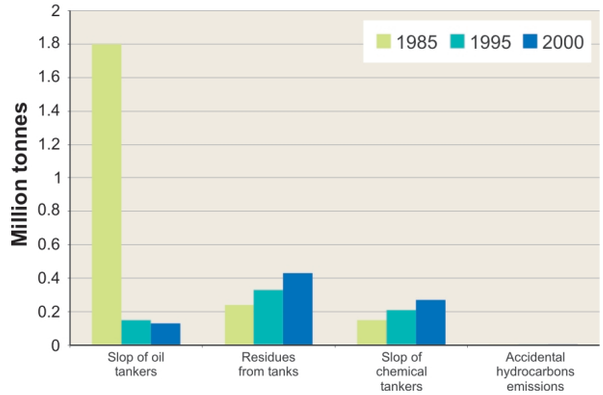
The general trend is of a spectacular drop in cumulative operational and accidental pollutant emissions (by 17.6 per cent per year between 1985 and 2000). But this should be examined at two levels. First, two important sources (probably increasing[30]) are unknown: accidental emissions of non-hydrocarbons, and losses of containers at sea. Second, the general trend hides increases in two operational pollutants, the volumes of which are increasing: fuel and oils residues (sludge) from all ships and the emptying of ballast water from chemical tankers which is not subject to any specific regulation (Figure 3.34).

The baseline scenario projects an overall increase in emissions (by 5 per cent per year between 2000 and 2025) essentially resulting from an enhancement of past trends (increasing dumping of ballast water from chemical tankers and sludge) and a slight increase in accidental emissions and tanker de-sludging, resulting from the very large projected increase in marine traffic (Figure 3.35).

Improving the safety of maritime transport

The international community has made efforts to remedy the specific situation in the Mediterranean.

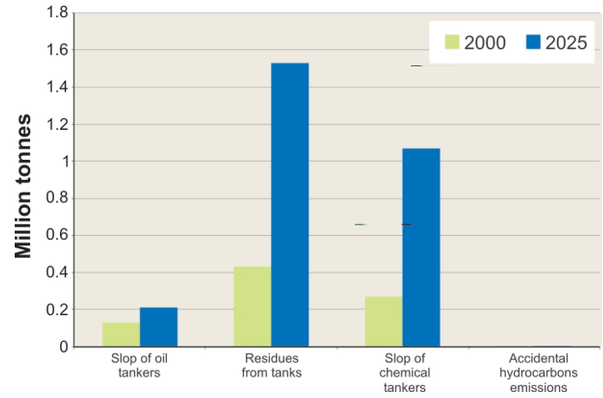
Figure 3.34 Accidental and operational polluting emissions into the sea related to maritime traffic, 1985–2000



Source: Plan Bleu

Note: Fuel oil consumption by Mediterranean maritime traffic was estimated at 30 per cent of world consumption by an international assessment carried out by the EU in 1997 entitled 'Study on the Feasibility of a Mandatory Discharge System of Ships Waste to Shore Reception Facilities in Ports'. Extracts of de-sludging coefficients were also taken from this study (0.5 per cent of the transported cargoes) and the percentage of cargoes de-sludging in the sea (83 per cent according to the analysis of the Rotterdam case). For ballast water, the coefficient of 0.47 per cent of the used oil fuel finishing up in the form of fuel residue or ballast water was also taken from this study. The respective percentages of hydrocarbon and chemical-product transports were deduced from J. P. Dobler's estimates in 1985 for the Blue Plan. From the same author, a reduction by a factor of 20 between 1985 and 2000 in oil de-sludging emissions was assumed for assessing the development of this kind of pollution. Data on accidental emissions come from REMPEC.

Figure 3.35 Accidental and operational polluting emissions into the sea related to maritime traffic, baseline scenario 2025



Source: Plan Bleu

Note: Fuel-oil consumption in 2025 is based on the baseline scenario assumptions for energy intensity (0.9 per cent decrease per year in energy intensity from now to 2025). For de-sludging, the 1985–2000 trend was extrapolated, and for accidental emissions, the 2000 ratio of emitted tonnage/traffic was projected to 2025.

The legal foundation for international cooperation in preventing, reducing and abating pollution in the Mediterranean is based on the *Barcelona Convention* for the protection of the marine environment and the coastal region of the Mediterranean (1976), ratified by all the Mediterranean-rim countries and the European Community, and amended in 1995. A Protocol relating to cooperation in combating pollution by oil and other harmful substances in the Mediterranean in cases of emergency, commonly known as *Emergency Protocol* (1976), was revised in 2002 and came into effect in 2004. It covers the prevention, preparedness for combating, and combating marine pollution. The revised text is in accordance with other international legal requirements, particularly the OPRC 90 Convention (a Convention on preparedness, combating and cooperation in combating hydrocarbon pollution) and takes into account the European Community's contribution to implementing international maritime safety standards and preventing pollution from ships.

By committing themselves in such a way, the Contracting Parties to the Barcelona Convention accept that navigation is an international activity that must obey rules adopted on an international scale (the International Maritime Organization – IMO) and that these rules apply in the Mediterranean without the need for additional legal provisions.

This continuing concern for safety is beginning to be expressed in domestic legislation and the inspection levels of ships using ports. Since 1983, the costs of ship inspection measures and intervention units in cases of pollution in Israel have been met by an eco-tax on oil imports (0.01 cent per imported litre) and a one-off duty on all ships entering an Israeli port. The monies collected contribute to a national fund directly managed by the marine environment sector of the Ministry of the Environment. Similarly, in Europe, it is the Mediterranean nations that show the highest ship inspection rates in ports (27 per cent on average in Europe in 2001, 43 per cent in Italy, 28 per cent in Greece and 30 per cent in Spain, but 10 per cent in France).[31]

Following the Prestige and Erika accidents, the EU introduced a certain number of measures[32] and is seeking to harmonize the legislation of the Mediterranean countries with those in force within the EU through the Euro-Mediterranean Transport Forum.[33] It is also trying to get Mediterranean countries interested in the European satellite navigating system (GALILEO), which should be operational in 2008. The MEDA programme is developing projects aimed at training appropriate administrations in the SEMC in the use of this system.

Some problems, however, remain unresolved, in particular that of the penal and civil responsibility of charter fleets, which remains a meaningless word in the light of the limitations under the IOPC provisions (international compensation funds in cases of accidental hydrocarbon spillage).[34]

However, international regulations and structures do not appear sufficiently opposable to operating companies and states. So, even if the International Maritime Organization decides to give the Mediterranean a 'sensitive area' status, the application of its recommendations and standards will remain within the jurisdiction of each state. Some countries have agreed to limit traffic and preserve their biological richness (the Franco–Italian agreement for the Bouches de Bonifacio) or to implement specific procedures in case of accidents (the R*amogepol* agreement between France, Monaco and Italy for the Ligurian Gulf). A strategy prepared by REMPEC aims to improve safety by training administrators in maritime affairs and exchanging information between countries, currently under discussion on a Basin-wide scale. Some proposals from NGOs such as Greenpeace and the WWF even aim at instituting systematic checks of the largest ships near straits (Gibraltar, Suez and the Bosphorus). It was along these lines that Morocco, in 2002, built an assistance centre in Tangiers for the navigation of vessels passing through the Strait of Gibraltar, at a cost of US$15 million. But these initiatives run up against two principles that make them difficult to implement: the principle of free maritime circulation (thus Turkey finds itself unable to regulate the Black Sea–Mediterranean traffic despite the accidents that have already occurred) and the extra-territorial nature of the high seas beyond the 12-mile coastal limits.

Real improvements in safety requires two types of measure:

1. Improving the *scope of the conventions* from the IMO, particularly MARPOL, to cover sectors that are currently beyond their range (particularly the dumping of pollutants other than hydrocarbons, and ships operating in territorial waters) and to increase regional coordination with a view to their ratification. In 2002, of the 420 ratifications needed to obtain a Mediterranean Sea completely covered by the whole of the IMO apparatus, only 233 were agreed. An adaptation that recognizes the extra-territorial nature of the straits is needed because of the exceptional traffic in the Mediterranean (231 ships passing through Gibraltar every day and 137 through the Bosphorus).
2. The creation of a *regional intervention system* in case of accidents to enable action for those involving spills of all dangerous substances, not only hydrocarbons. This could be done in two stages. The first is to create rescue units, the costs of which would be shared according to the coastline of each rim country and the amounts of hydrocarbons and dangerous chemicals transported by each country. The investment needed for four units of this type (one near the Strait of Gibraltar and the others in the Tyrrhenian, Adriatic and Aegean Seas) has been estimated at 45 million euros, which can be put in perspective by comparing it with the costs of the spillages from the Erika (300 million euros) and the Prestige (one thousand million euros) as evaluated by the French and Spanish administrations. The second would consist of selecting places of refuge at various points along the coast. These would be sheltered from the high seas, thus near coasts, where a damaged vessel could be taken or towed if threatened by sinking, in order to lighten its load or, if it is dangerous or polluting, transfer it entirely.

Towards a more sustainable transport system

In addition to improving eco-efficiency and sectoral policies aimed at changing the modal split of traffic, general measures are vital for decoupling an increase in traffic from economic growth and for a massive switch towards greater use of rail and public transport. In the Mediterranean, as elsewhere, economic measures and international cooperation also have a role to play. But this can function only on two conditions:

1. the problems of infrastructure funding have to be resolved;
2. economic measures and international cooperation have to be part of an integrated vision of transport development that involves all actors. A combination of measures that link incentives with sanctions is likely to be the most effective way of moving towards a more sustainable transport system.

This integrated vision is the basis of the alternative scenario presented at the end of the chapter.

Rationalizing taxes and subsidies

Economic analysis enables transport externalities to be evaluated, even if some improvement in the analysis is still needed. It also indicates optimal price levels for preventing or minimizing the effects of these externalities.

The preferred way of reaching this optimum is *price setting*: through a tax on the harm generating activity

being equal to the marginal cost of that harm, the invisible hand that the market makes work automatically in the case of merchant goods is recreated in a conscious way. This is the polluter-pays principle, with pricing at the marginal social costs or even at the cost of congestion in the case of loss of time in traffic (users pay the value of the delays that their presence creates for the other users).

The improvements that are currently being made by integrating the environment into transport policies essentially derive from regulation (for example banning sulphur additives in petrol, speed limits, banning single-hull tankers and MARPOL). In comparison with the many regulatory tools, examples of well-adapted *taxes* are rare. The increase in car taxation in Lebanon from 20 per cent of the price of the vehicle in 1997 to 55 per cent in 2002, was aimed mainly at reducing public deficits, and the proceeds did not go to financing rail or mass transport infrastructures. In France, the purpose of the 'axle tax' (*taxe à l'essieu*) first levied in 1970 was to get the owners of lorries to pay some of their external costs (in particular the increased damage to roads caused by their weight); it has not since been revised. The adjustment of motorway tolls around Paris was a modest experiment, partly abandoned. Congestion taxes are being tried from Asia to London (since January 2003). Hong Kong and Singapore set up an electronic toll system based on congestion. The results of these very recent experiences seem promising (for example, a reduction by 45 per cent of traffic in the areas involved in Singapore and 20 per cent in London). There are similar projects in Italy and Spain. Aeroplane noise is fought through a tax on many airports (Italy, France, Spain, Tunisia, Cyprus, Malta, Greece and Turkey), but this tax has a financial aim (to compensate local residents) whereas it could vary according to congestion. Paying for parking is a form of taxation on urban transport, but its effect is ambiguous, since it tends to increase the number of vehicles in circulation by favouring short journeys.

On the other hand there are many situations of *inconsistent pricing* in almost all the Mediterranean countries. Motorway tolls tax traffic flows, not congestion; in urban areas two motorway routes coexist, one toll-free, and the other with a toll (for example Nice, Athens, Marseilles, Madrid). Fuel price developments between 1991 and 1998 favoured the car: the prices of premium grade petrol and diesel fell (in constant dollar terms) in all Mediterranean countries and in most cases with a significant advantage for diesel. Diesel and petrol are taxed at very different rates with no relationship to their impacts on the environment. In the hydrocarbon producer countries (Algeria, Libya, Syria, Egypt), petrol benefits from a low level of taxation (see Chapter 2). The pricing of rail has become completely anarchic in Europe with prices varying by a factor of ten from one country to another without the disparities being justified by differences in cost or demand. Other measures (permits-to-pollute markets) are little used in transport.

Thus, the shortage of anti-pollution taxes and the many pricing inconsistencies contribute to the pollutant-payer principle not being applied. Why is there this gap between theory and practice?

- A first set of difficulties has to do with the *problem of evaluating externalities*, for example for congestion or road noise (Box 3.11). To overcome these problems, the use of transport is taxed in other ways, the main way being taxes on fuel. But this does not nearly reflect the cost differences between cars. The other measures that affect cars (road tax discs, parking, purchase tax, tolls) are even blinder. All these taxes have contrary effects that limit their impact. Those of payment for parking have already been noted. Fuel tax has different short- and long-term effects; it affects traffic more in the short than in the long term and influences vehicle design and consumption per vehicle. These may well be praiseworthy objectives but they are not related to the fight against congestion. All of these pricing measures affect traffic volumes but not the impacts on the environment. However, trying to reduce these impacts through reducing traffic is not very effective.[35] The fight against environmental damage should focus on old, poorly maintained vehicles with single occupancy and on driving styles (for example, bonuses when scrapped, standards on vehicle use and tolls on single occupancy).

Box 3.11 Examples of difficulties in assessing externalities

Measuring the cost of congestion is often difficult and nearly impossible to calculate with precision.[36] For example, for a single road, the cost of congestion is relatively well correlated with traffic intensity, since one vehicle slowed down by another cannot pass; the average speed reduces almost linearly with increasing traffic intensity, and calculating the cost of congestion is relatively easy. But when the road has a variable morphology, the calculation gets complicated. When several vehicles are slowed down on the same road by local narrowing, a queue forms. Traffic is higher than the capacity of the road, and the cost of congestion is no longer simply correlated with traffic intensity.

For road noise, the main source is friction between the tires and the road. Who is responsible? The motorist who uses his tires or the community that manages the road? And in what proportions? Thus, unlike the situation with most goods and given the present state of technology, making motorists pay directly for the use of their cars is not easy.

- A second set of difficulties derives from the *variability of optimal prices* depending on circumstance. The costs of congestion on roads can vary by a factor of 1000 between quiet rural roads and rush-hours in cities. Pollution from the same kind of vehicle can vary by a factor of one to five depending on whether it is well or poorly maintained. Similarly, if infrastructure costs are considered as externalities, road damage increases as the fourth power of axle weight: a 13-tonne axle should pay four times more than a 10-tonne axle, and the amount to be paid would differ from one road to another. Clearly price differences that depend on the vehicle and the circumstances would be very difficult to implement. It is also easy to see that the equalizations that would be needed would reduce the effectiveness of the pricing system.
- A third set of difficulties has to do with the *multiplicity of decision-makers* with inconsistent objectives. Pricing is not implemented through a single price only but by the combination of many different charges. This would not be too troublesome if the sums were coordinated towards a single objective. But in many countries this is not the case. Taxes on petrol depend on the energy ministries in most of the SEMC and on the economy ministry in the Mediterranean states of the EU. They have macro-economic objectives. In Europe, road tax discs are often set by local authorities and are paid directly into their coffers (a purely financial objective). And the rationale behind road tolls is the financing of infrastructures. Taxes on parking, often non-existent in the south and north, frequently result from local decisions that are not coordinated with neighbouring districts.
- Finally, *transport taxation has considerable redistribution effects* and is seen as a form of general taxation. Thus, congestion taxes, apart from raising large amounts, result in no change in the well-being of the consumers, and it is the public authority that recovers the value of the time lost in traffic jams and uses the resulting community surpluses.

Incentives against pollution can have similar effects. They can be administered either in the form of taxing the polluters or subsidizing those who clean it up, or a combination of the two. The consequences of the three possibilities are similar at the effectiveness level but very different in terms of redistribution. All possible ways of changing the state of things in terms of external effects have consequences in terms of distribution, which sometimes results in rather strong reactions from the groups affected. It is easy to understand why the divergent interests involved use the uncertainties in the calculations to guide them in a direction that is favourable to them. It is also understandable why pricing reforms are very difficult to implement (problems of equity and social acceptability).

However, some northern European countries are tackling the task, and in southeast Asia the pricing of parking and the use of the private car are beginning to be rationalized.

What can be learnt from this for the Mediterranean?

The first recommendation would be to pay more attention to the problems of distribution and social acceptability when introducing eco-taxes. These issues have generally been neglected in the relationships between decision-makers and specialists. Regional forums on the greenhouse gas effect show that this kind of concern is gradually emerging. Attention should also be paid to compensation of the affected groups and ways of limiting the harsh effects of over-rapid change. Tax reforms of fuel prices should develop in a planned way (see Chapter 2).

To prevent special interests from exploiting the uncertainties in the calculations, the values of the basic parameters on which they rely should be set after the widest possible debate, as is happening in several Scandinavian countries. In the Mediterranean countries, such political choices are made by university and administrative experts and thus have little legitimacy.

On both the northern and southern shores of the Mediterranean, there is strong resistance to an ecological rationalization of prices. Of course crises can arise, making large changes possible and unblocking the situation. At the technical level, electronic data transmission offers enormous possibilities that are likely to drastically alter the way in which external effects are internalized. But with the present state of the transport system, it is difficult to see a significant change in the relative prices of the various modes through taxes and prices to the 2010/2020 horizon. Only an integrated approach (used in the alternative scenario described below) can offer the prospect of such reforms. Indeed if the EU, the Mediterranean's biggest client and supplier, redirects its transport systems towards rail and combined transport and decouples its economic growth from increased traffic, the Mediterranean countries would be obliged to adapt their networks to this new situation. The challenge of Europe–Mediterranean interconnection is structural, and also in terms of sustainable development.

Ensuring the funding of transport policies and infrastructures

The coming years are expected to see continuing pressures on public finances, not just for the southern and eastern Mediterranean countries but also for the southern and eastern European countries since the large

amount of EU structural funding devoted to the development of the EU southern regions may well be transferred to central and eastern Europe, to the new Member States, which are well behind the southern member states in terms of development.

Moreover, in addition to these quantitative developments, in deciding on transport investments the EU may choose to stop supporting the major road projects of the SEMC to the benefit of a more inter-modal approach involving rail and coastal transport (see the Commission's White Paper), whereas most of the SEMC investment programmes essentially concentrate on roads.

In this changing international scene, the transport policies of the SEMC, and often those of their regional or urban institutions with responsibility for transport in their areas, have also changed, because of a double constraint. First, these countries have been obliged to follow the general trend of opening up transport markets, if only to benefit from new knowledge and possibly promote investments by foreign operators. Second, they have had to limit their expenditure to reduce their budgetary deficits, create a climate of confidence and attract foreign capital, even if the last of these is also attracted by good infrastructures.

This explains the serious difficulty in initiating the ambitious investment policies needed to set up a new transport organization. For cities, these budgetary constraints are often expressed by a limitation of major projects for mass transport equipment, leaving an increase in car use the easier option.

Today, the question of *public investment* is the subject of difficult debates,[37] including within the EU for funding major projects such as the rail links through the Alps and Pyrenees. This is why the idea of cross-financing from resources devoted to roads is making progress (rather in the way chosen by Switzerland); it is raised in the EU's White Paper as a possible way to resolve the problems of funding 'sustainable' infrastructures. Given the huge road investments that most Mediterranean States are prepared to make, such a strategy would guarantee significant development of rail infrastructures. In the relations between the north and the south, the possibility of linking reimbursement of the SEMC external debt to implementing an investment programme based more on rail and rationalizing transport taxes should also be considered.

In addition to this public funding, *private investment* is also a way of financing infrastructures in the SEMC. The weakness of such investment (4.5 thousand million euros for all the SEMC between 1995 and 2000)[38] raises doubts about the viability of such a strategy. Even if liberalization of the transport markets were to attract a significantly greater share of private investment, most specialists agree that a massive input of public money would still be needed. In this context, the European Commission and the EIB have established close cooperation in order to systematically build public–private partnerships for funding EU-Mediterranean interconnection projects. The measure used for achieving this objective is the Facility for Euro-Mediterranean Investment and Partnership (FEMIP), which could result in an increase in EIB funding to the SEMC of 1.4–2 thousand million euros, during 2000–2006. If this were more targeted on non-road infrastructures, it would certainly be good news for sustainable development.

Improving international cooperation to regulate liberalization

At the EU level, the decision to enlarge and to define a common transport policy has created new market framework rules for sustainable development. It is in this context that the liberalization that dominates at the international level must be assessed.

In the SEMC the dominant factor is indeed the *liberalization* of the transport sector. This is particularly important since there is no international agency or authority with a remit for transport in the area. In this situation the national authorities are repositioning themselves: they remain responsible for applying rules and standards and are the main financers of infrastructures, but increasingly look to the private sector to manage the flows of equipment, passengers and freight. This liberalizing movement has encouraged a number of carriers, in particular in the air sector, which has strengthened some services (Tuninter in Tunisia, Royal Air Lines in Morocco, Egyptair in Egypt).

In the maritime sector, the development of strategies by the world's big ship owners, who have selected the Mediterranean to site their hubs, is an example, with the development of whole regions now being shaped by decisions the rationale for which is international and purely economic. For example, Gioao Tauro in southern Italy has become a huge transfer port with no significant relevance for the surrounding inland area. Environmental impacts (noise, air, sea and land use) is considerable in return for minimal local development and employment. Of course, the effects of such installations are not all negative, for example the installation of proper service networks between the various ports has benefited many of them in southern Europe, and even a few in the eastern Mediterranean near the exit from the Suez Canal. The Mediterranean has, therefore, regained a central role in international maritime matters that had long been centred around northern Europe. The entire port complex has been made more dynamic, and port operator policies for opening up are seen almost everywhere in the SEMC.

But this liberalizing movement, together with a very large increase in traffic, has more generally resulted in an aggravation of the environmental and social impacts

discussed in this chapter, and at the local level, in effects on the quality of the service provided to customers.

Box 3.12 Liberalization of road transport, examples of impact in the city of Batna, Algeria

Since the land-transport market was liberalized in Algeria in 1988 the country's public road transport fleet has increased hugely. According to the Ministry of Transport, between 1988 and 2000 it developed in the following ways:

- **Freight transport**: freight capacity increased from 710,000 to 1,560,000 payload tonnes. The number of vehicles increased from 60,000 to nearly 150,000 (all types), a 150 per cent increase.
- **Passenger transport** (excluding informal transport): the fleet grew from 12,600 to 44,700, for all types except taxis, an increase of nearly 255 per cent.

Although the objective of liberalization can be considered to have been generally met quantitatively, there remain serious problems of national planning, continuity of public service and, more generally, sustainable development. In the passenger transport sector and in urban areas, the example of the city of Batna (a medium-sized city of 300,000), is typical of the situation found in most Algerian cities.

The mass urban bus transport market in Batna has splintered into a multitude of operators, with 138 local operators in 2000. The companies seem rather like cottage industries (1.63 vehicles per carrier in 1996, 1.41 in 2000).

To survive in such a competitive environment, operators do not operate on the routes allocated to them (theoretically the length of the network is 90km; in reality it is only 34km) but concentrate on the profitable routes. A rota system per day and operator is enforced, concentrated on the formerly profitable routes, confirming the existence of over capacity. However, there are routes that are not serviced, because of weak demand and the poor condition of the roads.

There is practically no system for monitoring the competence of the operators, which explains the lack of professionalism and know-how, resulting in inadequate safety. The lack of requirements for financial capacity (as required elsewhere by the European directives or the LOTI law – Loi d'Orientation sur les Transports Intérieurs – in France) makes it impossible to ensure the continuity of the service and, most importantly, a renewal of the ageing fleet: 56 per cent of the fleet is more than 10 years old and some more than 45 years old, resulting in safety and pollution problems.

The Algerian government seems to have taken the measure of the problem, and is trying to improve public services and the quality of public transport through a new law passed in 2001 dealing with the organization of land transport.

Source: Boubakour, 2003

In the general context of the consequences of competition, the regulations covering social and environmental protection provide safeguards that are often not very effective. Thus, in addition to open maritime registry, many road transport companies (including on the northern shore) are among the economic sectors with the longest working hours and the lowest hourly salaries, and the frequency of take-offs and landings at airport hubs is increasing.

The most worrying aspect of liberalization for the future is that it appears to have no limits. Current limits are essentially technical (especially in the Mediterranean): inadequacies in domestic transport systems and door-to-door operations with good connections between long-distance transport and national terminals after crossing borders. But these limits will eventually be lifted under pressure of the need to ensure the economic competitiveness of each country's transport system, with a concomitant worsening in the social and environmental damage described above.

The necessary *regulation* of this liberalization seems inconceivable at the national level: each country is far too dependent on being attractive to foreign investors and the efficiency of its export chains in purely economic terms to consider unilateral modification of the conditions of competition between different transport modes and a reduction in traffic growth.

The essential regulatory factor for this liberalizing movement can only be E*urope* and its opening onto the Mediterranean. In the 1990s, the EU became an important centre of influence for new transport regulation, to be incorporated in the national legislation of its members and to guide transport policy in central Europe and through wider cooperation. The community experience of transport policy serves as a reference for many SEMC. This influence was initially a conveyor of liberalization and the opening-up of markets, reinforcing the dominant trends at the international level. Currently it promotes *integration* and cohesion, and is concerned with questions of harmonization, the construction of networks and impacts on the environment. The Commission's White Paper advocates shifting modes, with inter-modal links involving rail and coastal shipping, and stressing the importance of the need to protect natural areas. This is also seen in the distribution of ODA towards the Mediterranean countries (Figure 3.39 p190).

Without the active participation of the EU in regulating the liberalization of transport in the SEMC, transport does not seem to have a sustainable future.

What form might this international cooperation take, placed under the sign of a liberalization regulated by the community *acquis*? Three 'concentric circles' can be distinguished:

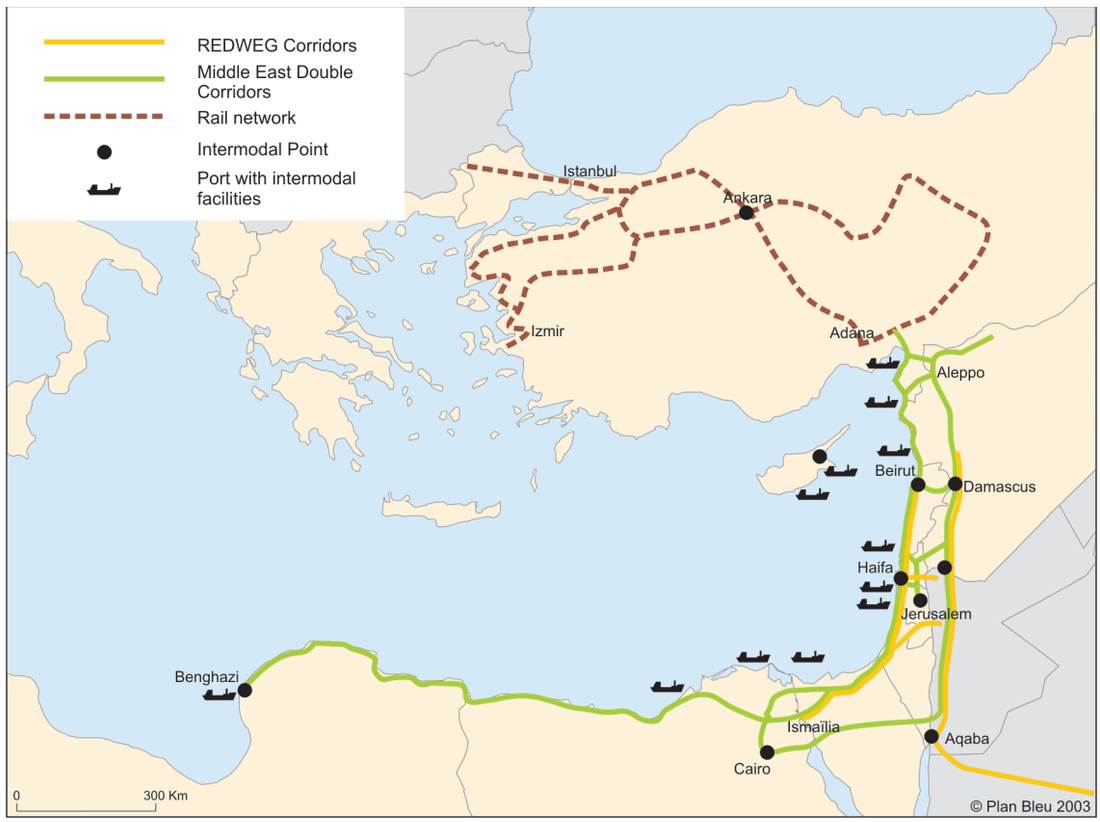
1 The EU, where the *liberalization of road transport* has been a reality since 1993, and the *liberalization of maritime transport* is underway for coastal shipping between European countries (not yet very developed for freight). The opening up of rail networks has been the subject of specific measures since 1991. The *liberalization of rail is* following a model of separating infrastructures from operations. This is taking longer to implement for air transport: the *opening up of air space* was done gradually following a number of predefined stages and lead to a system with several 'degrees of freedom'.

2 The central and eastern European countries of the eastern Adriatic, where the principles adopted by the EU are being transferred fairly rapidly, either formally to satisfy membership requirements, or indirectly when defining new priority transport corridors to match those in the EU. So the priority corridors agreed at the first pan-European conference on transport in Crete in 1993 were added to by defining 'priority transport zones' in eastern Europe and the Mediterranean, agreed at the Helsinki pan-European Conference in 1997. For the eastern Adriatic countries, the Commission recently defined a 'strategic network' with the states, intended to concentrate European aid as part of the stability pact.

3 A still wider circle that includes the rest of the Mediterranean for which several European initiatives have been launched but where transport markets are still very opaque and where operators are still often directly or indirectly monitored by states. These initiatives are dominated by the challenge of opening-up markets but also by the need to develop networks and criteria for evaluating projects.

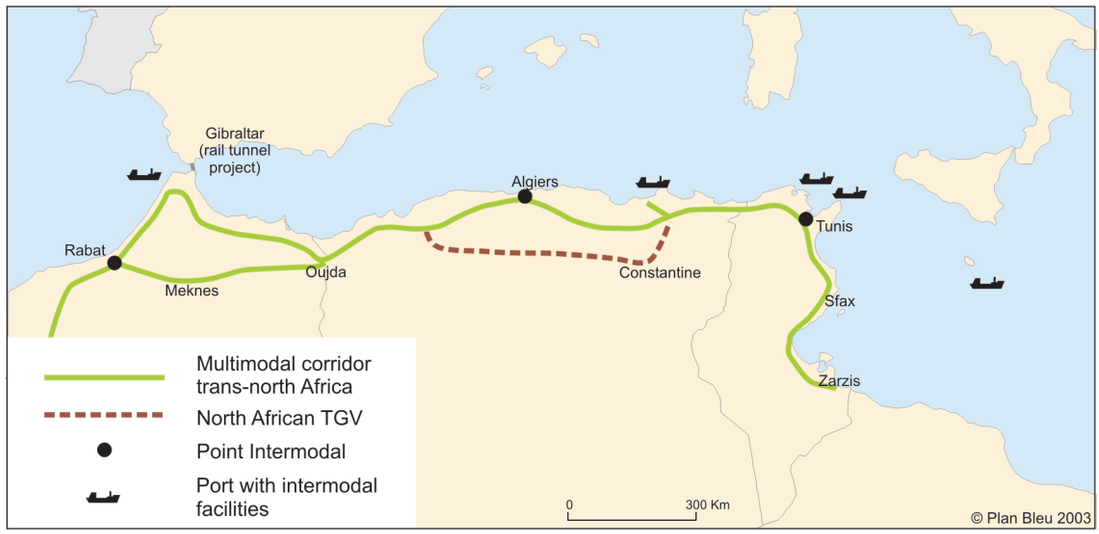
In concrete terms, this international cooperation could be structured around the funding of networks drawn up according to the *Euro-Mediterranean multi-modal corridor concept*.[39] At present, these corridors include both the eastern and western Mediterranean and the Balkans and serve the EU as reference points within the framework of its thinking about establishing a Euro-Mediterranean transport network.[40]

Figure 3.36 Corridors of International Euro-Mediterranean networks in the eastern Mediterranean



Source: INRETS DEST (1997) in Reynaud (2002)

Figure 3.37 Corridor of International Euro-Mediterranean Maghreb Networks



Source: INRETS DEST (1997) in Reynaud (2002)

Eastern Mediterranean

On the heels of the Middle East peace process launched in the late 1990s, economic cooperation was agreed between Syria, Lebanon, Israel, the Palestinian Authority and Egypt. Five committees were set up to consider issues concerning refugees, water, the environment, arms control and regional economic development (REDWEG). This last committee defined 'corridors', routes to be developed as priorities as multi-modal channels by trying to optimize existing infrastructures. Even before REDWEG, initiatives that began in the 1980s at a regional level (the TER and TEM programmes), particularly within the framework of the Arab League, came up with the idea of the double eastern Mediterranean corridor (Figure 3.36). Projects have been assessed for each of these corridors and proposed for community financing. However, they remain in abeyance awaiting an end to the political crisis that is still engulfing the Near East.

Western Mediterranean

Crossing the Alps by rail (Lyons–Turin, operational by 2015), and the trans-Pyrenean central rail tunnel project, which has been adopted as a priority project by the Commission, have already been discussed. As seen above, these projects should relieve the road traffic bottlenecks in southern Europe, even if their funding (especially for the latter) is still problematical.

As far as Maghreb is concerned, international cooperation in transport matters rests mainly on the CORRIMED process (International Euro-Mediterranean Network Corridors), which is similar to that used in the eastern Mediterranean and aims to:

- integrate with Europe and serve the inland areas around ports and airport entry points;
- create connections between countries and regional integration;
- carry out the planning and economic development of the Mediterranean countries.

Since the UMA (Arab Maghreb Union) was established in 1989, the Maghreb countries have made considerable efforts in the transport sector with a view to reaching bilateral and multilateral accords and harmonizing technical and regulatory standards.

The multi-modal trans-Maghreb corridor (Figure 3.37) includes the trans-Maghreb Unit Motorway, the trans-Maghreb Train, coastal shipping and port services and north–south connections. It is a matter of regret from the sustainable development point of view that only road investment has started.

The Balkans

The multi-modal corridor concept in this region is defined through the TIRS network (Transportation Inter Regional Survey).[41] This essentially involves the rehabilitation of road and rail infrastructures in the former Yugoslavia as shown in Figure 3.38.

International cooperation also has a role to play in *air transport*. One of the essential elements in the Partnership would be to enable the emergence of an efficient and reliable Euro-Mediterranean air system, enabling a strengthening of the links around the Mediterranean. Priority efforts should at first be concentrated on monitoring and air traffic control infrastructures. Within this

Figure 3.38 Priority infrastructure network for the Balkans

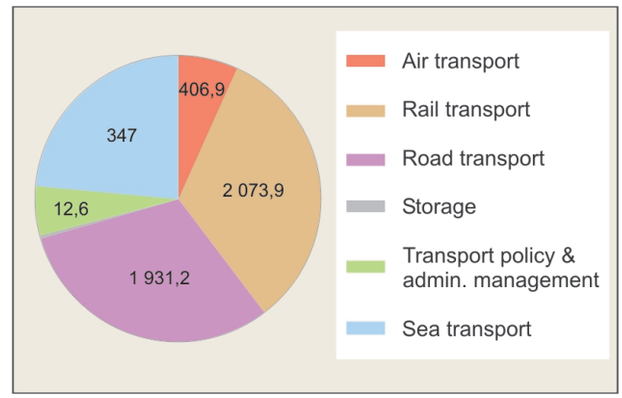
Source: Revue Transports, no 418, March–April 2003

framework, the development of an SEMC system integrated with the European system is a priority. Setting up infrastructures of reception, land-links, and calculation for satellite data, based on schemes defined by the OACI, as well as harmonization of procedures, will enable a full extension of the European network. This should enable the regulation of traffic peaks and parking on hubs.

Thus international cooperation (especially Euro-Mediterranean) is vital to meeting the objectives both of sustainable development and of practical infrastructure projects. The national policy changes that have so far been pursued have been indispensable (more transparent liberalization, rationalization of taxation and subsidies, modal switches), but it is difficult to see how these changes might actually occur without the new impetus that introducing European policies into the transport sector could provide. In this regard, the distribution of ODA among the different modes is significant (Figure 3.39): between 1973 and 2001 roads took only 31 per cent of the funds compared with 33 per cent for rail, 7 per cent for air and 24 per cent for inland waterways and sea transport.

Only financial resources can truly lead the Mediterranean onto the path to sustainable transport. Unfortunately ODA for transport in the Mediterranean remains ridiculously low. In 25 years, the Mediterranean countries (excluding France, Italy, Spain, Greece and Monaco) received only US$6.251 thousand million of ODA. In contrast, the EU is planning to spend 2.780 thousand million euros in five years in the framework of its trans-European Transport Network strategy, and the motorway investment requirements alone in Maghreb from now to 2010 amount to US$7 thousand million.[42]

Figure 3.39 Official Development Assistance in the transport sector, 1973–2001, towards the Mediterranean countries (US$ millions)



Source: OECD-DAC 2000 database

Even if the imperative of sustainable development is more widely appreciated, notably at the EU strategy level, the thrust of transport development in the Mediterranean seems directed towards ever more traffic and roads. However, starting with current shifts in transport policies, a more sustainable future could be built. This is the subject of the alternative scenario.

An alternative scenario

The paths examined above towards more sustainable transport are brought together here in the form of an alternative scenario, which assumes that the group of measures described above are adopted simultaneously and in a combined way. This integrated approach should lead to a slightly lower increase in road traffic than in the baseline scenario and to an improvement in the environmental performance of transport through changing the modal split and regulatory improvements. The scenario includes:

- *Decoupling economic growth from traffic growth*: this implies adopting *fiscal measures* that increase the cost of road transport (congestion charges, fuel taxes, removal of the tax advantages of diesel, lorry taxes, etc.); *subsidies and tax incentives*, for virtuous practices relating to the

occupation or loading of vehicles (pooling freight, favouring car-sharing, the use of information technology for driving vehicles and traffic management, company programmes aimed at voluntary reductions in transport needs,[43] etc.), *promoting non-motorized modes* (infrastructures for pedestrians and cyclists, car-free tourism).

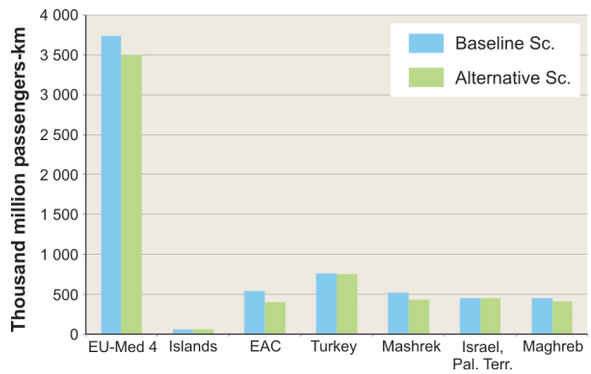
- A *modal split* that favours rail over road or air by redirecting infrastructure investment and internalizing all the social and environmental costs of road transport that are currently paid by the general public.

What would be the quantitative effects of such developments? Policies aimed at reducing road traffic are rare and have been applied only on a very restricted geographical scale. The results have nevertheless been spectacular. In Singapore, for example, there was a 45 per cent drop in traffic between 1975 and 1991 in the area targeted by the congestion tax. This is why it is not unreasonable to assume a decoupling of economic growth from traffic twice that in the baseline scenario. For the modal split, a 20 per cent traffic share for rail seems realistic since it is the objective of several local scenarios for traffic development (e.g. the trans-Pyrenean scenario to 2020).[44]

Traffic

Based on these assumptions, passenger and freight traffic is projected to evolve as illustrated in Figures 3.40 and 3.41.

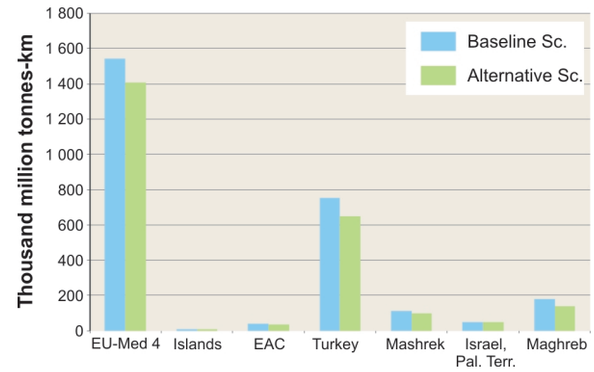
Figure 3.40 Passenger traffic, alternative scenario, 2025



Source: Plan Bleu

Reductions in traffic are most marked for the EU-Mediterranean, eastern Adriatic and Mashrek countries. They account for a modest 8 per cent drop compared with the baseline scenario.

Figure 3.41 Freight traffic, alternative scenario, 2025



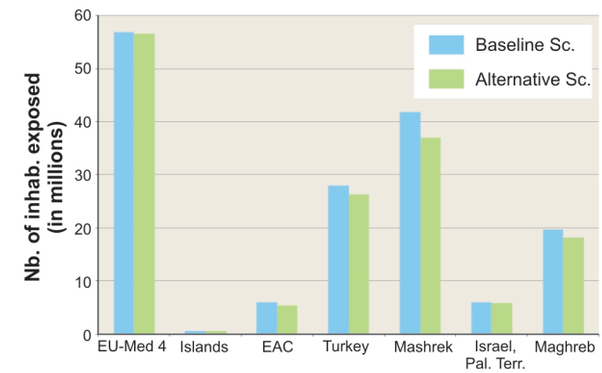
Source: Plan Bleu

The reduction in freight traffic compared with the baseline scenario is also modest (11 per cent).

Impact

However, these small differences in traffic translate into considerable gains in terms of impacts.

Figure 3.42 People exposed to road noise above 55 decibels, alternative scenario, 2025



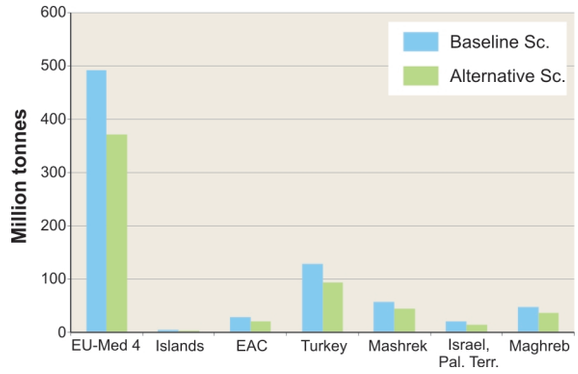
Source: Plan Bleu

Note: A drop in transport/GDP intensity is assumed to result in an equivalent drop in exposure to road noise.

For road noise, the gain appears relatively limited. This is due partly to the projection method used and partly to the fact that there is little scope for technological improvement. Nevertheless in absolute terms, nearly 9 million Mediterranean people are spared a road noise level of more than 55 decibels, compared with the baseline.

The improvement in terms of CO_2 emissions is clearly greater than for noise pollution: 191,000 tonnes of CO_2 avoided and a significant reduction in all sub-regions. The modal-split effect (the transfer of some road traffic to rail) is of great importance for this indicator.

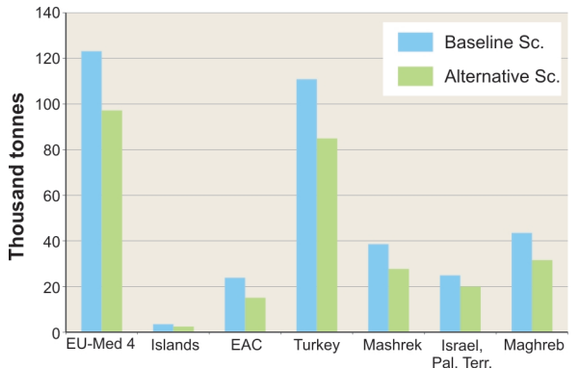
Figure 3.43 CO_2 emissions, alternative scenario, 2025



Source: Plan Bleu

Note: The drop in energy intensity in the alternative scenario in Chapter 2 has simply been transposed to transport.

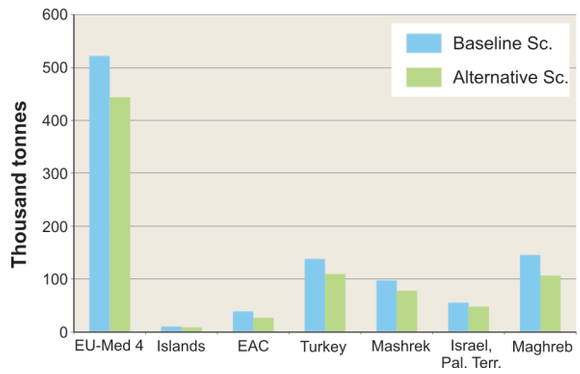
Figure 3.44 VOC emissions, alternative scenario, 2025



Source: Plan Bleu

For VOCs, gains are significant: 90,000 tonnes, nearly 25 per cent less emission than the baseline scenario.

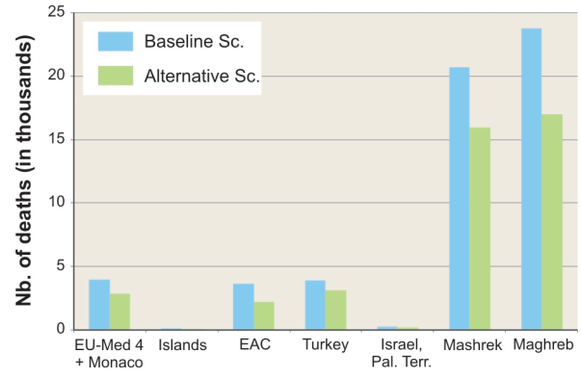
Figure 3.45 NO_x emissions, alternative scenario, 2025



Source: Plan Bleu

For NO_x the gain is considerable: 185,000 tonnes, 18 per cent less emission than the baseline scenario, although this is less than for VOCs.

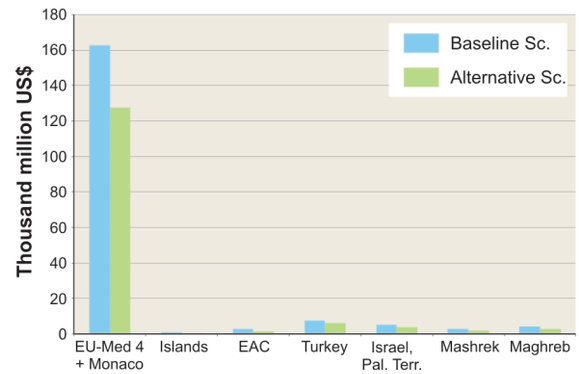
Figure 3.46 The number of road accident deaths, alternative scenario, 2025



Source: Plan Bleu

For road accident deaths the gain is much greater: 15,000 fewer per year than in the baseline scenario. With a more proactive road safety policy in the SEMC, the improvement would be even greater.

Figure 3.47 Congestion costs, alternative scenario, 2025

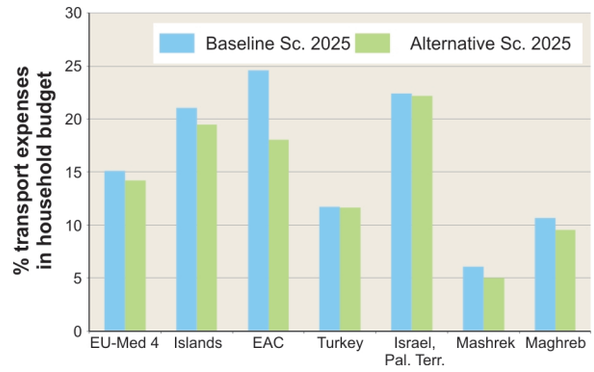


Source: Plan Bleu

The effect of decoupling GDP from traffic is particularly important for congestion costs: the alternative scenario foresees 41 thousand million euros less cost in 2025 than in the baseline scenario, or the equivalent of the total cost of road congestion in the Mediterranean in 2000.

The impact of the alternative scenario on the share of transport in household budgets is minimal, except in the eastern Adriatic countries (25 per cent in the baseline compared with 18 per cent in the alternative scenario). Other policies linked to housing would need to be

Figure 3.48 The share of transport in household budgets, alternative scenario, 2025

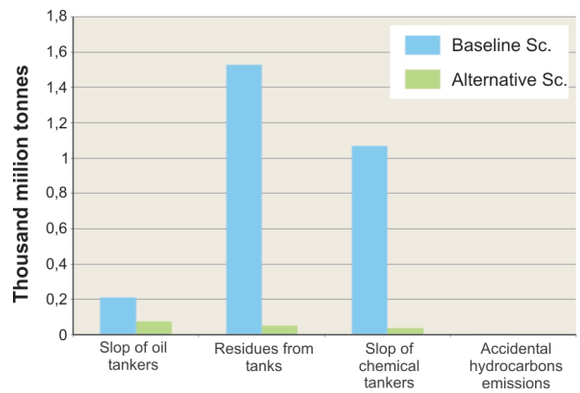


Source: Plan Bleu

combined with the decoupling of GDP from transport and changes in modal split if the share of transport in household budgets is to be really stabilized or even reduced.

For *maritime transport*, the alternative scenario assumes extending MARPOL to chemical products and including the costs of de-sludging and ballast water treatment in port dues. The projected effectiveness of such measures is based on the observed result of the mandatory separation of ballast tanks on emissions from de-sludging (a 30-fold reduction).

Figure 3.49 Polluting emissions into the sea related to maritime traffic, alternative scenario, 2025



Source: Plan Bleu

The gains are spectacular: 159,000 tonnes of pollutant emissions in 2025 compared with 2.81 million in the baseline scenario, a 94 per cent drop. This is particularly attractive since the measures used in the alternative maritime transport scenario do not require as much change as those that govern the results of the alternative land transport scenario.

Thus a small drop in traffic compared with the baseline scenario would result in very considerable gains at the environmental and social levels. These have been quantified mainly to show the orders of magnitude and give an indication of the challenge; such quantification is always somewhat arbitrary. The effect that such a scenario would have on the economy still has to be determined. This will depend to a large extent on resolving the problem of funding of Euro-Mediterranean cooperation and on the capacity of the Mediterranean people to change their future.

***

To conclude, questions need to be asked not only about transport projections but also about the whole transport system.

The baseline scenario, with its very large increase in freight and passenger traffic, is unsustainable: the environmental impacts get considerably worse for some people (especially from emissions of pollutants from vehicles and ships), the social impact becomes increasingly unmanageable (road accident deaths, the impoverishment of suburban households) without guaranteeing the economic competitiveness of the transport systems. In contrast, the strengthening and more effective application of marine safety rules and some transfer from road to rail, albeit minimal, are likely to help both the environment and the economies of the Mediterranean countries.

So the question is how to shift from one scenario to the other.

There is no doubt that the volume of freight transported will depend on economic and population growth. The underlying economic picture is one of specialization and diversification of production on the international scale. Globalization and new technology result in a very considerable growth in all kinds of traffic (local, national and international) and in the economic specialization of regions of the world. The Mediterranean will not escape this, at the risk of marginalizing itself in the general context of global growth.

Nevertheless E*urope* can play a growing role as a centre, or even as an original model, for regulatory development, although it is not yet easy to see how this could be achieved. Trade, economic, social and cultural exchanges and migration give Europe a particular responsibility for the future of the Mediterranean, particularly since so much of the traffic in the sea is in transit between Europe and other continents. Of course, significant traffic flows still depend on local initiatives or bilateral cooperation, but the problems of governance of this traffic are the same, independent of scale, and

require integrated policies that closely associate the future of transport with the choice of technology and development paths at local, national and international levels. Such choices can only be made through strategic planning, aimed at taking control of the future.

From this point of view, the alternative scenario assumes some changes already recommended by the European Commission for its own transport policy.

- *The use of new technologies* for vehicles and the organization of transport and communication modes. Vehicles should be adapted to Mediterranean cities and to their future needs, with a particular place for small vehicles in narrow historical centres, two-wheeled as well as non-motorized. Communication tools play a part in controlling traffic and monitoring transport systems in order to ensure the quality of the service, but can also have new roles in distant areas or difficult to get access areas, such as islands, to ensure servicing to remote sites.
- *Spatial planning* to ensure a decoupling between economic growth and the growth of traffic, including tourist traffic. Transport is not just for providing individual satisfaction. People often suffer from it, particularly in areas congested by daily commuting. This presents a double challenge: to plan a living environment that respects the natural environment, history and culture, and to control traffic. This double challenge relates back to the setting of objectives for and by the community and therefore to the problem of decentralizing institutions, and of cooperation between them.
- *Preserving the marine world*. The Mediterranean sea is at the heart of the eco-region, not on its edges, in contrast to many other regions or organizations of regional areas in the world. This is why it is particularly important to control the traffic across it, including planning for the coastal areas and for short and long journeys. A revitalization of coastal shipping is being considered for short journeys. The potential of major hubs is reaffirming the importance of the Mediterranean for international trade flows. These hubs are, as yet, only partially integrated into the organization of Mediterranean transport. But, without them, the region risks being marginalized in the international organization of the economy. The question of their siting in the context of their surroundings and the monitoring of intercontinental ship movements through the Mediterranean are becoming crucial.
- *Partnerships between the Mediterranean peoples*. There are already some European examples of progress towards more sustainable transport (high-speed trains, the timid renaissance of coastal shipping, harmonization of the European skies). These initiatives have an important role to play in developing in-depth contacts between neighbouring peoples for the benefit of better mutual understanding.
- *The strengthening of future oriented analyses*. Prospects relying on objective data and transparent arguments can help to build an understanding of major changes and define the debate about what transport system to aim for.

The crucial points for shifting from the baseline to the *alternative* scenario are at three levels:

1. *Local*: actions aimed particularly at more dense fabrics in cities through planning, aid for housing and parking, and organic linking between urbanization and mass transport.
2. *National*: using laws, conventions and contracts with local authorities to implement sustainable transport at the local scale by undertaking an exhaustive assessment of the external costs of current systems; by implementing a tariff system for transport use (especially for the car) and a system of subsidies that favour protection of the environment and social equity, all within the framework of regional integration, guided by the new directions of European transport policy.
3. *International*: by substantially increasing European funding of Mediterranean transport systems that are not exclusively road-oriented and by ensuring the effectiveness of international maritime safety conventions, particularly by monitoring shipping in transit and adapting the international law of the sea to the situation in the Mediterranean.

The projections in this chapter are, of course, only indicative. The intention is not to foretell the future. There will undoubtedly be many changes in the areas analysed (particularly relating to urban congestion) that may accelerate the advent of an organization of transport quite unlike today's. But simply drawing attention to the 'hidden' costs of current trends may help to predict the adverse effects of such changes and alter the relationship between each Mediterranean citizen and his mobility.

Notes

1 Transport in a number of Mediterranean countries represents a significant proportion of economic activity. Thus in 2000, the transport and communications sector accounted for 10.7% of GDP in Syria, 9.3% in Egypt, 6.7% in Algeria, 6.1% in Morocco and 10.9% in Tunisia.
2 Before the integration in 2004 of Cyprus, Malta and Slovenia into the EU.
3 Spain, France, Italy, Greece, Monaco, Serbia and Montenegro, Albania and Turkey.
4 World Bank, 1998.
5 The ratio between the rate of change in the traffic and the rate of change in GDP for the same period.

6 Lablanche, 2003.
7 EU DG 16, 1991; World Bank, 2002.
8 A. Jorio, 2000.
9 Orfeuil, 1997.
10 The 1970–2000 elasticities have been reduced for the projection to 2025 by 18.2 per cent for cargo and 48.3 per cent for passenger traffic. These figures reflect the reductions in projected traffic/GDP elasticities by the EU in the baseline scenarios of its White Paper and its Climate-change Programme. However, the 1970–2000 elasticities for the countries entering the EU in 2004 (Cyprus, Malta and Slovenia) and for Bosnia-Herzegovina in reconstruction have been kept.
11 Kunzli et al, 2000.
12 Algeria, MATE, *Report on the state and future of the environment*, 2000.
13 The relationship between the quantity of energy consumed and the number of passengers carried multiplied by the distance they covered.
14 INRETS' data for France; Boubakour 2002, Va-t-on vers des transports écologiquement viables au Magreb? for Morocco and Algeria.
15 Orfeuil and Morcheoine, 1998.
16 Israel, Ministry of the Environment, *Towards Sustainable Development*, 1999.
17 INFRAS/IWW 2000.
18 CEC, 2001.
19 The Turkish General Directorate of Highways 2000. Yücel Candemir, Brief Presentation of Transport Policies in Turkey, MEDA TENT 2003.
20 ECMT, *Short Sea Shipping*, 2000.
21 Measures not always well received by people as seen in Algeria in April 2003, when the bill's introduction triggered a transporter strike.
22 To navigate, a boat must have a licence number (like a car) that is issued by a national register. As with car licences, this operation requires that a certain number of obligations contained in the registering country's laws be met. Obligations are theoretically verified through inspections.
23 TDW: deadweight tonne (the maximum capacity of transport authorized for ships).
24 Vende, 1999; Dobler and MARPOL, 2002.
25 When a tanker navigates empty there may be problems of stability, so part of the tanks (ballast) are filled with sea water. Before tankers are again filled with oil, the ship empties its ballast (de-sludging) to make room for the oil. Unfortunately the ballast water has often had time to become impregnated with residual oil that sticks to the walls of the tanks after each unloading. Thus large quantities of hydrocarbons are expelled into the sea on desludging.
26 Studies of the Marine Board of the National Research Council of the United States National Academy of Science.
27 WWF, 2003
28 Helmepa, *Evaluation of the Port Reception Facilities in the Mediterranean*, Athens, 1997. These data are being updated by REMPEC.
29 REMPEC also operates under the aegis of the International Maritime Organisation (IMO).
30 Chemical freighters are not subject to the same regulations as oil tankers, and the spilling of chemical products into the sea is much less visible than hydrocarbons (but often more harmful for the environment). Containers are being stacked higher and higher, even on decks, meeting financial and economic imperatives, a procedure which, at least in the short term, is not being questioned.
31 EU, DG-Transport, 2001.
32 These proposals concern the banning of transporting heavy fuel-oil by single-hull tankers, the introduction of penal sanctions resulting from flagrant negligence, the implementation of a community approval system of certificates of sailor competence delivered outside of the EU, improving the system of reporting by port pilots and improved protective measures for coastal waters, in particular territorial waters and exclusive economic zones.
33 The Euro-Mediterranean Transport Forum was founded in 1998 and is the forum for developing regional cooperation in the transport sector. Organized and presided over by the European Commission, it is composed of high transport civil servants of the EU Member States and the Mediterranean countries.
34 The IOPC (International Oil Pollution Compensation Fund) acts in cases of accidental hydrocarbon spillage, on behalf of the producing and distributing oil companies fitting out ships. The fund is fed by these companies in return for an exoneration from their responsibility beyond a certain financial amount. At present the IOPC has nearly a thousand million euros, which corresponds to the damages assessed in the Prestige accident alone.
35 In urban situations, a 5 per cent reduction in traffic can reduce congestion by half; but the environment will hardly be improved. This has been demonstrated by the experiences on traffic control during pollution peaks.
36 Economists define it as the delay that vehicles impose on one another in terms of the speed/traffic flow relationship in conditions where the use of the transport system approaches the system's capacity (Wyrnbee, 1979, *Journal of Economics*).
37 In Algeria, the government is planning to create a road fund that will be fed from road-user fees and open the funding of rail to the private sector by conceding network operations to it (Chafik, 2003).
38 FEMISE report on the change in trade and investments structure between the EU and its Mediterranean partners, March 2002.
39 Multi-modal corridors are the major traffic routes around which researchers and engineers, funded by the EU since the late 1990s, are trying to structure transport infrastructures in the mid- and long-term that promote combined transport solutions and the development of south–south trade.
40 EC, *Communication sur le développement d'un réseau euro-méditerranéen de transport*. COM(2003) 376 of 24/06/2003.
41 A study financed by the French Development Agency (AFD) carried out in 2001–2002 by the Louis Berger office, with a view to identifying priority transport infrastructures for the Balkans.
42 Chafik, 2003.
43 In some states in the US and in the Scandinavian countries tax deductions or subsidies to companies that promote car sharing or encourage their employees to live near their place of work are granted.
44 In countries for which the baseline projection of the share of rail is over 20 per cent, this has been increased either by 10 per cent (for freight in France), or by 5 per cent (Slovenia, Croatia, Bosnia-Herzegovina and Serbia-Montenegro for freight; Egypt and Morocco for passengers).

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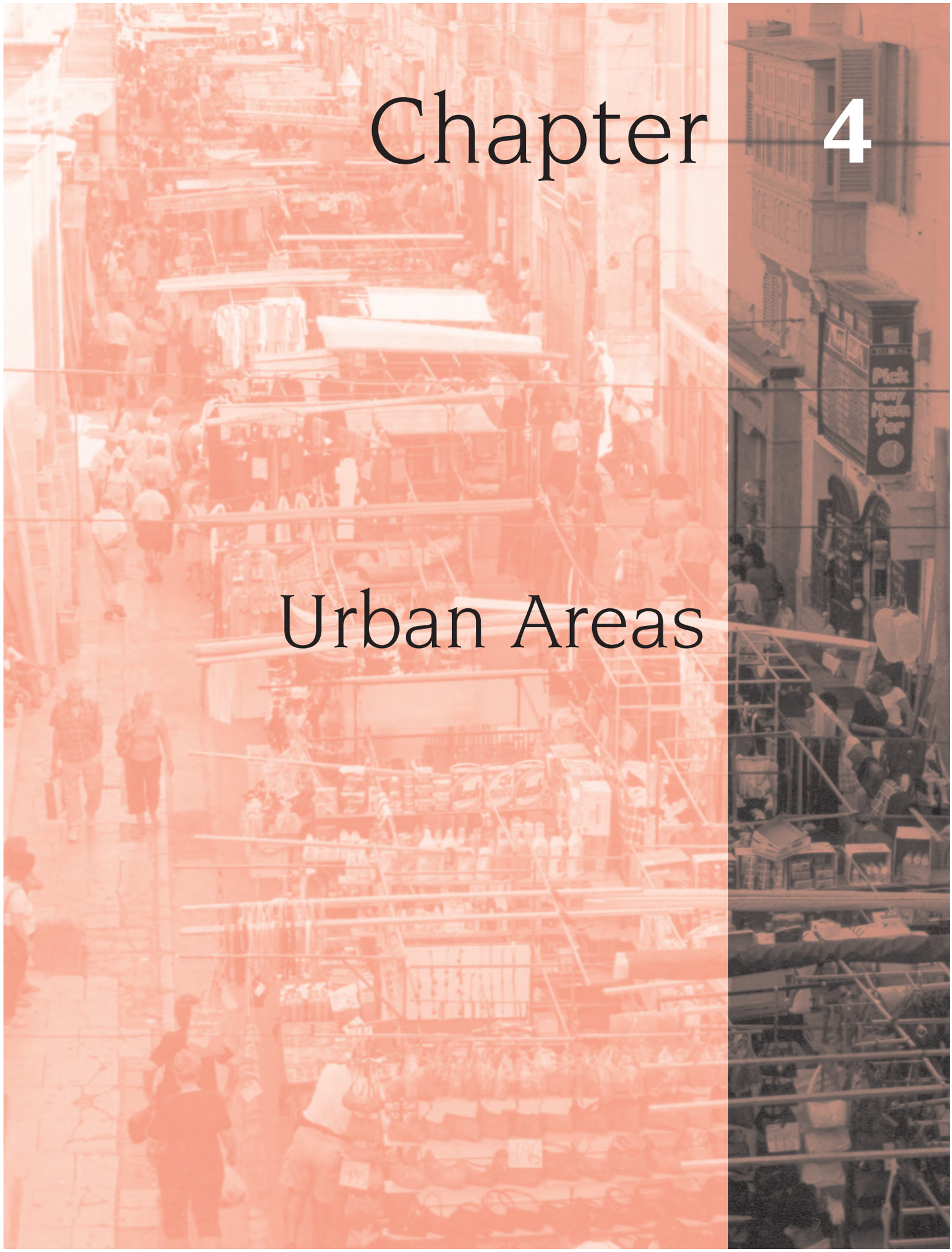
Chapter 4

Urban Areas



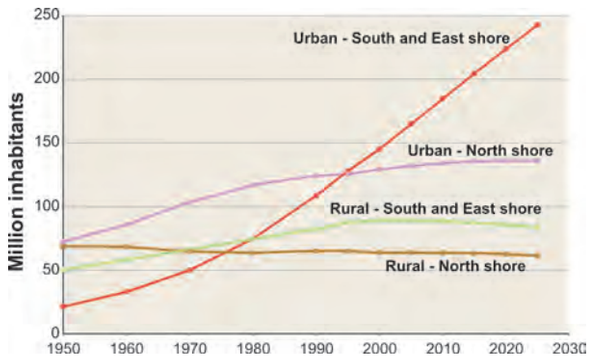
The future of the Mediterranean Basin up to 2025, 2050, and even beyond, will depend largely on the urban areas that have always been important in the region. Some 380 million inhabitants, or 80 per cent of the population, are soon expected to be living in and around cities.

For thousands of years, the different civilizations that have shaped the region have relied on the vitality of cities, their economic, political and cultural functions, their exchanges and struggles, on their functional and balanced spatial layouts and on the interlinkages between them. Cities have been tightly integrated into the Mediterranean environment, characterized by its specific geopolitical and bio-climatic situation.

From a historical point of view, the issues of unsustainable urban development in the region have arisen quite recently, only during the past few decades. The acceleration of urbanization in the south together with the resulting boost in demand, uncontrolled urban sprawl in the north, the concentration of people in large agglomerations, the development of inequalities and segregation, all contribute to the transformation of societies, and are challenging what used to be the Mediterranean *city*. The spatial and temporal relationships between cities and their immediate or more distant surroundings have changed profoundly.

Responses to current unsustainability issues do exist, and in some cases have existed for a long time. Examples are policies for physical planning and regional development, land management, and town planning; these are all responses relevant to a frame of action much broader than local development. But no Mediterranean country has yet had the courage or the resources to develop policies, which, if they are to succeed, require national Governments and urban authorities to work together, and people to turn into true citizens again.

Figure 4.1 Urban population in the Mediterranean countries, trends and projections



Source: Attané and Courbage; *Plan Bleu*, 2002

The challenges are often serious. Some courses of action that are put forward may lead to a change of scenario. The levels of action are necessarily interlinked. Urban structures, regional development policies, moves towards decentralization or de-concentration as well as mutual support between states, regions and towns all need to be taken into account in each country. More active cooperation between Mediterranean local authorities and an acknowledgement of the specific urban situation in the Euro-Mediterranean process are also crucial.

Widespread urbanization, once in the north, now in the south

At the beginning of the 21st century, Mediterranean peoples and societies are mainly urban (Figure 4.1). The total urban population[1] of the countries bordering the Mediterranean increased from 94 million in 1950 (44 per cent of the population) to 274 million in 2000 (64 per cent).

The *northern Mediterranean countries* (NMC – from Spain to Greece) have experienced strong urban growth throughout the 19th century and up to the 1970s, and their current very moderate growth rates are projected to continue.

The *southern and eastern Mediterranean countries* (SEMC – from Turkey to Morocco) have, for the past two or three decades, seen an accelerated rate of urbanization, 3–5 times faster than the northern countries. Whereas European countries needed a whole century to absorb urban growth, southern and eastern ones take only a few decades. Thus, in spite of a recent slowdown in population growth in the southern countries – along with a spectacular decrease in fertility rates and a relative decrease in rural–urban migration – the strong trend towards urbanization is expected to continue during the next 50 years.

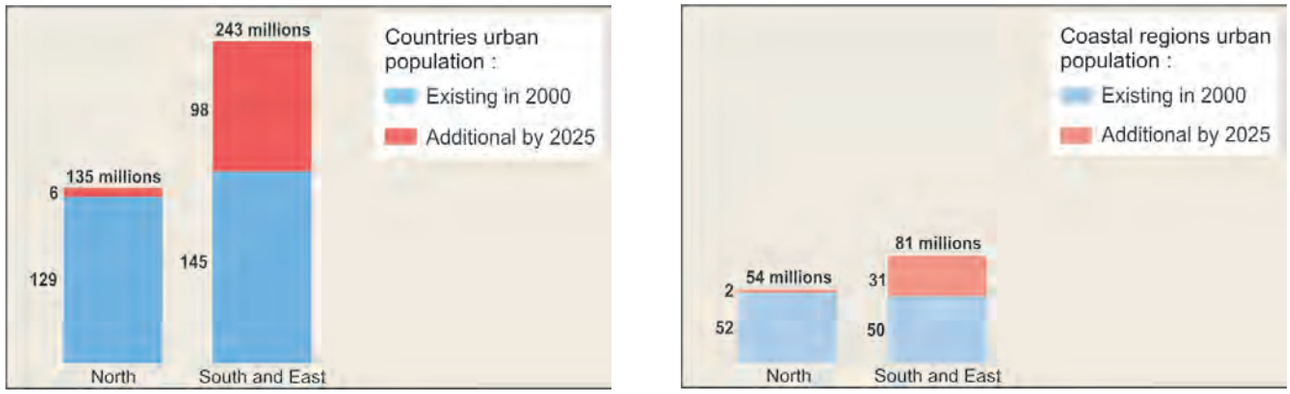
It would certainly be more stimulating to look into the future in more than one way, but, except for immigration policies, the prospects to 2025 more or less follow current trends. In absolute figures, the urban population could reach more than 243 million in the southern and eastern countries (145 million in 2000) and nearly 135 million in European coastal countries (129 million in 2000). Approximately a third of this growth would take place in the *coastal regions* (Figure 4.2).

According to United Nations (UN) estimates, the urbanization rate in the SEMC in 2000 was already slightly higher than in the NMC. By 2030, three-quarters of the population will be urban (Figure 4.3).

Apart from the convergence observed in urbanization rates, urban issues in different countries are seldom comparable.

The southern and eastern Mediterranean countries experienced very clear urban growth (an annual average

Figure 4.2 Urban population in the countries and their Mediterranean coastal regions, projections 2000–2025

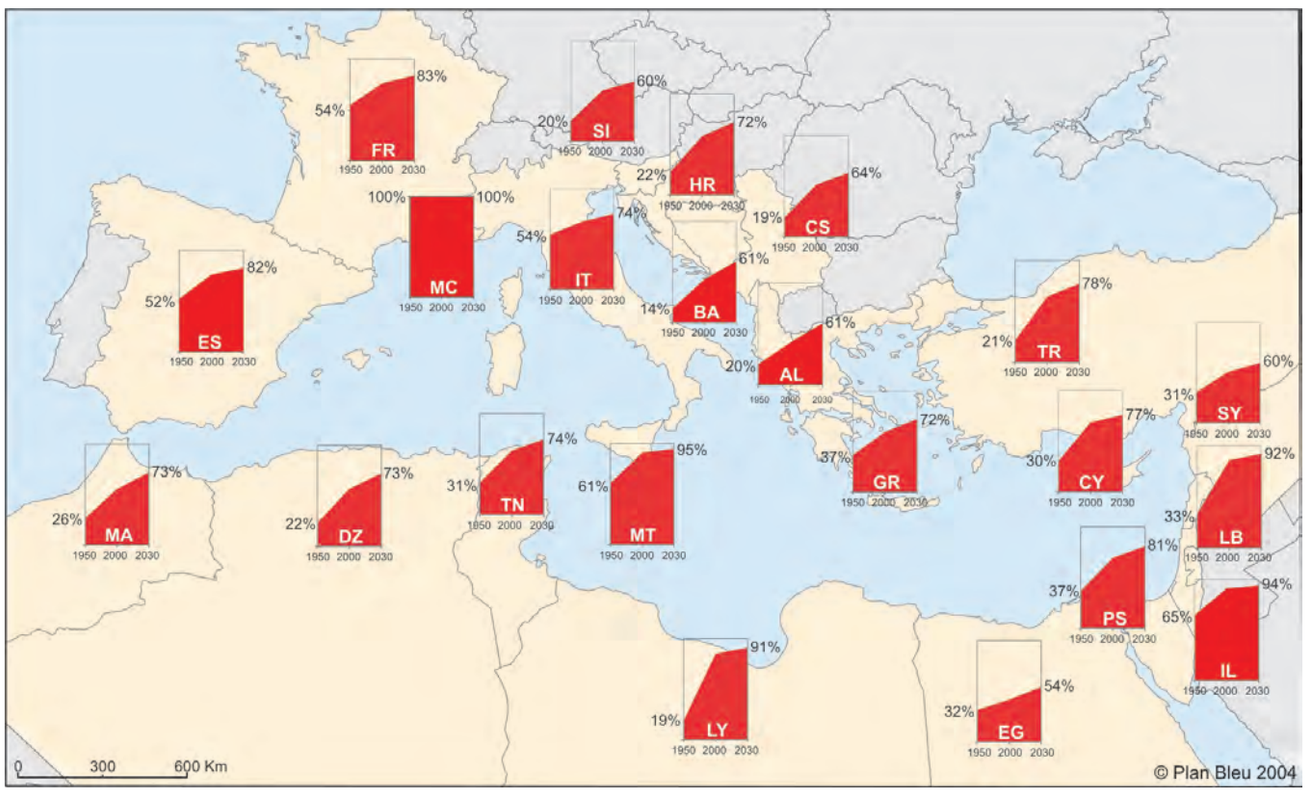


Source: Attané and Courbage; *Plan Bleu*, 2001

of 4 per cent between 1970 and 1990, 3 per cent in later years). In spite of the decreasing fertility rate in most countries, population growth will only slow after 2030 or even 2040. Till then, the challenge will be to achieve the economic development needed to be able to deal with urban growth.

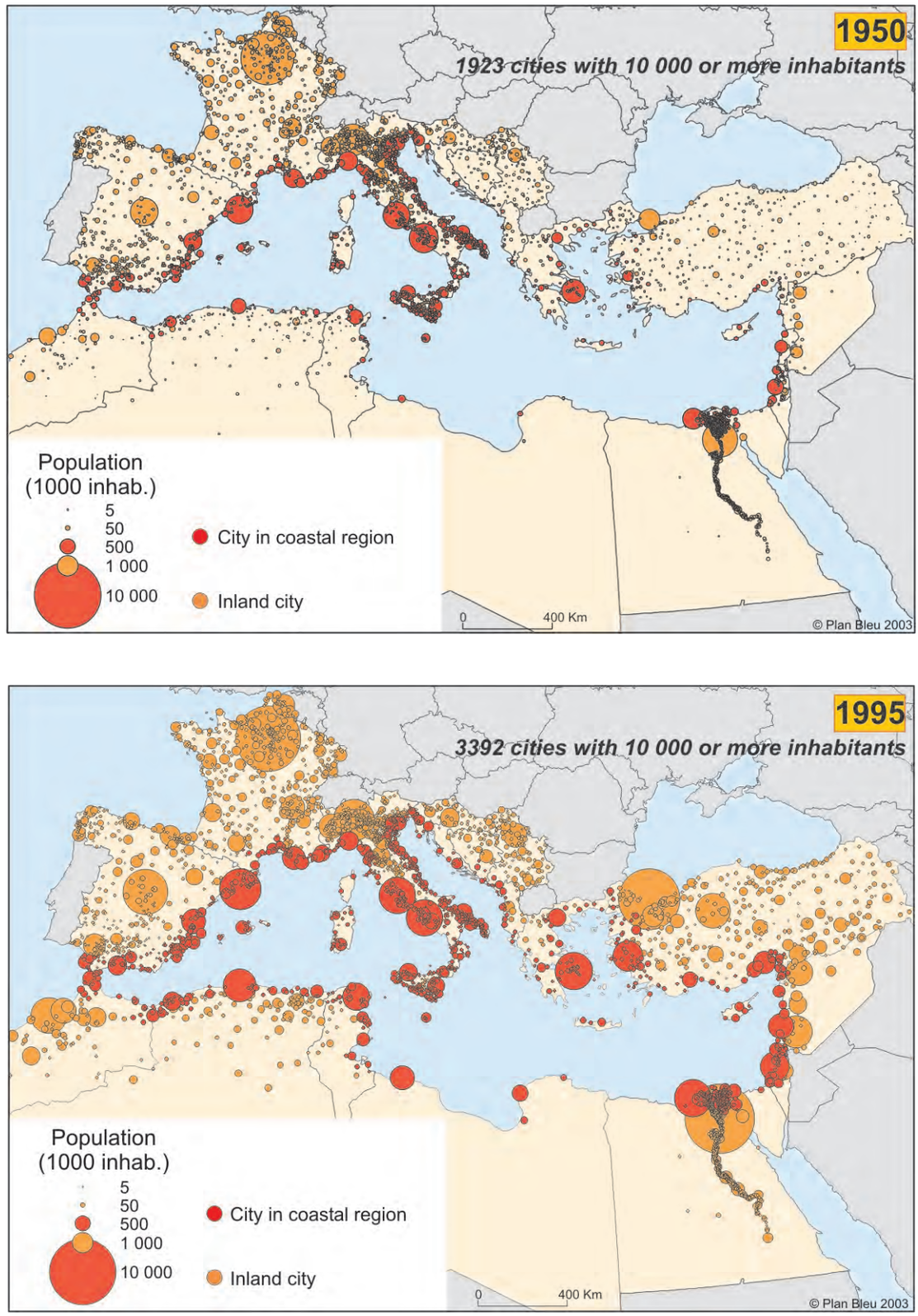
- The driving force behind this growth is becoming more and more endogenous (natural growth, very young urban populations), fed by internal redistribution,[2] inter-city migration and rural to urban migration, which is either decreasing (Egypt, Tunisia) or being maintained (Turkey, Syria, Morocco).

Figure 4.3 Urbanization rate in the Mediterranean countries, 1950, 2000 and projections to 2030



Source: UN Population Division, World Urbanization Prospects. The 2003 Revision

Figure 4.4 Cities with 10,000 or more inhabitants, 1950 and 1995



Source: Plan Bleu from Géopolis

- There are, and will continue to be, many young people, with the economically active population growing by 3–4 per cent per year. These people need training and employment. According to the forecasts, net entry into the employment market will be 4.2 million per year between 2005 and 2009, falling gradually to around 2.3 million per year by 2025–2029.[3] Jobs and the appeal of working in the city are no longer the major driving force of urban growth (unlike 50 years ago). The unemployment rates in Mashrek and Maghreb countries are among the highest in the world and the young are especially affected, for example in Cairo where 20 per cent of 15–29 year olds are unemployed.
- Urban demographic pressures and the lack of jobs encourage the so-called 'grey' sector: informal jobs are estimated at about 30 per cent of active urban employment in Turkey, 45 per cent in Egypt and Tunisia, about 40 per cent in Algeria and Morocco.
- The poverty of a large part of the urban population is of real concern in Mashrek and Maghreb countries. In Egypt, 42 per cent of the poor live in urban areas. In Beirut, 25 per cent of the population lives below the poverty line. There is certainly more poverty in rural areas, but the number of urban poor is increasing.[4]
- The spread of urban areas significantly complicates city management, since public services cannot keep up with the speed at which new neighbourhoods, often not officially recognized, are created.

With nearly 100 million extra inhabitants between 2000 and 2025, including 23 million in Turkey, 36 million in Egypt, 10 million each in Algeria and Morocco respectively, cities are, and will be, undergoing major economic, social and environmental change (Figure 4.4). Economies of scale certainly need to be taken into account, but the marked concentration of populations creates difficult problems in the fields of employment, infrastructure and services, pollution management, and waste production – where there is an alarming increase in quantity.

In the northern Mediterranean countries (mainly Spain, France, Italy and Greece, but also Malta and Cyprus), as in all European countries, the transition from the rural settlements of a largely agriculture-based economy to the urban settlement patterns characteristic of an industry- and service-based economy has now ended. The urbanization process has reached 'saturation', with the population concentrated in the central areas of agglomerations apparently unable to grow and sometimes even tending to decrease. It is true that around the Mediterranean basin, strictly defined, cities have seldom been transformed by the industrial revolution. However, they do show the demographic stagnation that prevails in other European towns.

But when considering total land area and urban land use, it appears that urbanization is far from over. The urbanized area continues to expand. At the local level, cities reach out towards the outskirts, even if the total population has stopped growing. Urban sprawl started in north-western Europe, spread to countries in the western Mediterranean, and then to the east (Athens, small Greek towns, Nicosia, etc.) Although this sprawl is occurring with time-lags, with limited effects, and in particular ways, it is becoming extensive and widespread, creating heterogeneous peri-urban areas with transport and commercial infrastructures, small businesses and low-density housing. At the same time, the agricultural and rural areas around cities, whether it is good or poor quality, is shrinking and often being converted to urban use. In addition, tourism, common in many cities, is adding to 'urban' growth, in the form of built-up areas that are often only seasonally occupied.

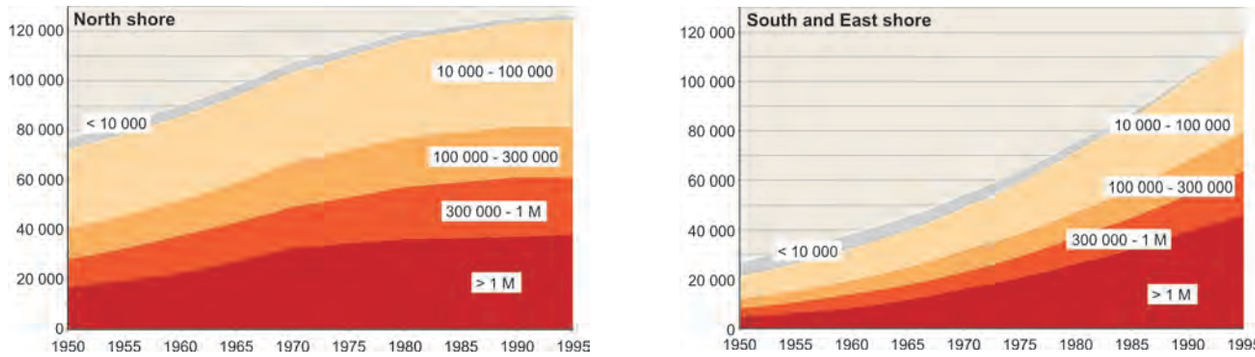
The process of extensive urbanization in the north, and increasingly in the south, has become so widespread that the traditional concepts of town/country, urban /rural, are no longer of great help when considering these new types of area, which are occupied by residents and 'urban' activities, but are not *towns* in the traditional sense. The phenomenon calls for new regional development policies that can limit or forestall mushroom development, wastage of land, and long-term human and environmental impacts such as the greenhouse effect and pollution.

Small towns and large cities: Is it possible to choose?

According to population projections, the urban population could reach more than 135 million by 2025 in the NMC (6.5 million more than in 2000) and nearly 243 million in the SEMC (98 million more). The spatial distribution of this growth, between cities of different sizes and between coastal and inland towns, throws up many questions: can the main metropolises increase their size even more, and by how much? Are we going to witness their hypertrophy or will there be a redistribution in favour of medium-sized towns? What future is there for small and medium-sized towns? Are these open questions? Is there, in fact, a choice?

Changes in agglomerations[5] since 1950 have been measured for 1887 towns in the NMC and 1505 in the SEMC, all having more than 10,000 inhabitants in 1995, and classified according to their size (Figure 4.5). In spite of the extreme variability in growth between different towns, the persistence of urban structures is evident and particularly clear in the NMC. For the SEMC, the graph shows how towns have grown spectacularly during recent decades, and the imbalances affecting the urban framework within countries, with a trend towards a macro-cephalic pattern. For coastal/inland distributions and the attraction of the coast, see Chapter 6.

Figure 4.5 Population in cities according to town sizes (thousand inhabitants)

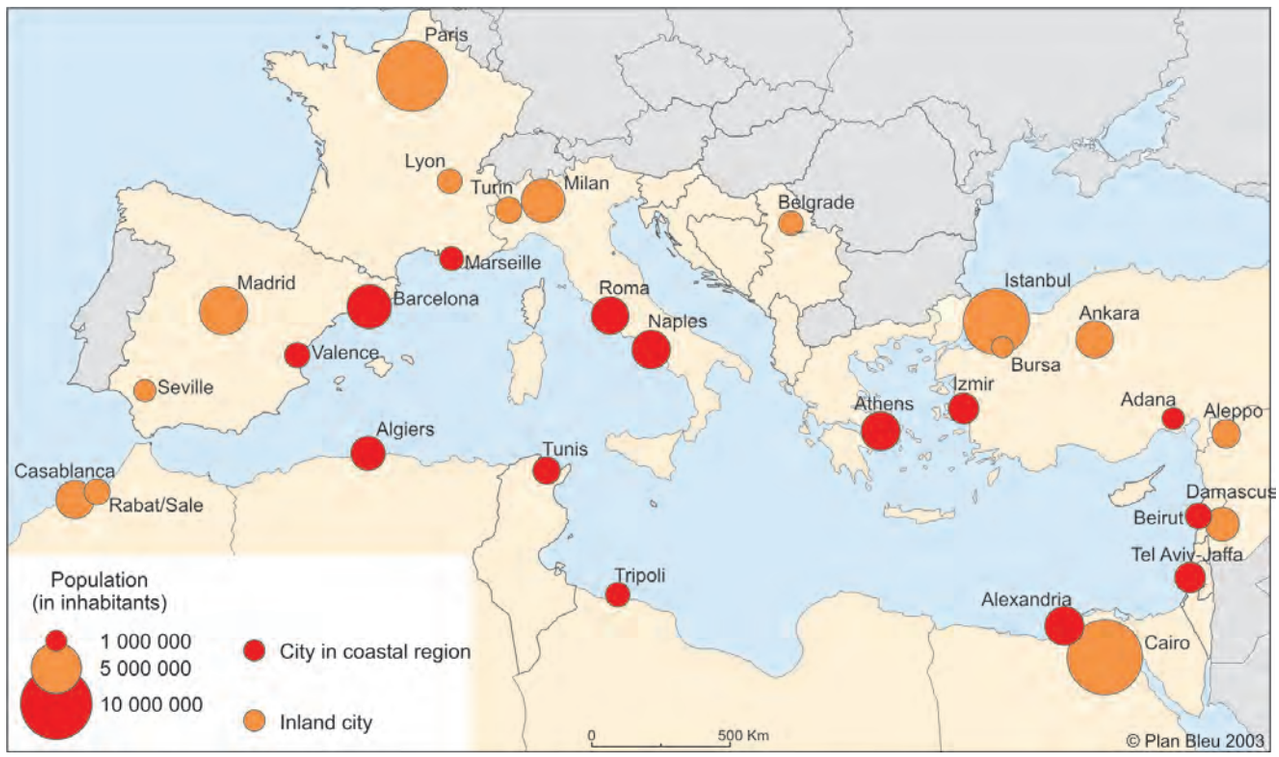


Source: Plan Bleu 2002, from Géopolis

Note: The shaded class corresponds to very small towns of less than 10,000 inhabitants which, during the period under consideration, have grown and passed to the next size.

The number of *very large cities*, with more than a million inhabitants, has grown significantly: 10 cities in 1950, 29 in 1995 (Figure 4.6). This class includes many metropolises located in the coastal regions, like Barcelona, Marseilles, Rome, Naples, Athens, Izmir, Beirut, Tel-Aviv, Alexandria, Tripoli, Tunis and Algiers, but also the three megacities (Istanbul, Cairo and Paris) and other inland metropolises (like Seville, Madrid, Lyon, Milan, Ankara,

Figure 4.6 Metropolises with more than one million inhabitants



Source: Plan Bleu, from Géopolis

Note: In the NMC, 7 big metropolises contained 22 per cent of the urban population in 1950; in 1995, there were 13 with more than 30 per cent of the urban population. In the SEMC, 3 very large cities contained 15 per cent of the urban population in 1950; in 1995, there were 16 large metropolises with 28 per cent of the urban population.

Aleppo and Damascus). The 'weight' of this class is considerable; the proportion of the urban population gathered therein continues to increase.

Small towns, with between 10,000 and 100,000 inhabitants, continue to multiply: 3062 in 1995 compared with 1776 in 1950. Their relative weight is characteristic of the settlement patterns in the region, even though their proportion of the urban population is tending to decrease (in the NMC,1369 small towns with 41 per cent of the urban population in 1950, 1705 with 34 per cent in 1995; in the SEMC, 417 small towns with 34 per cent of the urban population in 1950, 1357 with 32 per cent in 1995).

Between these two extremes, the 218 *medium-sized towns* and the 83 *intermediate cities*, which contain about a third of the urban population in the region, are changing in ways that are less easy to interpret.[6]

- Medium-sized towns (from 100,000 to 300,000 inhabitants) have certainly grown in number (in the NMC, 74 in 1950 to 123 in 1995; in the SEMC, 25 in 1950 to 95 in 1995), but their power to attract seems hardly to have changed: 16 per cent of the urban population in the NMC in 1950 and in 1995, 14 per cent and 13 per cent respectively in the SEMC.
- Intermediate cities (from 300,000 to 1 million inhabitants), on the other hand, maintain their attractiveness but in a less marked way than very large cities. In the NMC, 21 intermediate cities contained 14 per cent of the urban population in 1950; in 1995 there were 46 with 18 per cent of the urban population. In the SEMC, 7 towns with 12 per cent in 1950 became 37 with 15 per cent of the urban population in 1995.

Apart from the distribution of urban populations according to town sizes, the very significant *differences in growth rates* (Table 4.1) provide a better indication of urban dynamics on the two shores, even though the average changes hide substantial fluctuations within the same class of town size during each period. The three megacities – Istanbul, Cairo and Paris – are here given a separate classification (more than 5 million inhabitants).

In the NMC, all sizes of town have registered the same type of cyclical change in their growth rate, with a maximum rate during the 1960–70s. Subsequently, urban growth slowed considerably (to 0.26 per cent per year in 1990–1995 compared with 1.22 per cent per year in 1960–70) and the growth rates across the various sizes tended to level out. Is this a new cycle? In any case, urbanization in the northern countries seems to have undergone a large change, resulting in the expansion of urban areas.

In the SEMC, changes appear to fluctuate more between periods, but the salient feature is the strength of their growth. In spite of a gradual slowing in growth rates during the period (from 3.2 per cent per year in 1950–60 to 2.6 per cent per year in 1990–95), growth remains very strong for all town classes. With 2.5 per cent annual growth, populations double in less than 30 years; with 3 per cent, in less than 23 years.

Table 4.1 Growth rates of cities, per town class

Town population (inhab)	No of towns in 1995	Rate of average annual variation (%)					
		1950–1960	1960–1970	1970–1980	1980–1990	1990–1995	Average 1950–1995
Northern Mediterranean countries							
10,000–100,000	1705	1.22	1.40	1.24	0.81	0.38	1.07
100,000–300,000	123	2.09	2.32	1.31	0.62	0.13	1.42
300,000–1 M	46	1.73	2.11	1.30	0.54	0.15	1.27
1 M–5 M	12	2.46	2.72	1.23	0.29	–0.05	1.48
> 5 M	1	1.66	1.34	0.42	0.43	0.41	0.90
Total	**1887**	**1.13**	**1.22**	**1.05**	**0.67**	**0.26**	
Southern and Eastern Mediterranean countries							
10,000–100,000	1357	3.06	2.79	2.82	3.14	2.58	2.90
100,000–300,000	95	5.04	4.20	3.75	3.33	2.95	3.93
300,000–1 M	37	3.85	4.16	3.75	3.49	3.14	3.73
1 M–5 M	14	4.84	4.42	4.27	3.18	2.56	3.99
> 5 M	2	4.48	4.59	3.75	3.50	2.49	3.90
Total	**1505**	**3.23**	**2.94**	**2.91**	**3.15**	**2.59**	

Source: Plan Bleu 2002, from Géopolis 1998

Behind these average trends, in 1990–95, Cairo grew noticeably more slowly than Istanbul (1.5 per cent and 3.4 per cent per year respectively). More generally, in Turkey, Syria and Morocco, all countries where rural–urban migration remains important, many towns, and especially those of medium size (100,000–300,000 inhabitants) still have a growth rate of between 4 per cent and 5 per cent per year, which means that their population will double in only 15 years. In the exceptional cases of Israel and the Palestinian Territories, several towns show an annual growth higher than 8 per cent; the population could then double in less than 10 years.

Metropolitan and regional development

When extrapolating only current population trends (the baseline scenario), urban patterns vary little or not at all. To examine future urban prospects, it is necessary to refer to the economic dynamics at work over the last decade, where, in the context of a growing interdependence of economies, urban areas and metropolises have become the preferred destination for capital flows and business internationalization.

Metropolitan development marks both a change in scale and a proliferation of relationships and functions. The process refers not only to the growth of large cities, but also to an increasing concentration within them of business, wealth, capital investment in information and communication technologies, and technological developments that affect transport, infrastructure management, construction and public works. The metropolitan functions that currently characterize and differentiate large cities are linked to integration processes in various kinds of networks (transport, research, knowledge, finance) on the basis of which more and more wealth is produced, and the power of metropolises is built.

The concentration of investments in the main metropolitan areas raises the issue of their increasing weight with the resulting costs of urban concentration. Globalization means relocation, increasingly large investments, and investors favouring the places with the most advantages. Given a choice between a medium-sized town and a metropolis with high-quality services (transport and telecommunications infrastructures, business facilities and services, a well-trained workforce), they choose the latter.

In European countries, several observers[7] consider it most likely that this major trend towards metropolitan development will be reinforced in future decades as a result of improved city networking. Along the E*uropean Mediterranean coast*, however, there are relatively few metropolitan areas that have acquired a dominant position at international level. But major urban projects proliferating around the Mediterranean demonstrate the willingness of large cities to affirm their position in European and worldwide networks (see the section entitled 'Urban regeneration and renewal' p220).

However, it seems evident that not all large cities will become metropolises in the globalized world. Some will have a regional metropolitan role, within a country or a group of countries, others will remain medium-sized towns with specific features and needs. Although urbanization is occurring everywhere, differentiation between different types of town remains just as important as globalization, expanding networks and convergence. The trend towards widespread urbanization requires policy-makers and land planners to think about different types of towns.

For the *southern and eastern countries*, prospects are contrasting and uncertain. However, with increasing economic liberalization and within the context of the Euro-Mediterranean free trade area planned for 2010, existing territorial inequalities will be highly accentuated, including those within towns:

- Economies in the SEMC, especially in the Maghreb, are already showing a clear dependence on trade with European Union countries. This south–north orientation of trade flows could intensify the growth of coastal towns even more, at the cost of inland towns.
- The removal of customs barriers and relocations may have profound consequences for spatial organisation, with unequal (positive or negative) effects on urban areas.
- In a situation where public budgets are tight and there is no access to structural funds such as those that exist in the EU, only a few regions in the SEMC will be able to offer attractive conditions for foreign or national businesses that are coping with stiff global competition.
- Under such conditions, the likelihood of an even balance developing between very large urban agglomerations and medium-sized towns are jeopardized. The trend is for too high a concentration of economic, political, administrative and cultural power in a very limited number of metropolises.

Faced with this threat of increasing regional inequality, can Mediterranean decision-makers balance the growth of metropolises with that of medium-sized towns, as India is trying to do?

Such policies are necessary but not easily achieved. State intervention cannot take the route of controlling migration. Spatial planning policies can only be implemented through financial support to housing and facilities, which influence people's choices. And incentives for job creation, creating attractive business areas, directing foreign investments, and creating fiscal advantages for certain priority areas are all effective levers, easier to implement by states or regions, but so far hardly used.

Increased expansion and mobility, vulnerable and fragmented towns

Expansion and the fragmentation of urban areas is a current characteristic of urban dynamics at the local level, with major impacts on the quality of life and immediate and more distant surroundings.

More than 25 years ago, the UNESCO Man and Biosphere programme proposed an ecological approach for the 'urban system'. It envisaged a city as an ecosystem with flows of people, materials, energy and information. Today, other approaches aim to assess the *ecological footprint* of urban areas, that is their impacts in terms of consumption of natural resources and damage to the environment, which often go far beyond the local or regional level. Generally, these impacts rise with the increasing wealth of cities. This approach shows a 'predatory' city, but cities are also places of human development and societal organization, capable of housing millions of people, and of limiting their impact on the natural environment. The problem is not so much the number of city-dwellers but urban lifestyles that are too wasteful, and the way cities are managed. Policies aimed at regenerating and renewing ancient and more recent urban fabrics seek to counter the expansion of suburbs and at the same time reduce environmental impacts.

Wasting space

Throughout the region, cities, which used to be compact, are spreading like oil stains, with sprawling towns and ribbon development along the coasts. They invade their surroundings, absorb previously independent small towns and villages, and use up vast amounts of land. They drastically reduce agricultural land, especially on the coastal plains, which are a limited and scarce resource in the region. Many such sprawling cities have become vast, loosely connected conurbations expanding at a far more rapid rate than that of the population in the agglomerations.

The trend towards urban sprawl is very common and occurs in both northern and southern agglomerations. However, the mechanisms and forces at work differ considerably between countries. Responses intended to channel such sprawling are rarely applied and often have no real effect.

In the north, increased mobility and dispersed activities are the main cause

In countries on the northern shore, where natural population growth in towns has now almost ceased, changes are characterized by a decreasing population in city centres, dispersion of people and employment, spreading of suburbs, creating urbanized areas that are further and further away from the centre; in short, resulting in ever-increasing artificial areas. Many factors affect urban sprawl. Determinants are: greater mobility, more use of private cars, households and businesses organizing their travel on the basis of their location, more affordable house prices far from the centre, and the choice of suburban, individual family houses. The result is a self-reinforcing spiral that moves urban functions away from the centre and invalidates urban planning intentions.[8] Analyses of urban sprawl suggest that the process is partly a result of the market operation and of urban lifestyles, but also of several public mechanisms that actually facilitate sprawl (such as housing, transport, and tax systems).

Car traffic has increased at a rate that would have been unthinkable 50 years ago. It has encouraged and accentuated urban sprawl, allowing towns to spread even more loosely. Private car ownership has grown everywhere. In Mediterranean EU countries the average is more than 590 cars per 1000 inhabitants. The length of daily trips has also grown and trips between suburban centres have increased even more (see further below).

Depending on the circumstances and the context, the *housing market* (with substantially rising house prices, while car prices are falling) and grants given by housing organizations have led to households moving to the edges of towns. In France, for example, measures to finance housing, in force for more than 20 years, have encouraged home ownership by households with modest incomes in areas where land prices are low, such as low density built-up areas increasingly distant from the centre.

The demand for out-of-town locations by businesses and shops often accounts for half of urban sprawl. In suburban areas, employment possibilities are growing rather more than in town centres, and this generates *taxation difficulties* in such large urban areas.

Moreover, standard zoning regulations, which recommend separating urban functions (such as housing, work and shopping), have, in the same way as the supply of cheap land, too often encouraged single function estates on the outskirts. The observed trend is characterized by *chaotic patterns of shopping malls* and hypermarkets (developments of some 10,000m^2, sometimes as much as 20,000m^2) far from town centres, and, in some cases, built on what were originally green areas. These commercial areas offer free parking leading to daily polluting emissions by the huge number of motorized customers. They are widespread and common on the outskirts of towns on the northern rim (such as most French and Spanish towns, the major Italian metropolises, Athens, Thessalonica and Split), and are beginning to proliferate elsewhere (in cities such as Istanbul, Ankara, Beirut, Cairo, Alexandria and Tunis). A gradual erosion of the retail trade (especially small shops) and employment in the inner cities is expected in the medium term.

In the south and east, dynamic 'spontaneous' housing development feeds urban sprawl

In most SEMC, change since the 1970s has been characterized by a steady rapid increase in unregulated construction, in large as well as medium-sized cities and smaller towns. This is a new pattern of construction often resulting in vast neighbourhoods that provide access to housing mainly for house-owners in the poor or middle classes. This form of 'spontaneous' and unregulated urbanization (without permits), often anarchic, takes place either on land where construction is forbidden, or in areas designated for construction and building houses that do not comply with housing or building regulations.

This process of spontaneous house construction adds to the stock of precarious housing (shanty towns)[9] that already existed. But instead of land being squatted or rented, land plots are sold by landowners on a parallel real-estate market, intended for those who do not have the means to buy into the official market themselves. Almost all occupants own their houses. Land prices are often higher than in regulated neighbourhoods, but the size of each plot is much smaller than the officially regulated size. The constructions are 'solid' and evolve over time, sometimes with several floors. Construction is not clandestine and occurs in full view of the urban authorities.

The exact extent of spontaneous housing is rarely known. In fact, depending on the country or city, between 30 and 70 per cent of town-dwellers cannot find a building plot and settle unless they use informal channels (Table 4.2).

Unregulated housing development shows the existence and dynamism of unofficial or illegal actors in urban land, that is, a parallel market in building land. At the same time, it reveals weaknesses in central state policies that were intended to guarantee access to housing for all. In fact, restrictions on public finance in the SEMC have prevented programmes from being carried out in full. Only the demand from the middle classes has been met, while the needs of less solvent people have not been covered.

In terms of *impacts*, unregulated housing is responsible for considerable sprawl, leading to a rapid gnawing away of suburban areas (including agricultural land) and a lowering of urban density in central areas. But it also results in other unwanted social developments, such as derelict areas on the outskirts due to speculation, with consequences for access to water and other basic services.

Faced with the rapid increase in spontaneous housing over the past 25 years in the SEMC, *urban policies* for precarious housing and/or unregulated neighbourhoods have changed significantly. Although starting at different times in different countries, policies have followed a similar pattern: 'zero tolerance' and the eradication of shanty towns in the 1970s, followed by 'tolerance' and some 'recognition' since 1980–85. For shanty towns, policies consist either of eradication while transferring inhabitants to new estates, or of rebuilding such neighbourhoods on site. For unregulated estates, priority is given to bringing land tenure in line with regulations, acknowledging the right to self-construction, improving infrastructure and, if possible, facilities.

Table 4.2 Estimates of the extent of unregulated housing (averages unless otherwise indicated)

As a percentage of the total urban population %		
Albania		70
Turkey	Large cities	50–70
Syria	Aleppo	40
Lebanon	Beirut	20
Egypt	Average of Egyptian cities	34
	Greater Cairo	58
Algeria		30
Morocco		30
As a percentage of the annual production of new accommodation %		
Syria	Damascus	60–80
Egypt		60–80
Tunisia		40
Morocco		40–50

Sources: Plan Bleu from Chaline, 2001; M. Chebbi, personal communication, 2003; UNHSP, 2003

Note: In Tunisia, spontaneous housing has decreased in recent years: 22–25 per cent of the housing stock in 2000 against 34 per cent in 1993.

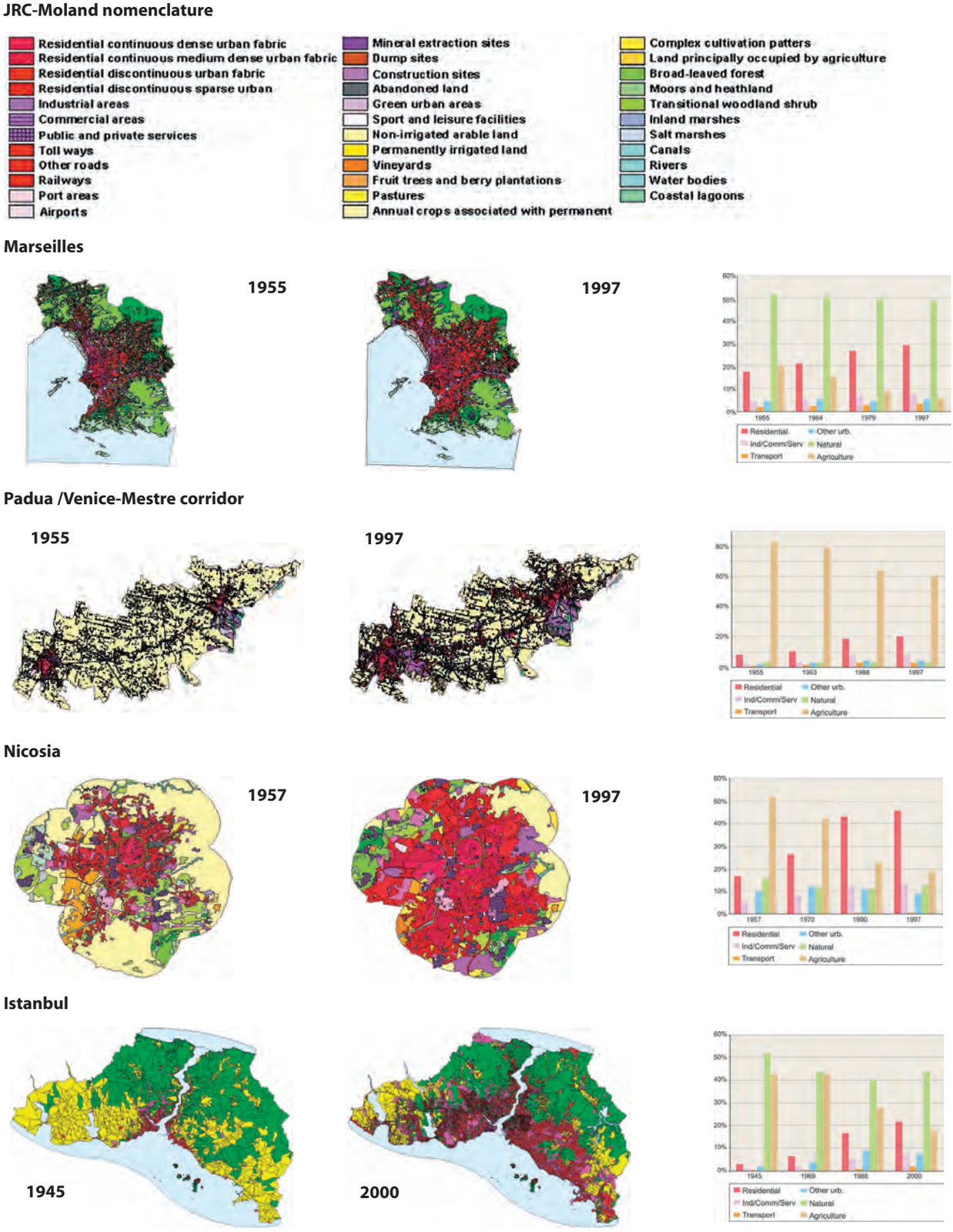
Gecekondu in Turkey, *tanake* in *Beirut*, *ashwaiyat* in Cairo, *mudun safi* or *brarek* in Morocco, are some of the terms used for informal housing. Cities on the European coast are not immune to illegal construction either 'abusive' in Rome or Naples, 'un-planned' habitation in Athens, and several similar forms in the eastern Adriatic countries.

Everywhere, very strong pressures on land surrounding towns

At first sight, at the national level, the area of artificial land seems to be low (3–10 per cent of total land area, depending on the country), but there are nevertheless strong pressures on agricultural land and on the environment. As artificial areas increase, the surface becomes less permeable and this can increase the risk of flooding, for example. An analysis of land use changes shows that more land becomes artificial every year, but few such areas change back to their original use. For example, in France, the total built-up area increased by 12 per cent between 1992 and 2000, roads and car parks by 10 per cent and non-built artificial land (such as gardens, lawns and construction sites) by 17 per cent. In total, 620km^2 of natural land are lost each year, half of which is for gardens around houses.[10]

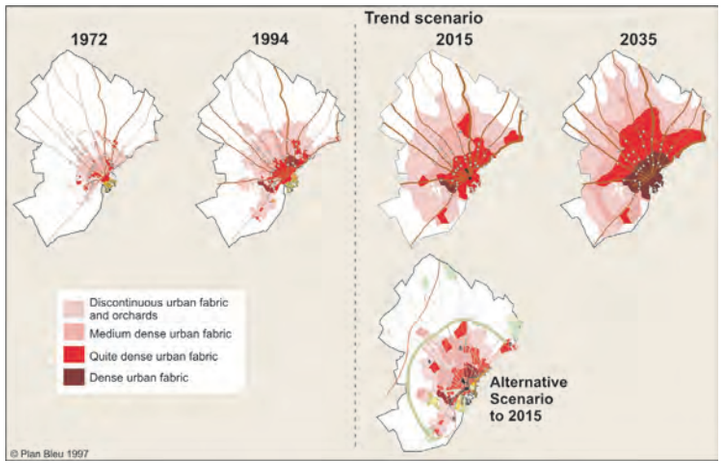
At the regional/local level, it is easier to observe the wastage of land resulting from significant land use

Figure 4.7 Land use changes in Marseilles, Padua-Mestre, Nicosia and Istanbul



Source: EU-Joint Research Centre, Ispra (MOLAND)

Figure 4.8 Land use in Great Sfax, Tunisia. Trends and scenarios



Land use changes in Great Sfax (1972–1994)

Land use	1972 Surface (ha)	1972 (%)	1994 Surface (ha)	1994 (%)
Artificial areas	7285	10.80	16,206	24.02
Agricultural lands	33,823	50.13	24,923	36.94
Forests and semi-natural milieu	30	0.04	30	0.04
Wetlands	1815	2.69	1815	2.69
Water surfaces	24,518	36.34	24,498	36.31

Source: Plan Bleu, 1997

Note: Urban fabric changes in Sfax from 1972 to 1994 show a clear increase in artificial areas, with an urban sprawl along the coastline and along transport infrastructures. Over 22 years, artificial areas have more than doubled, at the cost of market gardens. In the baseline scenario, the average decreasing size of agricultural land (1.4 per cent per year) is extrapolated to 2015 and 2035. An alternative scenario to 2015 is based on the assumption that measures are taken to redirect urban growth and preserve market gardens, mainly the implementation of land management policies, the development of secondary urban centres linked between them, a green belt surrounding the urban area and green 'lungs' within the agglomeration.

changes. In the five examples given in Figures 4.7 and 4.8 (Marseilles, Padua-Mestre, Nicosia, Istanbul and Sfax) the increase in built-up area (housing, commercial areas, transport infrastructure, industrial areas) has led to substantial losses of agricultural land. Within 40 years, 45km^2 of agricultural land was lost around Marseilles (107 hectares per year), 25km^2 around Nicosia (62 hectares per year), and 116km^2 in the Padua/Venice-Mestre corridor (276 hectares per year). Within more than half a century 561km^2 was lost around Istanbul (1021 hectares per year), and in the Sfax region 89km^2 of market gardens were lost in 20 years (405 hectares per year).

Apart from quantitative losses, a major problem is the irreversible loss of good quality agricultural land and natural land of high ecological quality.[11] The loss of good agricultural land is estimated at 7500 hectares per year in Turkey and at 12,000 hectares per year in Egypt, especially around Cairo, where highly productive (cotton) irrigated land is found. In Damascus, urban expansion is mainly taking place in the agricultural areas of the Ghouta oasis, jeopardizing a rare resource and polluting the water table that supplies the town. In Greater Algiers, poorly controlled urban sprawl continues to gnaw away fertile land, especially on the Mitidja plain. In Lebanon some coastal plains are already threatened (Box 4.1). Other details are given in Chapter 5.

Box 4.1 Land speculation and pressures on the agricultural plains in Lebanon

In the Lebanon, the war years (1975–1990) had a direct impact on agriculture and uncontrolled urban expansion. Thousands of hectares of agricultural land were abandoned, and rural poverty encouraged a movement away from an agricultural economic system towards land and real estate speculation, transforming lands into 'forests of cement'.

The peripheral areas around Beirut, Saida, Zahle and Tripoli gradually spread over a wider area. The Lebanese coast from Tripoli in the north to Tyre in the south (140km) has become one long stretch of densely populated urban settlements, haphazardly built and lacking services. This sprawl crosses Dahr-el-Baidr and the Beqaa valley, where main roads are lined by low-density urban ribbon development and the scattered urbanization of rural areas.

Although no reliable figures are available on the absorption of agricultural land by planned or speculative estates, it is estimated that, over the last two decades, urbanization around cities and motorways has taken nearly 20,000 hectares or 7 per cent of all cultivated land, and a higher proportion (15 per cent) of irrigated land.

Some coastal agricultural plains are seriously threatened. The plains of Minieh, Nahr Ibrahim and Damour, and the Saida orchards, could loose their agricultural function within less than 10 years. Agriculture could disappear even sooner in the plains of Tripoli, Batroun and Nahr-el-Kalb. In contrast, the most important plains, those of Akkar and Kasmieh, offer good chances of long-term preservation.

Source: Blue Plan 1999. Mediterranean Country Profiles. Lebanon

Is it possible to cope with uncontrolled urbanization?

Regulations intended to protect agricultural areas against urbanization have been formulated in most countries, but with limited, or even minimal, effect. Prohibitions and threats of punishment can only be effective if alternatives to land speculation are made available and town planning is enforced. Town planning measures need to be rethought in order to integrate the real city (official as well as informal areas), the dynamics at work, and the 'malfunctioning' that is the expression of existing interests.

- Drawing up *master plans*, inspired by the industrialized countries, was common in the 1970–80s in the southern Mediterranean cities. Experience has shown that these measures have often been ineffective, especially because of the lack of regulatory and budgetary resources for implementation and, above all, the lack of land tenure control. Although these planning measures are still being applied in most cities, today a balance is being sought between suburban extension and concerns for renewing and regenerating the existing fabric, both the ancient fabrics and those handed down from colonial periods. Town planning becomes less coercive and more strategic (see the section entitled 'Urban regeneration and renewal' p220).
- Sometimes, a solution was sought by creating *new towns* in the outskirts, intended to function relatively autonomous from the inner city. Egypt adopted this

Box 4.2 New towns in Egypt

In Egypt, urbanization takes place at the cost of arable land, since the great majority of towns are located on the fertile land of the Nile delta and valley. Soil improvement measures have been taken on 'new' land won from the desert. However, the quality of this land is lower than that in the valley. Since 1979, the Egyptian government has also made huge efforts to build new towns intended to absorb the Cairo overflow and safeguard agricultural land in the Nile delta and valley, which is under pressure, but the results have been below expectations.

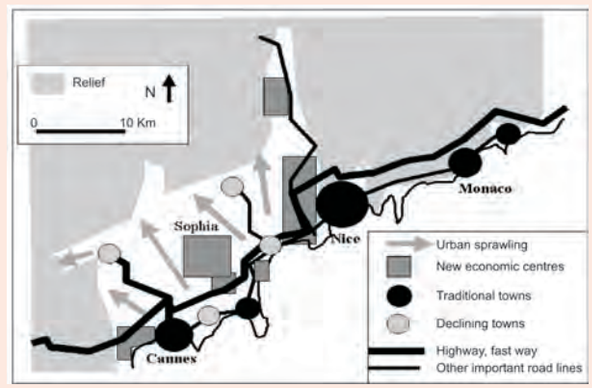
Of the six new towns being built in the desert some 30–40km outside Cairo, two (Fifteenth of May and Tenth of Ramadan) seem promising with about 70,000 inhabitants, but this is small compared with the intended 250,000–500,000. Other attempts for ten new settlements on the Cairo suburban fringes, with a range of building plots without basic facilities, have also not reached their targets. In the 1990s, four new residential towns were started to the east of Greater Cairo. In fact, major difficulties are occurred with the development of the new towns because the projected rail connections are still missing.

Source: El Kadi, 2001

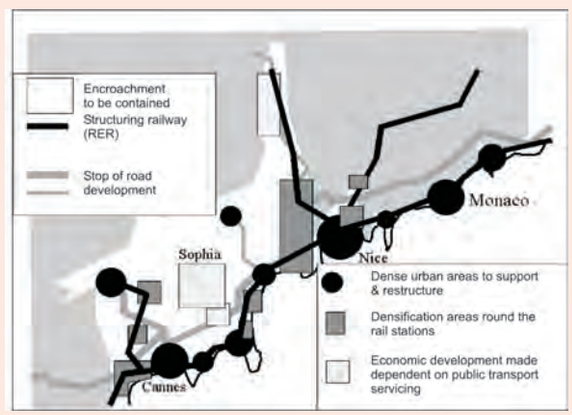
Box 4.3 Development scenarios in the French Riviera conurbation

The French Riviera conurbation has been spreading since the mid-1960s. Its development pattern is determined by secondary housing, car use and road development. This process results in an intense consumption of space. Between 1970 and 2000, the urbanized area was multiplied by 2.4 and the population by 1.4. Suburban houses with large gardens are common. Commerce and industry have relocated; new economic centres emerged, such as Sophia Antipolis, linked to the motorway network. Located in a typical Mediterranean situation (strong topographical constraints and scarcity of available space), real estate is scarce. The result is a substantial rise in real estate prices, reinforced in the case of the French Riviera by very high pressures from tourism.

1960–1990 changes: car logic



'Rhine' scenario



Up to the mid-1960s, the French Riviera conurbation had developed mainly around railway lines. Thirty years later, a sustainable development scenario (a 'Rhine scenario', referring to German and Swiss towns where urbanization remains concentrated around public transport lines) could have channelled and redirected urban growth around the railway

and trams lines and through rehabilitated town centres, making use of opportunities to increase densities around railway stations and tram lines, and supplementary measures to discourage car use in dense areas and limit the spread of the road network. For such a scenario to succeed it would have been necessary for the public authorities to ensure a strong commitment to implementing land management policies, regulating the real state market, and developing public transport.

However, the option recently chosen by the public authorities through the Directive territoriale d'aménagement (a planning document drawn up by the central State and subjected to a public enquiry in 2002) would take a different direction. It does envisage some dense population poles along the railway line and encourages the rehabilitation of town centres. But it also plans to strengthen the road networks and continue the development of the outskirts. This choice shows how difficult it is in urban planning to integrate local public action and national level strategies. The central state has to respect the autonomy of local authorities and can hardly impose a scenario like the 'Rhine scenario'.

Source: Jourdan, 2003

policy to de-congest Cairo (Box 4.2). France did this in the 1970s by launching a dozen new towns around Paris and regional metropolises. Algeria may follow with its 'Algeria' project, a city to be built in the desert, 200km south of Algiers, for some 400,000 people, intended to become a business centre. These fully planned public operations seem only rarely to attain their desired goals, especially the mixing of functions, the job/residence balance and the urban atmosphere.

- In countries where traffic has exploded, innovative policies are trying to influence mobility at source, by organizing towns in more appropriate ways. In the last few years *joint town and transport planning*, linking population density with dense transport facilities, has been introduced in some industrialized countries.[12] Emphasis is being put on making existing urban fabrics more dense, especially around public transport stations and correspondence points and along transport corridors, in order to prevent excessive car use for urban travel. Given that town planning measures usually intend to control too high densities and almost never too low densities, the innovation lies in defining minimum densities in order to increase population density. The concept of minimum density seems suited to a period of urban expansion and falls within a sustainable development approach (energy saving for transport, less polluting emissions, safeguarding natural areas). In Naples, the combined urban and metropolitan transport systems illustrate this search for measures to integrate town and transport planning (Box 4.8 p219).
- In general, countering the excessive expansion of big cities calls for determined overall (regional) development policies for the entire country, and for putting in place a set of measures, both stimulating and discouraging, to promote the development of medium-sized city *networks*, mainly by improving accessibility.

Social and ecological inequalities in fragmented urban areas

With urban sprawl, fragmentation within a city increases, undermining overall social cohesion. Social differences have always existed, but this old issue is reappearing in new and overwhelming forms. The process of fragmentation is probably most visible in the vast metropolitan areas of both the south and the north, where a mosaic can be seen, where differences are accentuated, where large cities are fragmented. Some observers even speak of a *metropolitan disaster*, which would turn cities into fragmented, centrifugal (scattered) urban areas.[13]

In any case, in large cities, there are considerable differences between neighbourhoods in terms of quality of life and environment. These inequalities are very often added to those of income, access to work, even survival. Apart from extensions, some inner-city neighbourhoods tend towards gentrification with extremely high land prices, luxury dwellings and offices. Other areas decline, where only those inhabitants and businesses that cannot afford to go elsewhere remain. In these less favoured neighbourhoods, socio-economic and environmental problems are accumulating, such as poor access to transport, housing and water, and consequent health risks.

With increasing inequality and urban fragmentation, people sometimes start to feel insecure, giving rise to withdrawal processes within groups. When social conditions harden, fragmentation leads to increasing confinement of both poor and rich neighbourhoods. 'Sometimes, entire neighbourhoods hide behind walls, some to protect themselves against thieves, others for protecting themselves against the police'.[14] The development of new residential neighbourhoods where the middle and upper classes take refuge in gated areas, can be observed in many parts of the world. This 'urban development' pattern has also appeared in the Mediterranean (Box 4.4).

Box 4.4 Gated cities in the Mediterranean

Secure residential neighbourhoods are generally composed of villas and/or buildings surrounded by a protective wall, provided with special services and equipment (such as video-surveillance, shops, green spaces, swimming pools, golf courses). Access to these walled complexes is limited, they are guarded 24 hours a day. Management is handled by the co-owners and falls entirely outside the responsibility of local public authorities.

In **Lebanon**, the first gated residential complexes appeared during the civil war from 1975 to 1990, arising from a demand for protection and for security of service supplies. In the 1990s, the post-war building boom, particularly in luxury accommodation, took place in a context of re-established public administration but without land tenure regulation. Investors developed projects on land located on the urban fringes and the coast, promoting a 'global lifestyle'. By 2000 gated residential complexes accounted for about 2 per cent of all housing in Lebanon.

Gated cities in **Turkey** have grown significantly for the past 15 years, especially around **Istanbul** and on the Mediterranean coast. First, small luxury housing complexes were built on the land of old properties, followed by holiday villages on the Marmara Sea coastline. With the development of the motorway network these villages became permanent fringe cities, resulting in the gated cities of the 1990s. By the end of 2001 there were about 270 gated cities in the Istanbul metropolitan area, the largest being 'Alkent 2000' (720ha) and 'Acarkent' (230ha in a forest). Gated cities are spreading more and more to the outskirts of the urban area, at the shores of the Bosphorus, near woodlands, and near the Marmara Sea and the Black Sea, on land that does not fall under the jurisdiction of the Istanbul metropolitan municipality.

In **Egypt**, exclusive and protected residential areas were built in the 1980s along the beaches of the north-western coast, and later along the Red Sea coastline. In **Cairo** the phenomenon developed in the city suburbs in the 1990s, facilitated by the ring road. 'Mirage City' in New Cairo, 'Mena Garden City', 'Dreamland', 'Golf City' and 'Beverly Hills' are among the main projects carried out or under construction, some of them offering more than a thousand houses per estate.

Walled real-estate complexes have arisen in **Spain** along the Mediterranean coast, both as holiday homes and primary dwellings.

In **France,** protected enclaves for the upper-middle classes are proliferating, with four in Montpellier, three in Avignon and 20 in Toulouse. The French Riviera has several protected residential enclaves including the 'Domaine des Hauts Vaugrenier' (170ha) between Nice and Antibes and, more inland, the 'Domaine de Terre Blanche' (265ha) not far from Cannes.

Source: Plan Bleu from Etudes foncières, several issues 2002–2004.

These drastic changes point towards a *break* with the mixed and compact urban model of the Mediterranean and Europe. Does this mean that cities are in transition towards a fragmented model with ghettos? In any case, the rapid increase in private, secure urban areas shows a purely market-driven development, where urban planning and the law appear to be powerless to realize the ideal town presented in plans inherited from the ancient city.

In the Mediterranean, where towns were traditionally well balanced, the process of developing gated cities seems to have started. Will it lead to fragmentation with 'well-to-do' enclaves and 'neglected' housing or informal towns? The *challenges* for the region are important. Fragmented cities put the very essence of the Mediterranean city at risk, an essence based on the principle of intermixing.

What efforts are being made to avoid segregation and combat exclusion in both the north and the south? Answering this question would require taking a look into the social policies carried out in the different countries, which is outside the scope of this report. However, segregation may also be approached through its spatial and environmental aspects.

In line with the 1992 Rio Earth Summit and the 1996 Istanbul Conference on Human Settlements (Habitat II), the international community defined Millennium Development Goals in 2000 and the Johannesburg Action Plan in 2002, which aim at integrating the social, environmental and economic development dimensions. They encourage looking at the *linkages between social equity and environmental quality* in order to facilitate this integration.

Urban vulnerability to natural and technological hazards

Warning signals are periodically provided by scientists who forecast a significant rise in urban vulnerability to disasters in the 21st century. This would be a result of urban growth (population and/or spatial growth), and climate change, causing more frequent and intense hydro-meteorological disasters at both global and regional levels.

The Mediterranean region is especially vulnerable to extreme weather events and even more to *earthquakes*, the effects of which tend to be concentrated in urban areas. Countries such as Morocco, Algeria, Italy (with an added volcanic hazard), Greece and Turkey are the most vulnerable to earthquakes. C*atastrophic floods*, which are linked to the sometimes violent rainfall of the Mediterranean climate and aggravated by deforestation and building on slopes, are also a major risk for many cities in Spain, France, Italy and Algeria.

In future, inequality of exposure to risks could increase between the northern and the southern shores. Indeed, if no substantial progress is made on the three fronts of hazard prevention (stopping building in disaster-prone areas, reducing makeshift housing, and implementing safety standards in urban dwellings), the vulnerability of the southern and eastern large urban areas will increase, together with the impacts of disasters in these huge urban concentrations. Floods, earthquakes and landslides have common features wherever they occur, but the challenges from the human point of view are not the same. The highly populated urban areas in the SEMC, with their unregulated housing construction, are especially vulnerable, as unfortunately demonstrated by recent fatal disasters (Table 4.3).

Table 4.3 Balance of recent natural disasters in the southern and eastern Mediterranean

		Fatalities	Homeless
Izmit (Turkey)	Earthquake (August 1999)	17,200 killed/ 44,000 injured	600,000
Algiers, Bab el-oued	Floods (November 2001)	920 killed	50,000
Algiers and Boumerdès	Earthquake (May 2003)	2200 killed/ 10,200 injured	120,000
Al Hoceima province (Morocco)	Earthquake (February 2004)	600 killed/920 injured	30,000

For *technological hazards*, lessons can be drawn from the accident that occurred in Toulouse in 2001 (Box 4.5), which, after the Seveso accident in a Milan suburb (1976), reopened the debate on the presence of hazard-prone industrial sites, which have been classified as such, in or near densely populated areas. The problem is even more worrying in Toulouse, where the city expansion towards the south-west occurred under legal circumstances.

Box 4.5 The industrial accident in Toulouse (France)

In September 2001, the explosion of a warehouse in the AZF chemical plant in Toulouse was the largest industrial accident recorded in France in 20 years. This chemical plant, which specializes in manufacturing agricultural fertilisers, falls under the Seveso Directive[15] and is located in the south-western suburb of Toulouse, less than 5km from the town centre. The depot that exploded contained stocks of substances (about 300 tonnes of ammonium nitrate) that did not comply with the required specifications and standards. The huge blast set the plant on fire and shook the ground (equivalent to an earthquake of a magnitude of 3.2 on the Richter scale).

The effect was very serious: 30 people were killed and 2400 were injured by the explosion; 2500 houses, several schools, a hospital, and buildings and residential halls of Toulouse University were destroyed by the blast. The AZF plant was built in the 1920s outside the town, but since the 1960s it had been gradually engulfed by urbanization. Today some 30,000 people live within the direct perimeter of this chemical area. The situation had already been condemned for several years by resident associations and ecologists.

Source: IFEN. L'environnement en France, 2002

What can be done at the national, the local and Mediterranean level? First, one should reject the idea of inevitability since the impacts of many accidents or disasters would be much less serious if timely action were taken during the urban development process. At the closure of the International Decade on Natural Disasters,[16] it was emphasized that disaster prevention and sustainable development approaches are part of two different worlds that totally ignore each other. In a sustainable development approach, the classical view of risk management is reversed: risks are integrated up front in development and spatial planning issues, and not the other way around. This is not usually the way it works in the world. Two proposals for action formulated within this framework are recalled here:

- Move gradually towards a less sectoral natural hazard management, by also considering hazards as economic, social and environmental issues, and integrating them into development or regional planning policies and programmes at all levels. For example, in France, plans for preventing predictable natural hazards, elaborated for more than 2700 municipalities, should be integrated into detailed land use planning and in construction rules and regulations.
- Give priority in sustainable development strategies to policies aimed at reducing vulnerability to the most important hazards, particularly the vulnerability of the most disadvantaged groups, especially those in the large cities of the south. Izmit, Bursa and other cities in the very vulnerable Marmara region in Turkey, provide examples of this approach. Their Local Agendas 21 have, since 2000, been redirected towards prevention and preparedness for natural disasters.

For *industrial hazards*, prevention policies need to integrate hazard reduction at the source (setting up safety management systems), organize specific inspection systems for hazard-prone activities (in the EU Mediterranean countries industrial risk prevention and management is regulated by two 1996 directives: Seveso II and the IPPC directive on integrated pollution prevention and control), and include measures in town planning to deal with technological hazards (for new establishments, granting permission only in areas far from residential areas; for older plants, granting no permission for new residential areas nearby).

Finally, without better guidance being given to urbanization, and if the processes through which a city is actually built are not taken into account from the start, technical responses for managing disasters, emergencies and crises can only involve damage control. Sustained efforts are necessary on two fronts:

- Reducing disaster vulnerability requires real alternatives to land and real-estate speculation (in order to stop urban settlements near hazard-prone industries or in flood-prone areas), to buildings not complying with anti-earthquake standards, and to deforestation and building activities (including infrastructure) on steep slopes.
- Improving disaster/emergency responses and hazard management techniques so as to mitigate the impacts of disasters.

Cooperation at the Mediterranean level has generally been focused on disaster management; in future, hazard prevention needs to be further supported and strengthened.

Ever longer travel in urban areas

Urban transport is an essential component of the urban quality of life and of accessibility, for people living both inside and outside the central urban area. There are two types of concern regarding the environmental impacts of urban transport:

- public health and the local environment, both of which require reduced air pollution and reduced noise from transport.
- greenhouse gas emissions, essentially carbon dioxide and nitrogen oxides (CO_2 and NO_x), the effects of which are global (threats to climate and ecosystems) as well as local, and which require national action plans (see Chapters 2 and 3).

We will here deal with travel modes both in central areas and on the fringes of towns. The current trend is characterized by an increased use of private cars, a mode that is costly to the environment in terms of energy consumption and polluting emissions. On the other hand, urban travel modes are closely related to *urban morphology* (urban structure). International comparisons carried out on 30 large cities[17] have shown that car use in urban areas increases as urban density decreases.

Individuals living in low-density suburban areas cover daily, by car, distances two to three times greater than those living in central areas, without spending more travel time. They are more or less forced to take the car because of the relatively long distances between their point of departure and destination, poor public transport systems, the good road traffic conditions and car parking. The situation is quite the opposite in most densely populated areas, where using the car is very much constrained (scarcity of parking spaces, congestion) and where public transport is attractive.

So, commuting distances vary greatly, depending on location in a given urban area. As a result, fuel consumption and polluting emissions increase by up to five times when comparing central dwellers with those living in the suburbs or in rural villages in urban fringes.[18] This situation prevails in cities of the Mediterranean EU countries, but how does it apply to the southern and eastern Mediterranean cities?

The 'automobile transition' in the south and east

The three Mediterranean shores, as we have seen, are experiencing expanding urban areas and increasing daily mobility. As travel distances continue to get longer, people are forced to use fast motorized transport modes: private cars and/or public transport. The main reasons for travel are work and study, while leisure is becoming more important in the urban areas in developed countries.

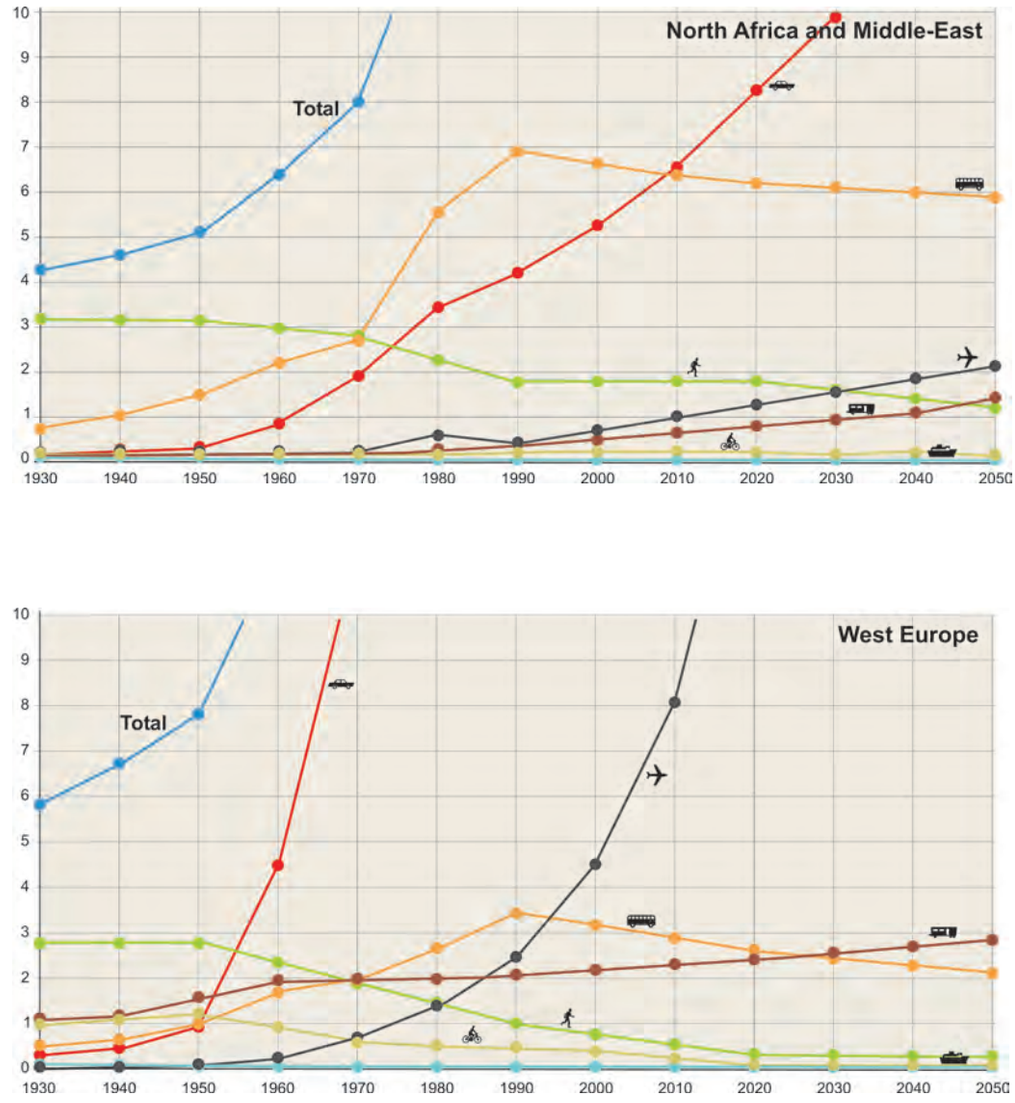
In 2003, compared with the northern developed coastal countries (where car ownership averages at more than 590 cars per 1000 inhabitants), car ownership in the SEMC is fairly low (on average 124 vehicles per 1000 inhab) with rates varying between 64 cars per 1000 in Egypt to 520 in the Lebanon (see Table A.25 in the Statistical Annex).[19] These are national average figures, however. Rates are higher in the cities, for instance in Cairo where the motorization rate may be higher than 110 per 1000 inhabitants.

Contrasts between the north and the south remain strong, but for how long? Differences in income levels, in the purchasing power of urban populations, as well as uncertain economic growth forecasts, suggest that widespread car ownership in the SEMC will not happen overnight. But other factors such as decreases in car prices, car attractiveness, particularly among the middle classes, a political will to democratize access to cars through significant reductions in customs duty, and the Euro-Mediterranean free trade area expected for 2010, suggest that the shift towards the car is already in progress in southern and eastern cities.

On a world scale, global prospective modelling of passenger mobility and the modal split to 2050,[20] suggests that the Middle East and North African countries will experience mass car ownership by 2010 (Figure 4.9). These models do not predict, but provide a first indication of ongoing trends: the SEMC seem to have entered the 'automobile transition', something to be examined more closely.

In order to clarify these trends in southern and eastern Mediterranean towns, travel modes have been analysed in six large cities[21] (Istanbul, Beirut, Cairo, Tunis, Algiers and Casablanca). The emphasis has been put on motorized travel in the large urban areas, even though it is known that pedestrian mobility, little researched and generally underestimated in mobility surveys, remains relatively important in small and medium-sized towns,[22] as well as in central areas of large Mediterranean cities.

Figure 4.9 Passenger travel modes in the Middle East, North Africa and western Europe (eastimates and forecasts (km/person/day))



Source: F. Papon (Inrets) for the Blue Plan, from A. Schafer's data for car, bus, train and airplane modes

Note: Forecasts through 2050 are based on historical trends everywhere in the world. Individual mobility increases with revenue, travel time remains relatively constant (1–1.5 hour per day), faster transport means are used to cover ever longer distances within the same time.

In North Africa and Middle Eastern countries, motorized travel, essentially by bus and by car, has risen noticeably in the last 20 years. By 2010–2020, and even more beyond, the car will largely be the dominant travel mode (10km/inhab/day by 2030), while the bus will continue to decline.

In west European countries, the 2050 prospect suggests that the mobility share of high speed transport (airplane, high speed trains, car) will significantly increase to cover longer distances. In 2004, car travel represented 60km/inhab/day (out of scale in the graph).

Table 4.4 Motorized travel share in six very large cities of the SEMC (estimates, in per cent)

City	Istanbul 2000	Beirut 1994	Cairo 1998	Tunis 2000	Algiers 1998	Casablanca 2000
Public transport	71	29	74	50	52	45
Private car (+ individual taxi)	29	71	26	50	48	45 (+10%)
Total	100	100	100	100	100	100

Source: Godard, 2003 from recent household surveys and estimates from various sources

Note: Classifying the different modes is not easy. For instance in Casablanca, small taxis (metered taxis operating within the urban boundaries) are classified as an individual mode in this table, but could also be classified as a public transport mode, since they actually serve as both (taxi-sharing is permitted).

Growing use of private cars and decline in organized public transport

Table 4.4 shows the modal share of motorized travel. For each urban area, average figures hide considerable disparities between social categories, particularly between those using private cars and those dependent on public transport.

Public transport still dominates in Cairo, Istanbul and Algiers, but its supremacy seems to be seriously threatened in Casablanca and Tunis. In Beirut private cars account for more than 70 per cent of journeys – an untypical figure for the region;[23] in 2003, this could well be 85 per cent. In Tunis car use increased in the 1990s, in spite of the light rail system in the central area; projects are being studied to improve public transport systems at the metropolitan level, without which the car share of motorized travel could reach 60 per cent by 2010.

In all cities, the private car share seems to be rising rapidly, as is well illustrated by the Cairo example (Table 4.5).

Table 4.5 Changes in transport modal share in Cairo

Motorized modes	Market share (%) 1971	1998
Car and individual taxi	13	26
Underground railway	0	17
Tram	15	2
Bus and minibus	62	19
Shared taxis	0	28
Other (rail, boat)	9	7

Source: Godard 2003, from 1971 and 1998 Household surveys in Cairo

Note: The share of individual modes is significantly in the minority, although it is rising noticeably due to road network development and the rapid increase of flyovers and other heavy infrastructures (bridges over the Nile, urban tunnels, the ring road), most of which are not open to public transport and favour cars. Within public transport, the traditional bus and tram system has been supplanted by microbuses (shared taxis), which are now the most important mode (28 per cent of travel), and by the underground, which has had a remarkable success (17 per cent), even though it so far covers only part of the metropolis transport routes.

So, individual motorization seems to have grown appreciably across the region in the 1990s, perhaps with the exception of Algiers.[24] The progressive liberalization of vehicle imports (new and second-hand vehicles), national programmes encouraging access to cars (Tunisia, Morocco) and the crisis in organized public transport systems, have no doubt contributed to foster car purchases, whether as a first car in a household or as second or third car in wealthier households.

Formal and informal public transport systems

Public transport systems have changed noticeably, and the mid-1980s was a crucial period for these changes.

The poor condition of public *bus and coach* companies offering suburban or intercity connections, and their deteriorating supply compared with growing travel needs, have led most countries (except Tunisia) and large cities to begin opening up to the private sector, although with mixed results (on deregulation in this sector, see Chapter 3). In 2000, bus travel, with either public or private systems, took a minor share of public transport (figures vary between 20 per cent in Casablanca and 1 per cent in Beirut). Only Tunis is an exception, here buses catered for nearly 68 per cent of collective travel in 1998.

Other transport modes, operating on small scales, have taken over from the bus: for example formal and informal *microbuses and shared taxis*, which play an increasingly important role in urban and suburban travel (Table 4.6). Their development is relatively recent, and is both a response to and a sign of the crisis in organized public transport. In Istanbul, the *dolmus*, an informal shared taxi, used to be an important traditional transport mode, but was opposed by the authorities. A new and flexible small-scale form has emerged, known as the 'service', for collecting company employees or schoolchildren by minibus. In Beirut microbuses were rare in 1994, while in 2002 they represented a dynamic transport mode. In Tunis, on the contrary, small-business transport with microbuses (*louages*) only operates for suburban services, while the predominant system is organized and run by larger businesses, the main one being a new public company.

Table 4.6 Share of informal systems in total public transport (at the beginning of the 2000s)

Istanbul	*Dolmus*, services and private minibuses	30–38%
Beirut	Taxi services (shared taxis halting on demand, not fitted with meters, carrying a red plate)	79%
	Microbuses, for 9–15 people, operating like taxi services between Beirut city and the whole metropolitan area	9%
Cairo	Shared taxis (small minibuses with some ten seats), operating on licensed fixed routes allocated by one of the three *Governorships* in Great Cairo	28%
Algiers	Minibuses	50%
Casablanca	Shared taxis and small taxis	23% and 10%

In general, these vehicles are of low-capacity (for 10–15 people), and are sometimes little more than converted vans. Today this public transport mode is expanding rapidly.

Finally, upmarket public transport systems, such as the *underground* or the *tram*, register varying success in the six cities, because of the considerable investments they require (Box 4.6).

Box 4.6 Underground and tramways in six Mediterranean metropolises

Cairo has successfully undertaken an investment programme in the underground. A first regional line opened in 1987, which transports more than 1 million passengers a day, and an urban line opened in 2000, which transports 500,000 passengers per day. The share of the underground has thus become significant in travel in the agglomeration (17 per cent in 1998), with ticket prices that are especially favourable to schoolchildren, students and civil servants. A third underground line is planned. At the same time, the tramway has experienced a decline (2 per cent of public transport travel), because of a lack of investment in modernization.

Istanbul has a variety of rail-based public transport (light-rail metro, tramway, underground, suburban train), with as yet a limited market share (some 6 per cent of all public transport travel). Important investments would be necessary for developing a regional rail service to cover the metropolitan area.

Tunis has made notable progress with its quite extensive light-rail network in the central area, built over a period of 15 years. The success of this flagship investment (25 per cent of all public transport travel) is now counterbalanced by the saturation of the network. A Regional Rail Network project is under consideration; implementing it would re-energize public transport in the city and the metropolitan area.

Algiers has chosen to build an underground and work began nearly 15 years ago. Many setbacks of all kinds (political and economic) have slowed progress, but completion should come about within a few years.

Beirut has not gone down this path, in spite of the 1994 Transport Master Plan proposals (IAURIF).

Casablanca has been discussing its underground project for 20 years but is faced with the financing obstacle, and no start was foreseen in 2003.

A recurrent question on rail and light-rail transport is that of beneficiaries and users: are car users encouraged to switch over? In Tunis the light metro did attract car passengers at the beginning, but this effect gradually diluted. The metro service quality, with overcrowded trains during peak hours, is certainly inadequate to attract and retain car drivers as long as road traffic conditions are not too bad. In the case of Casablanca, with wide income disparities, a major issue relates to whether an underground system would attract both disadvantaged groups and the car-relying middle classes. In an unfavourable financial context, it seems difficult for the underground to satisfy several objectives at the same time: to provide mass transport on radial suburban lines, to maintain a satisfactory cost-recovery rate from revenues, and to attract car users. The underground financing and pricing system both depend to a large extent on the answer to this question.

Improving transport management in urban areas

Southern and northern cities have many difficulties in common:

- for land use planning: continuing urban sprawl with a decline in population densities in central areas;
- for urban transport: increasing car traffic and numbers of cars, decreasing public transport travel, longer trips, especially by car, congestion and traffic jams;
- for local air pollution: increasing ozone pollution, the presence of several other air pollutants (see the section entitled 'Air quality and public health' p223) and high noise levels.

Many of these difficulties are similar, although some are more acute in certain urban areas. Policies will be conditioned by institutional shortcomings, town sizes and their economic specialization. Challenges and room for manoeuvre differ from country to country.

In the southern cities, better linking of public transport systems

In large cities in the south, maybe to a lesser degree in Beirut, minibuses, buses, formal and informal shared taxis provide a significant travel share for urban and suburban areas. The future seems open for the southern cities and countries, although they will need to innovate, since the attractive car-dominated European model will be difficult to reproduce. In addition, the model would lead to the same impasse found in northern cities. Several paths can be followed:

- Making access to the town easier and strengthening public transport before mass car ownership occurs. However, re-conquering the public transport market will have to face the financing issue. In most cities, authorities rarely have the resources (their own revenues through transport-specific local taxes) to maintain cheap fares. State intervention thus plays a decisive role in stopping the downward spiral of reduced passenger numbers, growing deficits and higher fares, and the decline of bus or rail transport.
- Taking advantage of typical informal/small business public transport systems in cities (microbuses, shared taxis and similar modes), which represent an undeniable asset. Their flexibility makes it possible to connect urban areas generally neglected by standard public transport systems, under attractive conditions. Their high occupancy rates make it possible to maintain a relatively low rate of polluting emissions per passenger-kilometre. On the other hand, this advantage is counterbalanced by the age of the vehicle fleet (10 years, sometimes up to 30 years), with serious local air pollution impacts. Major anti-pollution efforts are thus necessary (such as fleet renewal, use of less polluting fuels, and regulation of licences).
- Imagining a town planning system where automobiles gradually adapt to the town rather than the opposite, so that urban motorways or bypass roads do not disfigure cities as it has happened in northern urban areas.

All these issues concern urban management and constitute policy challenges for local and regional authorities as much as for central Governments and international cooperation bodies. Here it can be noted that national and international financing for urban and regional rail networks is allocated mostly to the capitals (political or economic) of countries. Since capitals are of strategic importance, this targeted financing seems logical, but only up to a point, because it occurs at the cost of financing transport needs in towns of secondary and tertiary importance. A better *overall* view of financing issues would contribute to a better balance among the various towns within a country.

In the northern towns, the struggle to reduce pollution

For north Mediterranean urban areas, and particularly those in the four EU countries,[25] the major challenge is to reduce air pollutants as well as their contributions to the greenhouse effect, where the share of urban transport continues to rise.

France and Italy have set up large scale innovative urban transport policies. Urban Travel Plans (PDUs) in France and Urban Traffic Plans (PUTs) in Italy[26] are intended to promote public transport and less-polluting transport modes. Although being old measures, 1982 for the French PDUs and 1986 for the Italian PUTs, they have been relaunched during the 1990s, within the framework of the two countries' commitment to reduce their greenhouse gas emissions (Kyoto Protocol). It is still too early to draw conclusions from these recent experiences, but it is useful to present the main innovations introduced (Box 4.7).

Box 4.7 Urban Travel Plans in French cities

According to the law on air and the rational use of energy, adopted at the end of 1996, all French towns with more than 100,000 inhabitants are legally required to set up urban travel plans (*Plans de déplacements urbains* – PDU) for passengers and freight. The plans have compulsory objectives and content: reducing car traffic, developing public transport and less polluting and economic travel modes, and re-assigning the road network for use by different travel modes. PDUs are developed by the urban transport authorities, within the urban transport perimeters of a town. By mid-2003, out of the 72 cities with more than 100,000 inhabitants, 43 had an approved PDU.

The law stipulates that PDUs must plan to reduce **car traffic**. Only the Ile-de-France PDU is targeting a 3 per cent car travel reduction by 2005; the other cities aim at reducing a few points in car travel, generally by 2010. This will not necessarily lead to car traffic reduction, due to the ever longer distances travelled and increasing car purchases in suburban households. Cities with overall coherent policies over time (particularly Grenoble, Nantes and Strasbourg) have managed to contain the continuous increase in the share of private cars in motorized transport. The Mediterranean cities have not yet achieved such progress.

Travel plans envisage a gradual 2–6 per cent increase in **public transport share** by 2010. Trams are often preferred (Strasbourg, Nantes, Grenoble, Bordeaux, Montpellier, soon to be followed by Nice, Paris, etc.). Trams have technical advan-

tages compared with buses (high flow in good conditions) and economic advantages compared with the underground (cost ten times less per km). Strategies to improve bus networks include bus lanes and priority at traffic lights. Other measures are designed to improve their attractiveness: accurate timetables, frequent services and integrated fares. 'Green' transport (bicycles and cycle lanes) is also encouraged. All these measures mainly concern densely populated areas, while they occasionally also enhance suburban rail systems.

Parking control is an important measure in PDUs to curtail car invasion in town centres. Measures concern overall supply and differentiated pricing, so as to encourage residents to leave their car in the car park, penalize commuters who use the car for going to work, and facilitate short-stay car parks for shopping. In addition, park-and-ride systems are set up along the public transport lines.

As for the **road network**, urban motorways should generally be restricted. Most PDUs are planning to create or complete bypass roads, designed to take transit traffic away from central areas. However, opposite effects may occur: although designed to reduce traffic, town bypassing actually sucks in cars, and new ring roads are shortly afterwards saturated during rush hours without any traffic reduction. To counterbalance new road supply, a third of the PDUs envisage road reclassification (Grenoble, Lyon, Marseille, Nantes, etc.), where roads are shared with alternative transport modes on roads going into the town. Other cities are considering underground tunnels, which would in fact encourage urban traffic.

Finally, the **search for coherence** between transport planning and town planning will require further efforts. According to the 2000 law on solidarity and urban renewal (SRU), town-planning measures should better integrate traffic issues, by defining areas that can only be developed on condition that public transport is provided. All PDUs were supposed to comply with the SRU law by the end of 2003.

Source: Environnement Magazine, October 2002, and CERTU/GART (2002) Bilan des PDU de 1996 à 2001 (www.certu.fr)

At least two lessons can be drawn from the French urban travel plans.

- Although intended to reduce car traffic, the great majority of plans only propose modal shifts. The relative reduction of car travel by such shifts is overwhelmed by increasing car numbers and distances travelled, since overall traffic depends first and foremost on growing numbers of households and car owners. So, the key problem is not modal shifts but car traffic reduction.
- Most measures in favour of public transport apply to dense areas, where modal shifts can be encouraged because public transport in such areas is most profitable. But much traffic comes from the outskirts, where the population is growing. Therefore, it is by taking action on the longer commuting distances at the urban region level[27] that the struggle against pollution and congestion will bear fruit.

Conclusions of more extensive work carried out in the framework of the European Conference of Ministers of Transport (ECMT) indicate the same direction. Currently, measures taken to combat central congestion seem to be relatively effective nearly everywhere. In contrast, traffic outside town centres is getting worse. Building new underground or surface infrastructures, with or without tolls, is not a suitable response to traffic congestion in urban areas. It is counterproductive since the problem of traffic reduction is evaded.[28]

Towards more sustainable urban transport systems in the north and the south

The challenge of more sustainable urban transport systems is thus linked to efforts to contain traffic in the periphery of cities, in suburban and even intercity connections. This will be a big challenge for towns in the years to come, in order to reduce negative impacts on citizens' life and on the planet's health. At the same time, by taking action in areas with poor public transport services, transport can become a tool for preventing segregation and some areas of towns becoming excluded.

In the search for more sustainable transport systems, *four lines of action* are here emphasized:

1 *Conceiving the transport system as a whole*, at the level of the enlarged urban and metropolitan areas (as Naples is trying to do, Box 4.8) is the first path, which raises matters of coherent public action and of defining transport authority.

Box 4.8 Integrated urban and metropolitan transport in Naples

In the early 1990s public transport in Naples (1 million inhabitants) provided a very mediocre service. The city centre suffered from weak accessibility due to gaps in the transport infrastructure interconnectivity for serving the entire urban area (3 million people) and to the 'fragmented' public transport management among six operating companies run by the municipality, the province, the region, and the central state (railways).

In Naples, daily travel between the city centre and the suburbs reflects important sprawl: for each person leaving the town, more than six enter. Most journeys are for work purposes (advanced tertiary and universities). Over the years private car travel has become predominant. Moreover, taking advantage of the weak public transport system, a parallel and illegal network has grown, using mini-vans for passenger transport.

This network was controlled by the local mafia, made possible through the lack of a regulating licences system and of effective agreements between local governments.

In 1993 the new municipal team (first municipal direct-voting elections in Italy) set up, among other things, a coordinated and integrated physical and transport plan in order to combat downtown ghetto forming. Consistency between the two plans was ensured in the new *Piano Regolatore Generale* (GRP, similar to a master plan) and in defining a public transport policy at the *municipal level* first, and later at the *metropolitan level* through involvement of the province of Naples (3 million inhabitants) and the Campania region (5.6 million people).

The municipal transport plan emphasized setting up a network structure and enhancing already-existing infrastructures rather than building new unconnected systems. The public transport networking in Naples itself and in part of the metropolitan area took place through institutional innovation, that is by founding the *Napolipass* consortium in 1995, in which the six operating enterprises are associated. The various transport tickets of the different companies involved were integrated into a single ticket (*Giranapoli*) issued and distributed by the consortium. Public transport integration gradually covered the outskirts of the Naples municipality. Revenues from the integrated ticket system clearly grew (50 million euros in 1999 against 27 million in 1995).

Later on, other municipalities drew up agreements with the consortium for special-fare subscriptions, so that 43 municipalities of the metropolitan area were gradually covered. Finally, an experimental single-fare system (the *Unico* ticket) was implemented in 2000 as an initiative of the Campania region for the entire metropolitan area, that is, the province of Naples and parts of the Caserta and Salerno provinces.

For Naples, the integration of the six operating companies into the consortium proved to be a stable system, more than the temporal agreement formula (fairly common in other European cities), which would have added uncertainties to an already weak public transport system. The innovation made it possible to maintain regular customers, attract new ones and combat the illegal parallel mini-van transport system.

Source: Floridea Di Ciommo. In: Jouve, 2003

2 I*ntegrating transport planning into town planning* in order to facilitate access to the town and to contain suburban developments is a second line of action, implying one or more of the following measures: renovating town centres and inner-city areas to reverse the trend of downtown depopulation, and regenerating old fabrics and port or industrial wasteland sites; limiting or forbidding the development of large peripheral shopping centres, which generate long individual journeys and many polluting emissions, as Barcelona and several French towns have undertaken to do; locating activities that generate travel according to accessibility to public or private transport, which helps to reduce car dependence.

3 E*xtending the public transport range*, so as to include inner and outer suburbs, and residential areas far out in the agglomeration. Serious and targeted efforts to provide these areas with good functioning public transport would improve accessibility to the town and reduce pollution due to suburban motorized travel. This touches on the problem of financing mass public transport in unprofitable areas.

4 Finally, *the search for solutions to financing public transport* faces the difficulty of reconciling financing needs with the price the user can pay. Public service obligations, such as offering reduced fares and other welfare advantages, need to be carefully considered so that public transport bodies are not undermined. Although there is no single model to be followed, the ECMT emphasizes the advantage of integrated approaches to urban travel, as they may hold the key to financing public transport. In particular: (i) the allocation of resources from other elements of the system such as road taxes, integrated pricing of public transport, parking fees, environmental protection funds; (ii) the use of incentive and dissuading economic measures, through direct and indirect taxation (for example on fuel and on firms). 'Green' taxation measures on fuel and city tolls have so far been little explored but are interesting ways to encourage the use of public transport and to respond to the crisis of financing public transport (see Chapter 3).

For all these measures to bear fruit, at least two conditions must be met. First, *a flexible national framework for action* needs to be set up that favours the integration of town planning and transport planning, so exploiting synergies between national objectives for transport, environment and health, and objectives at the regional and local levels. Second, *sectoral policies need to be linked*, since local and regional policies intended to stem congestion and urban sprawl risk being ineffective when national policies on housing and real estate, for example, continue to encourage the building of houses or businesses on the outskirts of towns.

Urban regeneration and renewal: An opportunity for Mediterranean cities?

For two decades the globalization of the economy has encouraged metropolises and big cities in the Mediterranean, and elsewhere, to take up positions in international competition and attract growing investment flows, mainly in the tertiary sector. Faced with the

risks of marginalization in the competition or poorly managed metropolitan development, cities are tending more and more towards strategic planning of their development. Despite highly varied institutional, economic and cultural local contexts, 'urban projects' are being reproduced from city to city, often linked to a major event, such as the Olympic Games in Barcelona or Athens, Seville's Universal Exposition, Columbus Celebrations in Genoa, the Mediterranean Games in Tunis or the Jubilee in Rome. Such events are used to transform the city and change its image. The strategies implemented aim to link the short-lived with the permanent.[29]

Beyond the short-term, urban policies are undergoing real changes in concerns and priorities. In the European Mediterranean countries, town planning oriented to ever more expansion towards the outside is being replaced by the will to slow suburban sprawl and rebuild the city in the city. In the south and east, cities are already facing the dual task of recovering important urban heritage sites likely to host part of the city's growth, thus limiting land and real estate pressures on suburban areas.

U*rban regeneration* policies have been developed as a response to the effects of economic and social change, to processes of degradation or abandonment affecting the urban fabric, the level of activities and the social functioning of some quarters. However, the objectives are more economic than social;[30] transforming the city's economic bases, introducing new activities (such as urban tourism and 'new economy'), revitalizing declining quarters and areas, creating jobs and providing the municipal budget with new sources of income. Regeneration experiences aimed at reconverting degraded industrial or dockland areas are being multiplied around the Mediterranean (Euroméditerranée in Marseilles, restoring industrial wastelands in Naples, Taparura in Sfax). Other examples of urban innovation projects are the seafront in Genoa, and the Balat and Fener quarters in Istanbul.

The *four examples* presented in Box 4.9 (Barcelona, Naples, Tunis and Aleppo) do not, of course, cover the whole range and complexity of operations in cities, scheduled for decades, but illustrate the different, sometimes combined, issues at the basis of urban metamorphoses. Examples include: regenerating obsolete industrial or dockland areas, renewing neighbourhoods that show various signs of vulnerability, and enhancing the historic and cultural heritage. With varied levels of intervention, the four examples show the opportunities taken or created by cities, the determination of local authorities, and the support or initiatives at higher levels (the state or regions), all in order to shift the development of a city and change its image.

Box 4.9 Urban regeneration and renewal in Barcelona, Naples, Tunis and Aleppo

Since the 1980s, **Barcelona** has undergone constant urban redevelopment, and has seen the renovation of obsolete functions to the benefit of emerging activities, the restoration of public spaces and the creation of new central areas. The founding in 1974 of the Barcelona Metropolitan Corporation (3 million people in 28 municipalities, including Barcelona) and the approval of the Metropolitan Master Plan in 1976 marked the beginning of regeneration and urban policies that are still succeeding one another. The transformations between 1986 and 1992 in preparation for the Olympic Games were used to stimulate a broad urban policy on a metropolis-wide scale, aiming both at long-term urban development and the affirmation of Barcelona as the capital of a European region. The major projects focused on improving and extending infrastructures (rail equipment, drainage and wastewater disposal networks, sub-surface networks, ring roads and traffic distributors), renovating the old town, improving the working-class suburbs, and *rehabilitating the seafront*, probably the city's most symbolic project. A special plan for the seafront made it possible to change the land use of the space occupied by derelict industrial facilities, re-order the infrastructures in the area (such as beaches, railways, the coastal road, sewers), ensure connectivity with the neighbouring areas, and integrate the quarter into the urban system. Mobilizing the financial resources for infrastructures and the Olympic village was handled by a private municipal company, and later by the Spanish State and the Barcelona Municipality together. Overall investment amounted to 503 million euros for the public sector and 613 million euros for the private sector. Three successive Strategic Plans have been implemented since 1988, mobilizing nearly 200 institutions to cope with changing conditions and to guarantee urban project coherence over time.

The continuing redevelopment of Barcelona constitutes a remarkable example of urban, economic and social rehabilitation of historic quarters, regeneration of vast wasteland areas, combining land uses, and channelling investments to new central zones. Barcelona's population has identified itself with the city's image and supported the process.

Urban renewal in **Naples** is mainly on the municipal scale. As a popular city with 1 million people, Naples has long suffered from an especially negative image, due to urban disorder, insecurity, criminality and trafficking. The urban–port regeneration policies carried out since 1993 aim at reversing this image, by operations relating to reviving the city centre, and also to a more global urban project seeking to replace the crisis-hit industrial and docklands with new developments founded on local heritage, cultural and tourism resources of the city and the Campania region. Changes are carried out within a rigorous budgetary context. The 1999 *Piano Regolatore Generale*, diverging from previous plans, envisaged the restructuring of the city by dividing it into sections, so as to act modestly but immediately on each section. Initial actions

were launched when preparing the G-7 Summit in 1994 and benefited from European financing. The main achievements in the *historic centre* have been the restoration and re-opening of many public and religious buildings, revitalizing public spaces and facilitating their access through pedestrian-only-areas. Less progress was made in the housing sector, the vast degradation of which would need exceptionally high investment, not affordable by the city in the present context. The *interface between the city and the port* (5km) has been considered within the broader frame of the city/coastline relationship, made possible by a 1994 reform of Italian legislation on harbours, which mandates port authorities to set out a development scheme, in concert with the city authorities. In Naples, this joint effort was made possible in the western dock area where the city and the port authorities were both motivated to re-boost the tourism sector, which had been in sharp decline since the 1980s. Recovering the artistic and cultural potential has enabled Naples to become once again a valued tourist destination (cruises and ferry connections with the islands). In contrast, in the eastern dock area, opening up to the sea would require a relocation of oil industry activities, so that 200 hectares in a very sensitive sector could be freed up (poverty, degraded urban fabric, insecurity and urban ghettos). For the time being proposals are in conflict: the City authorities are willing to put in a 160 hectare park and a high-tech activity zone, while the Port authority would prefer a free commercial zone and a container terminal.

The Naples case illustrates the possible affirmation of a metropolitan function within a framework of budgetary constraint. By promoting a return to normal city life, instead of a spectacular American-style waterfront, Naples has prefered to enhance the existing and the forgotten, as well as providing basic urban facilities.

Tunis is undergoing a complete metamorphosis. The city is surrounded by two lakes and two sebkhas, for which four important development projects have been started, which are at various stages of development. The point of departure for all four projects is to restore a degraded ecosystem before starting any urban development. Located in the heart of the capital, the *lagoon* is undergoing a dual project for developing its banks: the northern lake has been entrusted to a mixed Tunisian-Saudi company, the southern to a government company. Both companies are in charge of cleaning up the lakes and developing the shores (some 2500 hectares of land after completion). In both cases the intervention is on virgin land and seeks a high-quality multifunctional urban fabric as well as efficient public services. Given the investments available for the embankment and for services, the focus is on luxury housing, although some social housing is planned for the banks of the southern lake. Land is state-owned, work began in the 1990s and the banks will be urbanized by 2030–2050. The two *sebkhas* are fragile areas where the problems of disturbed ecosystems and uncontrolled urbanization are accumulating. The Sijoumi sebkha project, at the southwest of the medina, was initiated by UNDP in 1994, with the Tunis Municipality supervising the work. In the Ariana sebkha, located at the north of the Tunis agglomeration, its northern shores have been taken over by tourism and its southern and eastern banks by illegal urbanization. The project is part of a rehabilitation programme by the Agency for coastal protection and development (APAL). A luxury residential area is foreseen around a planned marina, as part of a plan to open the sebkha to the sea. With the financial package for the projects not yet finalized, the sebkhas' future is still open.

The Tunis case shows a case of renewed urban planning, where several concerns are present in the reasoning and the actions of the authorities: a restoration of the link between the city and its lakes, which used to be repellent; the environmental and sustainable development themes that can attract international funds; and 'nature in the city' as an urban marketing argument intended for the well-off classes.

Aleppo, Syria's second biggest city, has a population of about 2.7 million. Its 11th century citadel (400ha and 120,000 residents), a UNESCO World Heritage site, is undergoing rehabilitation of its specific habitat (houses with interior courtyards), which had evolved little during the Ottoman period. The high heritage value of this urban fabric has not always been taken into account. For example, the 1954 Master Plan for the city intended to build roads through the old town and was implemented in some 20 per cent of the area (destroyed habitats, parking-lot construction, displacement of residents, etc.) until 1978, when an important local movement lobbied the national government to protect the site. With UNESCO's intervention in the early 1980s, the Master Plan for the old town was set aside and a project for *preservation and rehabilitation* initiated. Implementation began in 1992 with technical and financial support from the German government and the Arab Fund for Economic and Social Development. A new structure (the Old City Directorate, directly dependent on Aleppo's mayor) is in charge of managing and developing the area, mobilizing local and international institutions, and seeking new donors. The old town's development scheme, approved in 2001, aims to ensure greater harmonization with the whole agglomeration and moving the developmental dynamics towards rehabilitating the old town. Main priority actions are the rehabilitation of the sewage and water supply systems, renovation of the fronts of houses and of buildings with heritage value, a traffic scheme, and an advantageous loan system for facilitating some urgent housing rehabilitation.

In 2004, with a new Master Plan, Aleppo is seeking to create investment-attracting conditions, encourage residents to get involved in stable economic activities, define activities that might be moved out of the old town, and develop new tourism-related opportunities, thus choosing to combine heritage preservation with urban development.

Source: de Forn, 2003; Bertoncello & Girard, 2001; Barthel, 2003; Qudsi, 2003

Despite the specificities unique to each city and the very different political cultures, some common elements of the four examples can be considered. First, as regards the forms of action, partnerships are vital, both public–private and public–public forms of agreement, but the initiatives remain public, that is 'hyperactive' municipalities in Barcelona and Naples, after a change in political majority, a state in partnership in Tunis, local mobilization and support from international cooperation in Aleppo. Scales of collective action become ever more interwoven, from the local, regional and national levels to the European or international levels.

In the four cases considered in Box 4.9, the modes of public action are no longer founded only on regulatory measures. Urban planning and regulation, and their use, has changed to the benefit of *urban projects* guided by a long-term vision of the city. The urban project approach is taking over from the coercive urban planning approach. More generally, the urban project sometimes leads to a new tool, the Strategic Plan, very widely used in Spanish cities for transforming entire urban areas. The formula has not had the same success in France and Italy, although some master plans or regulatory schemes do approach metropolitan development in terms of 'strategies'. As for the contents of the transformations, a certain, not always resolved, tension can be felt between urban projects aimed at accessing the globalized economy on the one hand, and city-dwellers demands for living space, on the other.

From a spatial point of view, regeneration becomes inseparable from *transport network reform* in order to ensure access to the enhanced areas and the spatial coherence of the urban project. This means articulating regeneration operations at the agglomeration scale or, better still, the whole metropolitan area scale, since the framework of regeneration projects is based on transport infrastructures and structuring facilities.

Finally, in Mediterranean cities, *making the economy more dynamic and social revitalization* are closely linked with *enhancing the historic and cultural heritage*. This means that the dynamics of the quarters concerned should be taken into account when combining new functions, bearing two risks in mind. The first is the risk of a 'conservationist' approach, which considers cities as unchanging entities (for example measures to safeguard ageless old towns or medinas); the other is the risk of 'developmental' approaches, which build new urban images from enhanced heritage assets that no longer have any meaning for residents (for example some urban–port tourist developments that follow imported models).[31] In the examples given, these risks seem to have been avoided. However, a systematic resort to the higher tertiary sector, to commercial, leisure and cultural activities, to ephemeral events or to luxury real estate operations, risk producing standardization, a commonplace production of architecture and public spaces, possibly resulting sooner or later in a loss of the particular character of Mediterranean cities.

Urban environment: Air, water, waste

Contrary to some current statements, cities are not the enemies of the environment, especially not in the Mediterranean. Their advantages have always been derived from economies of scale, higher productivity, and rationalization of services. In addition, they have a stock of resources and flows (air, water, soil, waste, etc.), which can a priori be conveniently managed, both quantitatively and qualitatively. But cities also have ever greater 'global' responsibilities, such as those related to the greenhouse effect (suburban and urban transport) and to water resources. Significant efforts are needed to decrease air pollution, improve access to water and reduce wastage, and slow the alarming rise in household waste.

Air quality and public health

Knowledge of the harmful effects of the main air pollutants on health is steadily improving, although there remain sizeable gaps. Outdoor air pollution is characterized by the presence of five main pollutants, all responsible for serious health effects: carbon monoxide (CO), nitrogen oxides (NO_x), fine particles and dusts (PM), sulphur dioxide (SO_2) and volatile organic compounds (VOC_s). In addition, tropospheric ozone (O_3) is formed from the emissions of nitrogen oxides and volatile organic compounds under the influence of light. In the Mediterranean, such ground-level ozone is the main secondary pollutant, likely to create or aggravate respiratory diseases. It irritates the eyes, throat and bronchial tubes, increases inflammatory reactions in the bronchus, causes breathing difficulties for people with respiratory sensitivities, and aggravates asthma.

Topography, climate and the wind regime play a very important role in pollutant dispersion and concentration in the atmosphere. In the Mediterranean, where calm anti-cyclonic weather is frequent, town centres give rise to ascending warm air masses that are reflected back to the ground when they come into contact with colder air masses from above. During summer, such temperature inversions of atmospheric layers generate a quasi-permanent pollution 'dome' in many Mediterranean towns. This, for instance, is the case in Athens and its *nefos*, Cairo, Genoa, Barcelona and Marseille-Berre. In addition, small particles are transported over long distances with the often short, erratic and unpredictable Mediterranean winds (land and sea winds).

Air quality monitoring networks on the *northern shore* (essentially in Spain, France, Italy, Slovenia and Greece) assess air quality changes, pollutant by pollutant, in

large cities every year. Regularly published statistics show decreasing concentrations of some pollutants over a decade, especially for SO_2 and NO_2. For example, between 1991 and 1999, sulphur dioxide concentration (SO_2) fell in Marseille from 23µg/m³ (micro-grams per cubic metre) to 12µg/m³, in Montpellier from 13 to 6, while in Athens the reduction was nearly 20 per cent between 1988 and 1997. For nitrogen dioxide (NO_2), concentrations remain rather stable: in Marseille 39 µg/m³ in 1996, 38 in 1999; in Montpellier 39 in 1995, 36 in 1998; in Athens, a 3 per cent reduction between 1988 and 1997 in spite of traffic reduction measures.

More generally, over two decades European countries have gradually set up policies to reduce polluting emissions from different sources (heating, conventional power stations, some industrial processes, etc.), while motorized transport emerged as a major source of urban air pollution. Today, motorized traffic accounts for 27 per cent of the fine particle emissions (PM10) and 52 per cent of ozone precursor gases (in particular NO_x, VOC and CO). Despite a 30 per cent reduction in PM10 emissions between 1990 and 1998, 40 per cent of the European population is exposed to dangerous levels of this pollutant.[32] The danger of small particles to health is in inverse proportion to their size: those with a diameter of less than10µm (thousandth of a millimetre) deposit in the trachea and bronchus, and may enter the blood.

In the *south and east*, concentrations of pollutants are occasionally measured on a piecemeal basis. They have remained stable for 20 years, sometimes above the recommended norms. For instance, the SO_2 concentration in central Cairo has varied for 20 years between 100 and 300µg/m³ depending on the season and the measuring points. In Ben Arous (Tunisia) the average concentration was around 100µg/m³ in the 1998–2001 period (the limit-value recommended by WHO is 150µg/m³).

Fine particle emissions are becoming a major concern. In Cairo, 2001 results from the air quality monitoring system showed PM10 concentrations in the central business area that, nearly every day, were 5–10 times higher than the standard threshold value. Main identified sources are smoke from diesel buses, open-air incineration of waste, and industry.[33]

Although air quality monitoring networks are only slowly being put in place in southern cities, progress has been made in measurements and data analysis for the existing monitoring stations. However, the information published hardly reflects the linkages between the environment and health, such as the exposure of the most vulnerable groups to pollution. Furthermore, data are not presented in a way that is easily understood by decision-makers, which hampers the adoption of necessary policy actions. Hence the growing interest in *epidemiological studies*, carried out jointly by environmental monitoring institutions and public health institutions (Box 4.10). These studies are still rare in Mediterranean towns.

Box 4.10 Air and health, developments in epidemiological approaches

The study of the link between air quality and human health has for a long time been relatively simple. When massive mortality episodes are linked to air pollution in towns, peaks in death curves come a few days after the peaks in air pollution. Until the 1970s, epidemiology restricted itself to considering only the health effects of short-time exposure to very high doses of pollutants. With the adoption of preventive measures, air quality has improved in many towns, and urban populations are these days exposed to lower air pollution levels than before, but over longer periods.

The first long-term study in Europe[34] carried out in the Netherlands, found a correlation between mortality and the distance between the place of residence and a major traffic artery. The risk of dying from cardiopulmonary disease is twice as high for people living within 100 metres of a motorway or 50 metres of a main road. This result shows that the use of average rates of exposure can be misleading, because the health impact of air pollution is then minimized. Approaches have changed towards monitoring the air quality that a population breathes in daily over long periods.

Epidemiological studies on the health impacts of air pollution are now being carried out in 32 European cities under the APHEIS programme for epidemiological monitoring set up in 2000, in which Valencia, Seville, Barcelona, Marseille, Rome, Athens and Tel-Aviv participate. The latest study assessed short- and long-term exposure to PM10 as well as acute and chronic diseases in 19 towns, with PM10 pollution levels between 14 and 73µg/m³ that entail health risks.[35] The study showed that even very slight reductions in particulate pollution can produce beneficial effects on public health: 5500 annual deaths due to long exposure to PM10s could be avoided by reducing PM10 concentrations by 5µg/m³ in all the studied towns, even those with low pollution levels. And 15 per cent of these premature deaths (832 deaths) could be avoided by reducing short-term exposure to PM10 by 5µg/m³. These results amply justify the adoption of preventive measures, even in cities with moderate pollution levels.

Surveys with a comparable scope do not yet exist in the southern and eastern Mediterranean countries. However, the results of the eco-epidemiological study conducted in Casablanca over 18 months in 1998–1999, are worthy of mention (Box 4.11).

Box 4.11 Air pollution and health in Casablanca

Given Casablanca's urban, industrial and harbour context and the high proportion of diesel vehicles, the monitoring station set up for this study assessed the following pollution indicators: sulphur dioxide, nitrogen dioxide and especially air-suspended fine particles (the black smoke type). Pollutants were monitored for a year, to take seasonal variations into account.

A noticeable rise in ill-health events (mortality, consultations for conjunctivitis among children aged over five and adults, consultations for respiratory infections among under five-year-old children) was observed when pollution rose from the base level (9µg/m^3 of black smoke) to a medium level (22µg/m^3) and to a high level (87µg/m^3). The study does, however, note that black smoke is just one air pollution indicator and cannot be considered as solely responsible for the health effects revealed. A second study was then carried out in Mohammedia, an industrial centre also subject to car pollution. Here the accent was placed on a particularly sensitive population: asthmatic children.

Source: Morocco. Secrétariat d'Etat chargé de l'environnement & Ministère de la Santé. Étude Casa-AirPol. Rapport final. Rabat, 2000

This type of survey is of undeniable interest. In the Mediterranean region, such epidemiological surveys should be carried out systematically and on a large scale, by increasing the number of monitoring stations in urban regions and in several agglomerations.

Improving air quality and public health

In European cities, improvements to engines, such as catalytic converters for petrol vehicles, and fuel switches (use of natural gas or liquefied petroleum gas – LPG instead of petrol) have, during the past ten years, led to important reductions in motor vehicle emissions. In contrast, emissions of CO_2, the main greenhouse gas, continue to increase (see Chapter 3 for past CO_2 trends and projections to 2025). Emissions of fine dust and nitrogen oxides are not decreasing as quickly as would be necessary to reduce public health risks.

In southern cities, traffic growth, the age of vehicles and the high proportion of diesel engines (notably buses) will continue to degrade air quality in towns. Diesel vehicles release less carbon monoxide and hydrocarbons, but three times more nitrogen oxides (NO_x) than a catalysed petrol vehicle, and 30 times more particles than petrol vehicles.[36]

In future, an explosive growth of motorized traffic, both in the north and in the south, will continue to aggravate air pollution in urban areas *locally*, and increase CO_2 emissions *globally*, in spite of technological innovations introduced by car manufacturers that cannot compensate for the rising traffic. Thus, one major challenge is to continue reducing NO_x and PMs released by light and heavy diesel vehicles. The progressive introduction of high-efficiency particle filters should help to bring down the level of PM emissions, including the smallest particles.

However, since nothing seems to halt the expansion of motorized transport, considerable efforts will also be needed in the next 20–30 years to contain passenger and freight traffic. In addition to the already-mentioned measures on linking urban transport and town planning, and introducing particle filters for diesel engines, efforts will be required in the following fields:

- limiting infrastructure development (if we really want to protect human life); the more roads, motorways and tunnels are built, the more polluting gas emissions are present;
- measures for limiting or forbidding private car use (pedestrian areas, urban toll roads), mainly in central town areas;
- sustained development of non-polluting public transport (light-rail, rail and other clean modes) and improved servicing of the different parts of an urban area or region;
- halting the open-air incineration of waste (see further below).

Does unequal access to water lead to resource wastage?

For this particularly precious resource in the Mediterranean region, cities are not the greatest water consumers: in terms of total consumption, their share is 3.7 per cent, while that of agriculture (with irrigation) is 95 per cent for the whole Mediterranean basin.[37] Nevertheless, taking cities' increasing water demands into account, important efforts are needed in towns, especially in the SEMC. For further details, reference is made to Chapter 1, and some challenges are briefly recalled here:

- Reducing drinking water consumption through awareness and education programmes, pricing policies (beginning with the installation of water meters), sharing water prices, and combating leakages in urban networks that sometimes exceed 30 per cent.
- Responding to urban sprawl (even limiting it) by installing basic infrastructures for drinking water and sewage, and by using primary or low-cost water treatment techniques, suited to the realities and capacities of southern and eastern countries.
- Reducing geographical and social inequalities in water provision, taking poor neighbourhoods and populations into account in pricing policies.

The last point will be underlined here. The issue of *unequal access to water in cities* is linked to the objective of '*reducing by half, by* 2015, *the proportion of people without access to safe drinking water or not having the means to obtain it*',

adopted in the Millennium Declaration of the United Nations General Assembly (2000), and reaffirmed in the Johannesburg Action Plan in 2002.

According to available statistical data on access to drinking water in the Mediterranean, in 2002 some 30 million (urban and rural) people had no access to safe water, a third of whom were living in Turkey and another third in the Maghreb countries. In the southern and eastern countries, official rates of urban servicing (about 95 per cent of the urban population) do not reflect the connection difficulties of many shelters in disorganized spontaneous urban neighbourhoods. These often illegal urban developments result in habitat types with multiple status, a variation that is also echoed in the access-to-water conditions. Some neighbourhoods are entirely connected to the network and others completely marginalized. Without first resolving the issue of unregulated housing, the demand from many users cannot be satisfied. Many neighbourhoods, both in town centres and on the outskirts, are thus dependent on standpipes or water sold by traders.

Since the 1980s, and especially during the World Decade for Water and Sanitation, important efforts have been made for individually piped water supply, but these policies mainly focused on the 'legal city'. The integration of informal quarters into the official city through drinking water and sewage networks has encountered enormous difficulties. Individual user-paid connections can hardly be realized in informal housing areas and shanty towns, since water distributors are not authorized to provide individual connections unless the requesting households comply with town planning regulations. The result is an accentuated fragmentation of urban areas in access to water, as illustrated by the case of Rabat-Sale (Box 4.12).

Box 4.12 Access to water in different quarters in Rabat-Salé, Morocco

The Rabat-Salé urban area is regularly supplied with water, and is relatively less often faced with water scarcity than other towns situated further south or further inland in Morocco. Within the agglomeration, contrasts exist within the central area (medinas, the old colonial town), between the city centre and the outlying settlements (high-quality or cheaper housing estates, as well as unregulated housing and shanty towns), and between the urban and the rural areas. This spatially heterogeneous and discontinuous urban system is unevenly serviced by basic infrastructures, such as road, water and sewage networks.

In many legal and regularized neighbourhoods, home to a poorer population with very irregular incomes, the practice has developed of sharing a meter among several households in the same building; a practice that is forbidden but hard to control. The bill is shared by the households, however, not in proportion to their individual consumption, but in equal shares. The result is that despite progressive water pricing, the water bill weighs more heavily on the budget of low-income households than on wealthier social classes. After all, the total volume consumed per water meter exceeds the 24m^3 of the first consumption block, even though the consumption per household is actually much lower than 24m^3.

In the illegal neighbourhoods, with either permanent or temporary constructions, water standpipes play an essential role. These are drinking water fountains situated in the medina, or stand-alone taps. Such forms of collective water provision are common in Salé and in fringe areas. However, despite their importance, standpipes tend to be closed down for economic and financial reasons, thus accentuating the fragmentation between Rabat and Salé, between the centre and the suburbs, and at the very heart of some central quarters where slums persist. Standpipes represent 3 per cent of the total consumption of the Rabat-Salé *wilaya* (in the 1990s), but are considered unhealthy and wasteful, and are held responsible for much of the budget deficit of local authorities.

Source: El Mansouri, 2001

The case of Rabat-Salé is not unique; a similar fragmentation can be found in Istanbul, Izmir, Damascus, Casablanca, and many other big cities. The situation becomes even more difficult in cities with serious overall water scarcity problems, such as Algiers, where competition for access to water is fierce (Box 4.13).

Box 4.13 Competition for access to water in Algiers

As in all large Algerian cities, Algiers suffers from a lack of water. In the 1980s a rationing programme was set up and has since become more drastic: water is distributed in time slots with an average duration of six hours a day; distribution generally occurs at night; and some quarters receive water only once in three days, sometimes even one day in six.

According to field surveys, the Algiers urban area can be split into a western zone where the wealthier people live (continuous water delivery, from 100 to 200–300l/cap/day), poorer quarters in the east where the water situation rapidly deteriorates (rationed distribution, from 80 to 100l/cap/day), and the city's central and northern zones, where the most deprived population lives receiving an extremely low allocation (less than 80l/cap/day). Finally, in the illegal quarters (that cannot be legally supplied) the situation is really critical. Slums are supplied by water trucks hired by the municipalities; households located on the edge of illegal quarters that can afford it, hook up illicitly to the main distribution pipes that provide a permanent water supply to military barracks and hospitals; and other households purchase water from private resellers at prices of sometimes ten times those charged by the official water-distribution company. The geography of water consumption by households thus becomes an indicator of the inequalities in the standard of living.

Source: Chikr Saïdi, 2001

These two examples illustrate how official rates for urban drinking water servicing hardly reflect realities on the ground in the SEMC. Moreover, changes in public water services, including delegating management to the private sector, have not given full attention to the *right to water*. Access conditions have become increasingly dependent on income levels. In fact the access-to-water issue in urban areas is not limited to the supply-and-demand equation, but relates to strategies driven by the key actors, where the objective of people's well-being may conflict with the economic and financial objectives.

Two lessons can be drawn from a sustainable development point of view:

1 There is a discrepancy between water policy and housing policy, whereas water connections should be installed before housing, or at least simultaneously. The two policies are envisaged solely from a sectoral and technical angle, without being steered jointly, thus making urban management very difficult and the action of water institutions much more complicated.

2 Water pricing seems unsuited to the functional and human dimensions of real towns. The question of pricing brings up the question of the role of public authorities and societal choice, since combating inequality requires deliberate action from public bodies, even when the management of the service is delegated. Table 4.7 presents a range of concrete measures for ensuring access to water, some of which are practised in Mediterranean towns and countries.

Household waste multiplied by three?

Since the mid-1970s, urban waste has become a concern of utmost importance in urban management in the Mediterranean countries. It mainly concerns waste produced by households, collected and treated by municipalities or by private operators on their behalf.

A sometimes explosive increase in waste

Volumes of waste have doubled or tripled in 30 years (Figure 4.10). On the northern shore, the very strong growth in waste volumes reflects the excesses of

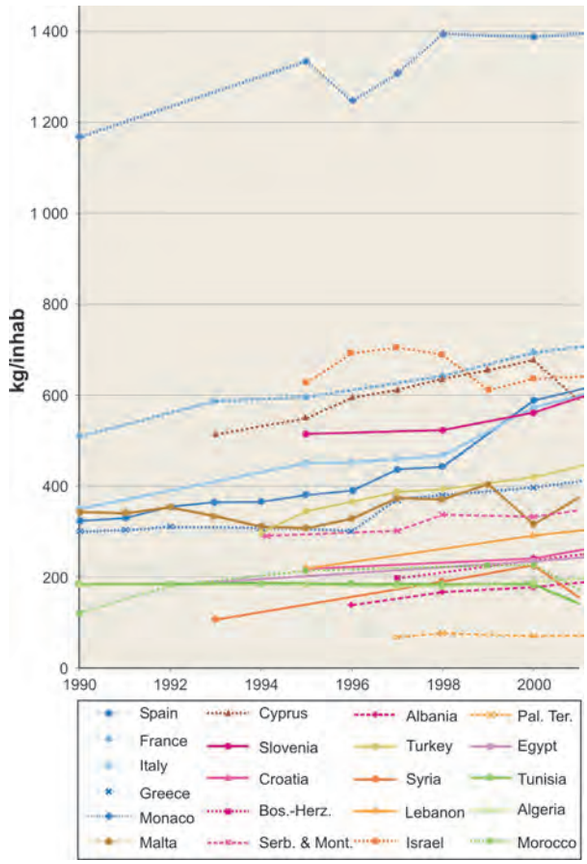
Table 4.7 Examples of solidarity measures for ensuring access to drinking water

Measures	Examples
Water free of charge	Collective water provision: maintaining drinking fountains and standpipes (Morocco), installing more standpipes or other watering places
	Water piped to dwellings: supply of a minimum free volume per household or per inhabitant, the remaining consumption being paid at full price (in Athens, free water for less favoured households)
Reducing obstacles to access to water	Reduction or suppression of individual connection charges, of secure deposits and of advances on consumption
Affordable water: pricing measures	Spain, France, Italy, Malta, Greece, Turkey, Israel, Egypt, Tunisia, Morocco, etc. – Progressive pricing where the unitary cost per cubic metre in the first consumption block (between 15 and 25m^3) is the lowest (lifeline tariff) – Reduction or suppression of general taxes (VAT) of the fixed part (subscription fee) in water invoicing
Targeted social pricing	Price variation according to the socio-economic characteristics of the consumers: abatement for retired people, families with several children, the poor (Seville, Athens)
	Subsidies ranging between 25 and 85% of the water price, related to a fixed provision with upper limit, for less favoured people (in Seville, abatement of 50% within a fixed threshold)
	Geographical cross subsidies for reducing differences in water prices within a region, among regions (in Turkey, highly different prices according to towns, with targeted measures for the less favoured towns)
Interdiction of cutting-off piped water	Measure targeted for poor households (France). This limit to contract law is sometimes based on court jurisprudence ('excessive constraint liable to disturb public order') and does not seem to have serious economic consequences
Aid for water invoice payment	Creation of a fund for helping those with difficulties to pay water invoices, financed by the consumers or the taxpayers
	Reduction or removal, in case of social services intervention, of penalties on payment delays, of costs of cutting-off/connecting-up; abandoning jurisdictional recourse when the household is living in penury (France)

Source: Plan Bleu from Smets, 2002 (see also Chapter 1)

consumer societies as well as the rapid increase in packaging. On the southern and eastern shores, the challenge for local authorities is to be able to cope with a growth in waste closely coupled to urban growth.

Figure 4.10 Production of household waste (Kg/inhab/year)



Source: Blue Plan estimates from Eurostat data and national sources

Note: Between 1990 and 2000, the yearly urban waste production per inhabitant has increased from 323 to 588 kg/inhab./year in Spain, 509 to 694 in France, 350 to 573 in Italy, 300 to 397 in Greece, and 513 (1993) to 677 in Cyprus. Monaco is out of scale in the graph, its production being some 1.4 tonne/inhab./year during the decade.

On the eastern Adriatic, the upward trend is also general (1995–2000 period) but with pronounced contrasts: from 515kg/inhab/year to 562 in Slovenia; clearly lower volumes in the other countries (from 218 to 241kg/inhab/year in Croatia, 197 to 237 in Bosnia-Herzegovina, 138 to 178 in Albania).

In the SEMC, growth is as clear, with important volumes in Israel (637kg/inhab in 2000) and lower ones in the other countries: from 297 (1994) to 419kg/inhab/year in Turkey, 290 to 333 in the Lebanon, 106 to 226 in Syria, 183 to 234 in Egypt. In the Maghreb countries, 1990–2000, volumes are 184kg/inhab/year in Tunisia, from 183 to 190 in Algeria, from 120 to 226 in Morocco.

Over the 1980–1998 period, the amount of organic matter has generally decreased: from 38 to 29 per cent in France, 43 to 32 per cent in Italy, 60 to 44 per cent in Spain, 62 to 47 per cent in Greece, and 85 to 64 per cent in Turkey. There has been a more or less parallel increase in packaging, plastic and toxic waste in dispersed quantities, such as solvents, car batteries, paint and pharmaceutical products.

If these trends continue, the future risk of running into a very difficult-to-manage situation is high, particularly as regards treatment facilities.

Predominance of uncontrolled dumpsites in the south and east

First, the collection rate varies from 0 per cent (in rural areas) to 90–100 per cent in the large urban agglomerations and is closely correlated with the income level in the areas under consideration: collection is provided in wealthy neighbourhoods, while disadvantaged neighbourhoods are poorly served.

Uncontrolled dumping is still largely predominant. Since the mid-1990s, countries have begun to remove the main black spots, closing some open dumps and replacing them by controlled landfills, while recovery and recycling policies are being introduced. In 1991 Turkey abandoned incineration and developed a policy of systematic recycling through a legal obligation to annually reclaim a certain tonnage for some economic sectors that are large consumers of packaging. In Syria, Damascus opened its first controlled landfill in 1998 and the government decided to set up a controlled landfill in Aleppo. In the Lebanon, Beirut closed the Bourj Hamoud site in 1997, built two composting/incineration units (but with a tiny share for incineration) and a controlled landfill in Naameh. In 1999 Egypt opened three controlled landfill sites in Giza, Alexandria and Cairo, and has built several composting units since 1990. In 1998, Tunisia granted a concession to a private operator for its first really controlled landfill in Djebel Chekir, meant to serve Greater Tunis. In addition, a national inventory listed 400 sites used for illegal storage of household waste, which would need to be reclaimed.

As regards legislation, ongoing efforts are trying to fill inadequate texts and vague classifications. Syria, Lebanon and Morocco are preparing new laws and in Algeria a new law sets the framework for solid waste management. However, the law is often not enforced. When national plans are defined, implementation difficulties appear at the local level. In addition, the intervention of multiple donors with different approaches to waste clouds the issue through a lack of synergy with the objectives of national plans.

Recycling is making progress in the north

Generally, incineration with or without energy recovery is taking the place of landfilling, and recycling and recovery are gaining ground. In the EU countries, European legislation sets the framework for policy actions:

- The 1975 Framework Directive on Waste, amended in 1991.
- The 1994 Directive on Packaging Waste, amended in February 2004, encouraging prevention, re-use of packaging material, recycling and especially reducing final disposal of this waste. The 2008 recycling objectives are set between 55 and 80 per cent.
- The 1999 Directive on Landfill of Waste lays down a fairly tight framework for landfills and forbids landfilling of non-processed waste from 2002 onwards. Enforcement is not yet fully operational in all countries, but the road has been paved.
- The 2000 Directive on Incineration of Waste strictly regulates this process, making it very costly (gaseous effluents and treatment of residues from purification of smoke from household waste incineration).

Implementing these regulations will be slower than expected essentially because of the inertia of incineration-based systems, and the very complex different processes for urban waste treatment (mainly for toxic waste in dispersed quantities). Other factors also come into play, such as the power of operators who have often acquired quasi-monopolistic positions on the waste collection and processing markets, or the weakness of local authorities.

An alarming situation

Progress observed in both the south and the north, should not, however, hide the fact that, except in France, Italy and Spain, dumping is still widespread (80–90 per cent depending on the country).

Waste dumps have very large impacts on environmental health (such as soil, air and groundwater contamination). Run-off drains toxic matter from household waste (leachate), which then flows into surface and groundwater systems. Open dumpsites often generate emissions of nitrogen oxides and methane from pockets of anaerobic fermentation. Pockets of methane trapped in the subsoil can prove dangerous when coming into contact with an inflammable source. This is why waste dumps are frequently places where fires break out in the Mediterranean, for example the big fire around Marseille in 1997 and in Portugal in the summer of 2003.

Poor management of household waste finally results in negative human health impacts. For instance, open-air incineration of municipal waste, currently practised in Egypt, Syria, the Lebanon and Morocco, has been identified as a major factor in decreasing air quality, especially through dioxin emissions.

The struggle for less waste

With rising urbanization rates in Mediterranean countries and changes in lifestyles and consumption patterns, the challenge for the future lies in reducing volumes and in recycling; recycled material is actually a valuable resource. Only policies designed to decouple waste production from economic growth could curb the increasing waste trend and the deteriorating situation in the Mediterranean region.

Two scenarios for waste production have been worked out (Table 4.8). Past trends are extrapolated and related to GDP growth. The resulting baseline scenario shows a difficult-to-manage waste volume by 2025: the NMC would produce 1036kg per capita per year (that is one tonne) compared with 566kg/cap/year in 2000; for the SEMC the volume would be 587kg/cap/year compared with 282kg/cap/year in 2000.

The alternative scenario is based on the assumption that policies are set up that aim at *reducing waste production at the source*, as well as making *recycling* increasingly common. Significant savings could be realized by all Mediterranean countries. By 2025 the annual average amount of waste produced under the alternative scenario would be 150 million tons less than under the baseline scenario. And the financial savings would be an annual average of some US$3.8 thousand million.

Following the alternative scenario path requires adopting deliberate measures in order to change collective and individual behaviour in consumption and particularly in packaging (Box 4.14).

Box 4.14 Ecological management of household waste in Barcelona

Since 1997, Barcelona has set very ambitious goals for managing household waste within the municipal waste management programme for the metropolitan area (33 municipalities). The programme envisages recycling about 60 per cent of the 1.5 million tonnes produced by the metropolis each year by 2006, and mobilizing about 751 million euros for that period. These funds have already led to the construction of three recovery facilities for collected waste (including one incinerator with energy recovery), linked to a network of drop-off centres where people can leave their waste free-of-charge, and to sorting centres staffed by skilled staff for separating the collected waste (iron, plastics, paper, etc.). For the organic component, a set of Ecoparks has been built to carry out totally integrated treatment, combining mechanization and composting.

The project's expected economic impacts are the creation of 5600 jobs, 3000 of which will be permanent at the end of the project, resulting in an injection of nearly 114 million euros to the regional GDP. From an environmental point of view, the project should lead to a significant reduction in quantities of waste to be treated, and to the closing of the Garraf dumpsite which, to date, is a major source of Barcelona greenhouse gas emissions and a threat to the local hydrological system (untreated leachate that continues to flow in significant quantities).

Source: Barcelona metropolitan area, 2004. Metropolitan Plan for urban waste treatment. www.ema-amb.com

Table 4.8 Two scenarios for waste production through 2025

Baseline scenario

Total (million tonnes)			AAGR (%/year)	**Per capita (kg/cap/year)**		AAGR (%/year)
	2000	*2025*	*2000–25*	*2000*	*2025*	*2000–25*
Total NMC	109	204	2.5	566	1036	2.4
Total east	37	111	4.5	386	857	3.2
Total south	29	81	4.2	210	409	2.7
Total SEMC	66	192	4.4	282	587	3.0
Total Med	**174**	**396**	**3.3**	**410**	**756**	**2.5**

Alternative scenario

Total (million tonnes)			AAGR (%/year)	**Per capita (kg/cap/year)**		AAGR (%/year)
	2000	*2025*	*2000–25*	*2000*	*2025*	*2000–25*
Total NMC	109	139	1.0	566	704	0.9
Total east	37	62	2.1	386	480	0.9
Total south	29	49	2.1	210	249	0.7
Total SEMC	66	111	2.1	282	340	0.8
Total Med	**174**	**250**	**1.5**	**410**	**477**	**0.6**

Source: Eurostat, ETC-AEE, national statistics yearbooks for 2000, *Plan Bleu* for the prospects

Feasible savings through the alternative scenario for 2025, compared with the baseline scenario for 2025

	Reduction at source		Recycling		Total savings in 2025			Cumulated savings 2000–2025 million US$
	million tonnes	million US$	million tonnes	million US$	million tonnes	million US$	In % of treatment and collection costs as per baseline scenario %	*period 2000–2025**
	2025	*2025*	*2025*	*2025*	*2025*	*2025*		
Total NMC	65	3845	14	860	80	4706	39	58,824
Total east	49	2043	1	53	50	2095	46	26,190
Total south	32	807	1	17	32	824	40	10,302
Total SEMC	80	2850	2	69	83	2919	44	36,491
Total Med	**146**	**6695**	**16**	**930**	**162**	**7625**	**41**	**95,315**

Source: Plan Bleu calculation and estimates; financial data on waste treatment and collection from the MSW Strategy for MENA countries-2010 study, World Bank (1998)

Note: AAGR: Annual average growth rate

* assumption of linear gradual exploitation of savings potential

In the baseline scenario, the quantities of waste produced in the years up to 2025 have been estimated from 1985–2000 elasticity for quantities of municipal waste produced as a percentage of GDP. This elasticity has been smoothed following an analysis of changes in the 'household waste/GDP' link between 1985 and 2000 in a sample of 30 countries (European countries and the US). In the alternative scenario, elasticity has been divided by 3 in line with current trends in the country with the most virtuous reduction at source, the Netherlands (an annual reduction in waste production of 2 per cent per capita in the 1990–2000 period). The 2000 recycling rate has been multiplied by 2 up to 2025, on the basis of progress observed in France and the US between 1990 and 2000.

Commercial outlets, the distribution sector and consumer groups all have a role to play, supported by the law. Along these lines, Italy has limited the use of plastic packaging and France is beginning to do so. Public awareness and people's daily involvement are decisive for implementation. It mobilizes associations at the neighbourhood level but actually begins in school.

The alternative scenario also takes into account the socio-economic aspects of waste collection and recycling. The prevalent technical-economic responses practised in the NMC should not be extended to the SEMC without adaptation, since they could threaten certain sections of the informal economy of waste, which provide far from negligible employment and sources of income (Box 4.15). Forms of collaboration can no doubt be envisaged between, for example, waste treatment companies and the people involved in collection, sorting and recycling.

Box 4.15 Household waste in Cairo and Alexandria: the *zabaleens* and foreign companies

Every day, urban areas in Egypt 'produce' some 30,000 tonnes of waste, including 8200 tonnes in Cairo and 2800 tonnes in Alexandria.

According to a study conducted by the Alexandria *Governorate*, waste volumes rise from 2800 tonnes per day in winter to 3400 tonnes in summer. However, the three landfills available to Alexandria, with a total area of 42.4 hectares, have a daily capacity of 2100 tonnes. So in winter, 700 tonnes of waste end up in uncontrolled dumps every day or lie in the streets and, in summer, the volume rises to 1300 tonnes of untreated waste.

In 2001, the Alexandria *Governorate* called upon a foreign company for collecting and processing domestic waste. Onyx, a subsidiary of Vivendi Environnement, signed a US$446 million contract to handle waste processing for 15 years. In 2002, the *Governorates* of Giza and Cairo in turn signed 15-year contracts with Italian and Spanish firms for waste collection and treatment.

In the contracts with these foreign firms in Cairo and Giza, there is no specific clause concerning the *zabaleens*, the tens of thousands of traditional rubbish collectors in all big cities in Egypt who collect about 30 per cent of the waste and recycle about 80 per cent of the collected waste. In Alexandria, Onyx has signed a more or less formal agreement with the *zabaleens* of Alexandria, before starting to implement the contract. In Cairo and Giza there are considerably more *zabaleens*, and a competition appeared between these *zabaleens* and the multinational operators who had become the waste owners.

Source: Plan Bleu from El Kadi, 2001 and Cedare, 2004.

What possibilities for action do cities have?

In parallel with the changing urban development, other changes are occurring in the Mediterranean region, related to the organization of public authorities, their effectiveness and level of representation at all levels, the participation of the general public and civil societies in collective choices, and the relationships with the central State.

Weak decentralization and urban governance in SEMC

Gradual changes are taking place in the distinctive features that have characterized public institutions in the Mediterranean countries for the past 40 years: a heavily centralized administrative, economic and political power, and a top-down administration pattern, hierarchic and often with little flexibility.

These forms of organization in the SEMC were set up after national independence, often applying a centralizing logic in order to ensure national unity and stability of the nation-state and its administrative bodies. But for nearly 20 years, due to the effect of widespread economic liberalization and concerns about decentralized participation, these forms of exercising power and even the way of governing are undergoing significant change:

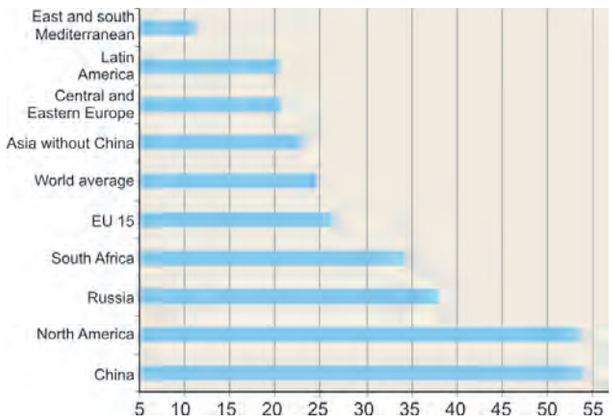
- the boundaries of public action have become less clear and the intervention levels are increasingly numerous and entangled: trans-national, national, sub-national;
- the number of actors involved has multiplied: community groups, non-governmental organizations and the private sector have a growing, and increasingly sought-after, role in the choices and decisions made by the public authorities;
- the way in which these different actors interact has also changed, becoming less hierarchical, more transverse and more flexible than before.

Decentralization is often presented as a possible response for taking account of the actual needs of the population; as a response to declining commitment by central government; as a way to bring decision and implementation levels closer together, and to facilitate the generation of investments by private sources. However, the choice of decentralization for a country is always complex and risky, since the decentralization process presupposes: political and financial devolution, without which local authorities cannot be deemed responsible to the people for their choices and commitments; a simultaneous reform of central state

and de-concentrated services, crucial for improving the functioning of local governments; and the existence, at different local levels, of networks of actors (public, private, associations, non-governmental organizations) capable of mobilizing local resources in synergy with resources obtained at other levels.

The Mediterranean appears today as one of the regions of the world where centralization is strong. Centralized systems are part of the historic heritage in the region, and the different empires – Roman, Moorish, Ottoman, Napoleonic – have fashioned, over time, a 'Jacobin' organization of the state. This is generally characterized by uniformity of rules; the will to cover the whole national territory with a central administration, through de-concentrated administration levels; a combination of elections and nominations at the sub-national levels; and the supervision of the centre over all levels. Public expenditure ensured by local governments reveals to some extent this centralization of power (Figure 4.11) and shows the southern Mediterranean as being behind other regions of the world.

Figure 4.11 Local level expenditure as a percentage of total government expenditure, 1997–2000



Source: Urdy, 2003, from World Bank Decentralization Database, 2002 and national sources for Mediterranean countries

Note: East and south Mediterranean: Turkey, Israel, Egypt, Tunisia, Morocco; Central and eastern Europe: Albania, Croatia, Slovenia, plus the other 15 countries of this sub-region; World average: sample of 56 countries.

For several observers, the 'participatory' and 'decentralized' processes that international organizations present as essential elements of 'good governance' are still theoretical in the SEMC, because they imply a significant degree of devolution of political and financial power and an equitable distribution of power, while neither of these are tangible realities today in these countries.[38]

Whereas EU-Med countries (Spain, France, Italy) have chosen a three-level sub-national organization of representative public authorities – Municipalities, Provinces or *Départements*, and Regions, the SEMC are still characterized by the absence of an intermediate, decentralized level between central government and the municipal level (Table 4.9). Therefore, de-concentration prevails, being present in the Provinces, *Wilayates*, *Governorates* and *Muhafazates*, where the executives are, in all cases, appointed by the central Government.

Except for the particular case of Israel, inspired by the Anglo-Saxon tradition of self-government,[39] attempts to create an intermediate decentralized level are rare. Only Morocco has set up regional local authorities in 1997.[40]

Almost everywhere the basic administrative unit is the urban municipality. These are in fact relatively ancient institutions in the Mediterranean, introduced by the *Tanzimat* reform in the Ottoman Empire in the 19th century, in 1858 in Tunisia (creation of Tunis' first municipal council), in 1864 in the Lebanon, and in the early years of the 20th century by colonial or mandated powers elsewhere. Today, all municipal councils are elected by direct universal vote and also the Mayors (whatever their local names) are elected, except in Egypt. However, the institutionalization of local municipal powers remains fragile and incomplete.

Administrative decentralization without financial means

Available data concerning decentralization practices in southern and eastern Mediterranean countries are extremely patchy, often inaccurate and difficult to compare. Practises can be analysed through different aspects.

Local authorities' duties

The question of shared responsibility between different levels of local authority has great relevance to the actual degree of decentralization, since the implementation of decisions can suffer from overlapping decision-making powers. The roles allocated to the different levels vary greatly from one country to another, but common features are found in most cases (Table 4.10 p234):

- Generally, the same areas of responsibility are passed on to local levels. In the SEMC, the duties transferred most often concern local services and facilities: land and town planning, social services, water and sewage, household waste, road networks, etc.
- As regards the spread of responsibilities, two typical situations occur on the Eastern and Southern shores. In the Middle East (Turkey and Mashrek countries) the areas of involvement have in general been clearly defined, so that the duties of different territorial levels overlap little or not at all. In the Maghreb (essentially

Table 4.9 Authorities at sub-national levels in south Mediterranean countries

Levels	Basic unit Level 1	Intermediate units Level 2	Level 3
Turkey	3228 Municipalities Mayor, elected by direct universal suffrage Municipal Council elected by direct universal suffrage	Province Executive appointed by the Council of Ministers	
Syria	95 Towns Chairman, elected from among the Town Council Town Council, elected by direct universal suffrage	*Muhafazat* Executive appointed by presidential decree	
Lebanon	708 Municipalities Mayor, elected from among the Municipal Council Municipal Council, elected by direct universal suffrage	*Muhafazat* (administrative level, with no legal identity) *Muhafiz*, civil servant appointed by central power	
Egypt	227 Towns Mayor appointed by the Governor. Council of the People, elected by direct universal suffrage	*Governorate* Executive appointed by the President of the Republic	
Tunisia	262 *Communes* Chairman, elected from among the Municipal Council Municipal Council, elected by direct universal suffrage	*Governorate* Executive appointed by presidential Decree	
Algeria	1541 *Communes* Chairman, elected from among the People's Communal Assembly (APC) APC, elected by direct universal suffrage	*Wilaya* Executive appointed by Decree of the Council of Ministers	
Morocco	249 urban *Communes* Chairman, elected from among the municipal Council Municipal Council, elected by direct universal suffrage	Province or Prefecture Executive appointed by royal *Dahir*	Region Executive appointed by royal *Dahir* and elected from among the Regional Council

Source: Plan Bleu

Algeria and Morocco) areas of responsibility overlap to a greater extent. This can lead to local authorities that act merely as managers of short-term operations, while central government keeps hold of both local and national strategic programming.

- The town is seen as the relevant level for the 'day-to-day' management of matters touching the population directly – social services, culture, environmental services and civil registration, while strategy formulation falls on the higher levels.
- Education, highways and economic development present particular cases of shared responsibility between at least two levels.

The degree of financial decentralization

Financial decentralization is a good indicator of the effectiveness (or not) of decentralization: it appears to be very low, as shown by Tables 4.11 to 4.14. From the point of view of the areas of responsibility allocated, the process in the SEMC shows strong resemblances with decentralization in European countries, whereas it appears distinctly more modest when considering the money involved. The share of local public expenditure of GDP is noticeably lower in the southern and eastern countries, and the same applies for public expenditure as a whole. The effort of local authorities in the SEMC appears to be lower than in European countries.

Looking at the *resources* aspect of financial decentralization (revenue from local taxes, tax revenue shared between several levels of local authorities, grants/transfers from central government), the standard practice is a fund that provides the local authorities, and from which they can also borrow.[41] Changes in the proportion of transfers from Central Government between 1990 and 2000 vary greatly from country to country.

Table 4.10 Responsibilities of local authorities in the Mediterranean

Responsibilities of local authorities in some southern and eastern Mediterranean countries

Countries and levels Responsibilities	Turkey		Lebanon		Israel		Egypt		Tunisia		Algeria		Morocco	
	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Land, town planning	■		■		■									
Social services	■				■		■		■					
Education	■				■		■				■			
Culture	■		■		■		■		■					
Water, sewage	■		■		■		■				■			
Household waste	■		■		■				■				■	
Public road network	■				■		■						■	
Economic development	■				■					■	■			
Registry office	■				■				■		■		■	
Law and order	■				■			■		■				
Green spaces	■		■		■				■				■	
Housing	■		■						■					
Health	■				■		■			■				■
Sport and leisure	■				■		■				■			
Urban transport	■											■	■	
Trading activities	■							■				■	■	
Energy supply	■											■	■	

Source: Urdy 2003 from Dexia, CFCE, ISTED 2002.

Note: Levels: 1 (municipalities, cities); 2 (wilayas, governorates…).

Specific responsibilities in dark colour; Shared responsibilities in lighter colour

Responsibilities of local authorities in some European Union countries

	Spain	France	Italy	Greece	Germany*
Social services	3	1-2-3	1-2-3	1-2	1-3
Education	1-3	1-2-3	1	1-2	1-3
Health	2	–	1-3	2	1-3
Water, waste	1-3	1	1-2	1	1
Public road network	1-2-3	1-2	1-3	1-2	3
Transport	1	1-2	1-2-3	1-2	1
Economic development	3	1-2-3	3	2	3

Source: Urdy, 2003; from Dexia, 2002

Note: Levels: 1: municipality; 3: region; 2: intermediate local authorities (provinces, départements) between the region and the municipality

* Germany is cited simply to show the absence of a level 2 (between the Länder and the municipalities).

Table 4.11 Share of expenditure by local authorities

Economic weight of local expenditure (% of GDP)			Share of local expenditure in total public expenditure (%)		
Turkey	4	1999	Turkey	11	1999
Israel	6	1999	Israel	16	1999
Tunisia	4	2000	Egypt	18	1995[a]
Morocco	2	2000	Tunisia	9	2000
EU15	*11*	*2001*	Morocco	7	2000, towns
			EU15	*24*	*2001*

Source: Urdy, 2003, from Dexia, CFCE, ISTED, 2002 and [a]E.S. Ghanem, 2002

Note: All levels of local authorities except when otherwise stated; the same applies to the next three tables.

Table 4.12 Proportion of transfers to local authorities from the Government budget (%)

	1990	2000
Turkey	18.69 (1997)	14.02
Israel	4.54	6.31
Egypt	1.69	2.10
Tunisia	12.33	6.56
Morocco	0.00	6.02

Source: Urdy, 2003, from World Bank decentralization indicators & IMF-GFS

Table 4.13 Local authority resources

Locally raised resources/total resources (%)		
Turkey	9	1999
Egypt	16	1995[a]
Israel	59	1999
Tunisia	63	2000[b]
Algeria	10	1999[c]
Morocco	27	1998[d]
Government grants and transfers/total resources (%)		
Israel	41	1999
Egypt	84	1995[a]
Tunisia	37	2000, city[b]
Morocco	45	1998[d]
Spain	*70 (municipality), 31(province)*	
France	*23*	
Italy	*62*	
Greece	*63*	

Source: Urdy, 2003 from Dexia 2002 and ; [a]E. S. Ghanem, 2002; [b]UN Pogar; [c]Ceneap, 2002; [d]J. H. Pigey, The Urban Institute 2001

The source of income differs according to the type of local authority: for authorities at the intermediate level (*mohafazats*, provinces, etc.) most income comes by way of government grants, while the municipalities raise the majority of their income themselves, mainly through property taxes (built-up and non-built-up land) and other taxes (on commercial premises, entertainment, motor vehicles, etc.). In the case of property taxes, fiscal systems often show poor efficiency due to the absence of or outdated necessary elements for implementation, such as a land register for taxation, an inventory of individuals or legal entities, or assessments of property values.

Operating *expenditure* absorbs a large part of local budgets (60 per cent in Turkey, 66 per cent in Tunisia and Morocco, 80 per cent in Egypt). It is used mainly to finance the salaries of staff who work in social services, planning, health, etc. On average, the share of capital expenditure (very variable from country to country) appears to be noticeably higher than in European countries.

Actually, it could be that central government releases itself from capital spending on infrastructures so that this charge falls on local authorities. Given the level of revenues, these obligations would far exceed the resources available. This can engender a substantial infrastructure backlog or a growing imbalance in local budgets. A worrying level of municipality debt is observed in some countries, for instance, in Turkey and Algeria, even though these unbalances are finally covered by the public treasury.[42]

Given the level of infrastructures available, the powers granted in terms of investment would require, in fact, a transfer of resources out of any proportion to what currently occurs. From this point of view, the rules governing *borrowing* would constitute a determining

Table 4.14 Capital expenditure by local authorities (% of total expenditure)

Turkey	40	1999 (local authorities)
Israel	23	1999
Egypt	18	1995
Tunisia	33	1998 (cities)
Morocco	34	2000 (cities as % of local authorities)
Spain	*31*	
France	*21*	
Italy	*12*	
EU15	*13.5*	*2001*

Source: Urdy, 2003, from Dexia 2002 and sources of Tables 4.11–4.13

factor: although by law, the general rule is that local authorities have the right to borrow money, only Israel allows local authorities to take out loans from private sources. Could this constitute a lever for change? On the other hand, there would be a risk of 'decentralizing' countries' external debt.

Control and supervision

In itself, monitoring the legality of the actions of local authorities and their spending powers is a fundamental element of the democratization of the life of a nation. In general, this control may take one of two forms: supervision exercised by a central government authority, or monitoring the correctness of income and expenditure, carried out by an authority independent of the executive and legislative powers, such as external auditors from a revenue court. The general rule in the SEMC is supervision. Most often, the central government (Ministry of the Interior or Ministry of Local Governments) supervises the legality of actions and audits the budget. In addition, *ex ante* political control is exercised by central Government, through the appointment of executives at the intermediate level.

Thus, the actual degree of decentralization is weak, particularly for financial resources. In parallel, there has been a real de-concentration of state powers, the state usually being too far away to manage the complex realities on the ground. However, the initiated decentralization appears to be slow in affirming the action of representative authorities to collect taxes and to make expenditures with reduced supervision. Moreover, decentralization is obviously not complete unless the population, companies and associations are allowed to participate from the very beginning, in defining collective choices. This was clearly specified in the 1992 Rio Agenda 21 and its chapter 28, encouraging local governments to adopt Local Agendas 21 through participatory exercises and a search for consensus.

Expansion of inter-municipal cooperation and metropolitan entities

In the SEMC, steady growth in the number of towns is matched by a rapid increase in urban municipalities. In Turkey, the number of municipalities rose from 809 in 1955 to 3200 in 2003. In Morocco, the administrative and territorial reform of 1992 led to an increase in the number of communes, both urban and rural (249 urban communes in 2005 compared with 99 in 1992). The same phenomenon is seen in Algeria, Tunisia and elsewhere. In small municipalities, the response to people's needs is compromised by their small size. Without a real tax base, with a rudimentary or non-existent administrative body, without skilled human resources and in chronic need of staff, the services they offer may be of poor quality and require very high per capita investment. In practice, they have almost no real possibility of organizing and planning urban services.

In the EU-Med countries, which have a large number of municipalities, the majority being of small or very small size, *inter-municipal cooperation* represents one possible response to coping with municipal fragmentation. Italy more than half a century ago, Spain in the 1990s, Greece in 1998 and France today, have turned to functional groups of communes (*comprensori*, *mancomunidades*, *communautés de communes* or *communautés de agglomerations*, *districts*). Even though most of these experienced difficulties when first set up, they do offer a possibility as yet hardly attempted in the SEMC. Inter-municipal collaborations are found only in Mashrek (Union of Northern Metn municipalities in the Lebanon, Joint Services Councils in the Palestinian Territories, Councils of Shared Services in Jordan).

The heterogeneity of municipalities raises another question. It is difficult to consider metropolitan areas with some million people on an equal institutional footing with towns of a few thousand. In Syria, cities that are capitals of *mohafazats* have their own financial resources, but the overwhelming majority of communes have not. In Turkey, the largest municipality has several million inhabitants while the smallest numbers less than 700 inhabitants. In the SEMC, but also in the NMC, applying the same communal status to all municipalities in a country has two major inconveniences: very small communes cannot provide quality services, and large metropolitan areas do not enjoy a status commensurate with their productive capacity and their actual tax base. The rare special statuses that exist are limited exclusively to the capitals, such as Beirut and Greater Cairo.

Some practices with *metropolitan bodies* are beginning to emerge. Turkey created a special status for 16 Metropolitan Municipalities in 1984; Morocco is also exploring this way with 14 Urban Communities by mid-2003. In Algeria and Tunisia, attempts to create metropolitan entities were never carried through. These are all experi-

mental practices, however, for example in Italy, where the 1990 law creating Metropolitan Cities has still not been put into practice because of strong opposition from the existing local authorities.

In any case, institutionalized cooperation between local governments responsible for urban areas that extend beyond the basic municipal boundaries has become a real need, especially clear for large urban areas. Unions, districts and other entities of this kind are being created for linking sovereignties that have less sense today.

Public–private partnerships

Today, cities are the areas that bear the brunt of the effects of the major macroeconomic reforms adopted in the SEMC over more than 20 years. They benefit from the effects of better economies of scale in agglomerations and increased profitability, when these occur. But they also suffer from the principal external diseconomies mainly related to the mismatch between exploding social demand and the capability of towns to act and invest.

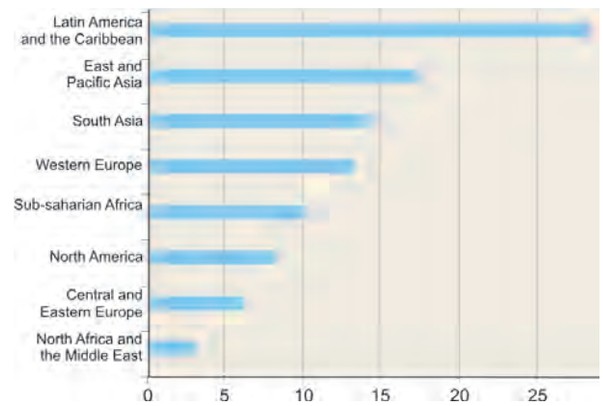
Urban dynamics in the SEMC contribute towards this mismatch between needs and capabilities to invest and perform. Each year Istanbul grows by more than 400,000 inhabitants, a metropolis like Casablanca would increase by 60,000 people each year. Municipalities are primarily confronted by their daily functioning problems, whether related to facilities or to human resources. A chronic lack of staff in the past has lead to a significant rise in the number of local government personnel who, without being sufficient, act as a brake on capital investment. In Tunisia, municipal staff increased by 23 per cent between 1991 and 1997; in Morocco staff numbers multiplied by a factor of 5.5 in 25 years, from 26,500 in 1977 to 143,259 in 2001. And the fact that governments relied on local authorities to absorb an excessive workforce supply has only increased the problem.

Progress made in providing services for nearly 20 years cannot, however, disguise the strong imbalance that persists between big and small cities, between city centres and suburbs, or between wealthy neighbourhoods and deprived ones. These inequalities are accentuated by the concentration of activities, financial resources, and wealthier populations in a small number of cities. For example, 80 per cent of private industrial establishments in Syria are concentrated in Aleppo and Damascus, and these two cities are almost alone in benefiting from private investment for the whole country. Tunis would draw about 60 per cent of investment in the country.

The needs thus remain dominant in the SEMC towns. For many public services, the municipality and its elected council are in the front line of responsibility for the quality and quantity of services provided. In managing urban utilities, the most usual methods are either direct management by the local government or through publicly owned enterprises, sometimes owned by the local authority. In the SEMC, national, de-concentrated, technical bodies, have often taken over responsibility for the management, investments and maintenance of water, sewage or electricity systems. These days, there is more and more reliance on contracting private enterprises. Over the last decade, municipalities have been encouraged to call on private companies for financing and managing urban facilities, and an increasing development of public–private partnerships is seen in most Mediterranean countries.

The term 'public–private partnerships' in fact covers many different forms, such as delegated management by contract, concessions and privatization.[43] These partnerships are currently receiving much attention, partly because they are recommended by international donors, and partly because large multinational companies increasingly dominate markets (Figure 4.12). These companies often provide the necessary capital for large investments in exchange for long-term contracts (20–30 years). In the Mediterranean, there have been many examples of the delegation of powers in the last ten years, especially for electricity, telecommunications, waste and transport, but also for drinking water and sewage management.

Figure 4.12 World distribution of public–private partnerships (per cent)



Source: Urdy 2003 from Franceys R., 2000, WEDC-IHE PPP Database (www.silsoe.cranfield.ac.uk/iwe/cws/pppdatabase/)

This process lies within a context of globalization and deregulation that limits the coverage of public utilities, where the concept of public utility or public service is roughly handled, depleted and put into question when the agreements are not rigorous or clear.

Given the growing importance of public–private partnerships for the future of the SEMC, some observations can be made in the light of ongoing experiences in the

Mediterranean and elsewhere. In addition to the specific forms depending on particular economic and political circumstances, two difficulties often arise. First, an imbalance between the partners, in which local authorities that have little room for manoeuvre find themselves in a weak position faced with multinational companies – only very large cities may have the capabilities to delegate authority. Second, there is a lack of regulation of the market for public utilities (water, sewage, waste, transport, etc.).

Public–private relations are being re-examined in some countries for a necessary *public regulation of partnerships*. Delegating management under good conditions should be exercised not only when calling for tenders (and legislation on public markets needs to be reviewed in many countries), but also at the time of implementation and subcontracting. Some countries have introduced interesting practices by making reference to environment and sustainable development criteria.

Box 4.16 Public regulation of concessions in Morocco

Morocco has recently, but very rapidly, become involved in granting concessions to private actors (currently, according to estimates, 80 per cent of the water distribution, electricity and sewage sectors are managed through private–public partnerships). And, since the late 1990s, there has been lively debate on whether or not a law is needed to regulate these partnerships. There are two possible ways to proceed.

When there is a legal vacuum, these operations are agreed in the conventional way and depend solely on the decisions of the two signatories: the contracting party (the municipality or a group of municipalities) and the contractor (a private company – usually foreign). When a law exists, it can set some clear principles for the delegation of management (transparency, general tendering rules, equal treatment of tender applicants, public registry of tenders), and provide a precautionary framework to avoid misuse and subsequent breaches of contract.

In Morocco, the question is being resolved by law. The draft law on private–public partnerships to manage public utilities is a broad text, flexible enough to facilitate the diversity of cases; it establishes the principles of transparency, competition and equality of access to public utilities and infrastructures. With this new legal framework, local governments retain an important role because there will be no centralization in granting concessions, and the regulatory body is an ad hoc commission supervised by the public authority that initiated the proposed concession (instead of a permanent national commission in charge of the regulation of public–private partnerships).

Source: Urdy, 2003

Since agreements are established for long periods, it is very much in the delegating authority's interest to define precisely the performance targets to be met by the private operator, on the basis of quantified indicators that specify the economic, technical, environmental and social requirements. These are, for example: population to be served, environmental quality targets, re-employment of municipal staff and/or job preservation, vigilance on the financial independence of the private operator and pricing, the proposed pricing structure and its social and spatial impacts, and on the procedure to be followed in cases of dispute.

In spite of the highly specific nature of each public–private partnership operation, and in order to reduce the above-mentioned mismatch between the delegating local authority and the private operator, particularly as regards access to information,[44] some consensus is emerging among a number of experts and non-governmental organizations on the need to set up a methodological support facility for delegating authorities in the developing countries. Such a supporting facility could be included in cooperation in the Mediterranean. There are examples such as 'Service public 2000', an association created in France at the initiative of mayors, for providing specialized and independent expertise; and PSIRU (Public Services International Research Unit)[45] database at the University of Greenwich, a worldwide watch facility on contracting-out and privatization in the water sector, which also covers North African and Middle Eastern countries.

Concerted approaches to sustainable urban development

Sustainable development initiatives, although still in their infancy, are emerging throughout the Mediterranean region. Launched by municipalities or urban agglomerations, sometimes even entire regions, local strategies aiming at a more sustainable development take on several shapes and names, such as Local Agenda 21 (focusing mainly on the environment) and Strategic Plan (for economic development). All these initiatives, sometimes covering different thematic areas, sometimes having global objectives, share the same ambition of *changing the fate of a region and its people*.

Sustainable development initiatives open up new perspectives for territorial planning. They can stimulate the involvement of local actors and revive democracy that may be losing momentum or is trying to find its way. Responses that stem from a public debate can be found for the many challenges that confront cities. More than 500 Mediterranean local governments are engaged in this kind of initiative (Box 4.17).

Even though they are not yet numerous, ongoing experiences show a rich variety of approaches. There are many keys to achieving sustainable development, depending on cultural and territorial specifics;[46] they also depend on choices made by urban authorities.

- *The quality of life as a priority*. In Spain and central Italy, the urban environment is seen in the built-up, architectural and aesthetic dimension and gauged by

Box 4.17 Local Agendas 21

Agendas 21 were born after the 1992 Rio Earth Summit, which defined an Agenda (in Latin, 'what has to be done') for the 21st century on the world scale. Its chapter 28 encouraged the launching of Local Agendas 21. International organizations such as the International Union of Local Authorities (IULA), the Fédération Mondiale des Cités Unies (FMCU) and the International Council of Local Environmental Initiatives (ICLEI) have been supporting the movement by signing the Aalborg Chart for sustainability.

In the Mediterranean, there is no specific survey on Local Agendas 21 processes. At the global level, the ICLEI survey of local authorities and associations in 2002 shows that of 6416 Local Agenda 21 processes in 113 countries, the majority of actions take place in Europe (the total number of Local Agendas 21 in 36 European countries represents nearly 80 per cent of the global results). In the Mediterranean, the number of Local Agendas 21 registered by ICLEI in 2002 breakdown as follows: 900 processes in the four EU-Med countries (of which 360 were in Spain and 430 in Italy), 30 in the eastern Adriatic countries, 50 in Turkey, 15 in Mashrek and 20 in Maghreb.

It is, however, difficult to use these data as if they were statistics, without taking into account the size and the number of municipalities in each country, the diversity of processes and the nature of projects. In certain countries, projects follow a national-level campaign; in other countries, the initiative is taken by local authorities and the state only provides support to a number of selected projects. Some processes relate to a global and integrated strategy that is elaborated with local actors' participation; others are of a sectoral nature and relate to a specific town policy (housing, natural hazards, transport, energy, greenhouse effect, tourism, etc.).

Source: Blue Plan from ICLEI. Second Local Agenda 21 Survey 2002 (www.iclei.org)

the open public spaces. The accent is put on hospitality and the quality of the urban living environment. In Barcelona, for example, urban planners place particular importance on the use of public places (promenades, squares and parks).

- *The heritage approach* to renewed cities favours operations of ecological and social rehabilitation, especially for old fabrics and the constant re-use of urban fabrics: 'cities that renew themselves', as in Italy where 'recycling' urban fabrics has long been implemented.
- *Combating suburban sprawl and the greenhouse effect* characterizes initiatives launched in some Mediterranean cities, also in northern European countries (the Rhineland countries) where space is scarce. Many initiatives seek to promote compactness, pedestrian areas and go-slow traffic zones, and to improve the living environment in fairly densely populated neighbourhoods. It is the search for a 'short-distance town' like the ancient Mediterranean cities, such as Ferrara in Italy, winner of the European Campaign for Sustainable Cities prize in 2003.
- *Improving environmental services* is a 'leitmotif' of approaches in several southern and eastern cities, sometimes within the framework of the Urban Management Programme for the Arab Countries. Some ten Tunisian towns are engaged in this way, most of them located in the Medjerda Valley. But large cities, such as Tunis, Sfax and Nabeul-Hammamet, have also started processes to develop city development strategies, with support from the United Nations Human Settlements Programme and the World Bank.
- *Decentralizing local decision-making processes* through people participation (women, young people, the elderly, etc.) and partnerships to raise local investment, is often encouraged in the SEMC, boosted by international development cooperation actors. In Turkey, for example, the programme for promoting Local Agendas 21 was launched in 1997 by the Mediterranean and Middle-East Section of IULA (International Union of Local Authorities) with support from UNDP. First introduced into nine towns, by 2003 more than 50 were included. In the Marmara region, the rehabilitation and rebuilding process after the big earthquake in August 1999 occupies a central place in Local Agendas 21. In Izmit (430,000 inhabitants) the Agenda 21 action plan was completely redirected in this sense in 2000. In Bursa (1.2 million inhabitants) the objective is to strengthen capacities for preventing and preparing for natural disasters with support from the UNDP and Swiss development cooperation.
- The principles of *eco-efficiency innovation* (e.g. recycling waste, promoting renewable energies, adopting environmental management standards such as ISO 14001, applying the High Quality Environmental standard in new buildings) are promoted in many approaches initiated by local authorities in France, Italy and Spain.

Only a few of these initiatives manage to use integrated sustainable development approaches by building bridges between the different sectors, between the local environment and the planet's well-being, and between the short- and the long-term.

Finally, most of these initiatives benefit from involving inhabitants, associations and businesses, and by encouraging consultation processes among the various actors, each with different concerns in community life, with varying status, uneven powers and differing legitimacies. But participation cannot be decreed, it needs to organize itself. Public authorities can only facilitate it by relying on associations of all kinds, particularly since these approaches are still fragile.

The need for national support

States have a major role to play in encouraging the flexible development of concerted approaches at the local level, with local authorities, civil societies and businesses as protagonists on various scales: regions, urban areas, municipalities and neighbourhoods. This implies setting up integrated policies and specific instruments to facilitate local actions.

In the EU-Med countries, national or regional policies acting under specific names but relevant to what is called 'integrated policies for sustainable urban development' have blossomed since the early 1990s.[47] These integrated policies have been supported by the EU since 1994 with the URBAN Community Programme.

In *France* the policy of social development of neighbourhoods goes back to 1982, followed in 1988 by the *Politique de la ville* (Town Policy) and Town contracts in 1992 (230 in 2000), and several other policies in the 1990s. In 2000 the law on Solidarity and Urban Renewal (SRU) placed social and functional mixing at the core of new town planning schemes and introduced the obligation of building 20 per cent of social housing in urban municipalities. The 2003 orientation and programming law on urban renewal relaunched the town policy and focused on the massive restructuring of deprived neighbourhoods (750 sensitive urban areas). In *Italy* the 1990s registered multiple initiatives, which included integrated action programmes, the *Programmi di recupero urbano* for degraded social dwellings and urban regeneration programmes for abandoned industrial estates, followed by the policy of Neighbourhood Contracts in 1997 (Box 4.18). In *Spain*, where there is no integrated urban development policy at the central state level, regions and cities have responsibilities for carrying out such programmes, also by relying on the European URBAN Programme.

Whether or not they are called 'policies for sustainable urban development', all these integrated policies are territory-specific and cross-sectoral policies, carried out through partnerships that seek to go beyond the traditional sector-based logic of public action by implementing various forms of cooperation. Apart from the above-mentioned inter-municipal cooperation, these policies seek to innovate in *vertical* cooperation (between different decision-making levels) and in *horizontal* or cross-sectoral cooperation. In addition, the multiple ongoing experiences show that these policies are not decreed by a domineering power but are formulated together from a given social reality.

Vertical *multi-level cooperation* takes on different forms and names depending on the country: contract, convention, agreement, signed between the different political/administrative levels (central state, region, province, municipality and today, Europe). These contractual forms of cooperation are part of a context of redistributing duties and powers (general for the European countries) with a dual movement of transfer of responsibilities towards supra-state control (the EU) and decentralization towards infra-state government levels. The movement is fed by the *subsidiarity* principle, according to which policies and projects are worked out at the government level that is closest to their implementation; the higher government levels act in a given field of responsibilities only if the lower levels are not in a position to provide a response themselves.

All integrated policies for urban development are part of a multi-level approach that implies reciprocal commitments between partners, and therefore the establishment of a contractual form. Of varying durations (renewable on a yearly basis in Italy within the framework of multi-annual programming; five years, followed by seven years in France), these contracts deal with a wide variety of topics (housing, security, employment, culture, etc.). As for budgets, although the committed sums may appear small, the contracted subsidies are in fact additional resources that serve as *levers* for mobilizing other public or private resources.

This form of cooperation has sometimes led to controversy. Local authorities regard it as a central government mechanism for transferring obligations without transferring the corresponding resources. In any case this is a process of passing on responsibilities by contractual means, enabling gradual decentralization. For the SEMC that have made little progress in financial decentralization, this way can prove very useful for fully supporting town development, especially for medium-sized towns.

Cooperation between the various sectoral policies (housing, urban planning, transport, environment, social and education, etc.) and between different departments, agencies and bodies in charge of their application is the hardest to implement in all countries. It opposes very heterogeneous sectors of skills that inevitably lead to confrontations between approaches, methods, and very different professional cultures. Because of the traditionally sectoral-management approaches, it is essential for *governing the interfaces* to set up specific mechanisms (task forces, working groups and programmes, 'department conferences', etc.) for removing barriers between professional cultures that are traditionally ignorant of one another.

At the central level, ministerial guidance of these integrated urban development policies is far from stable. It is a new field of action implying the re-composition of sectoral policies in order to integrate, at the highest possible level, the complexity of urban issues. And even though integrated urban development policies may sometimes be seen as an overdose of complications, the actors directly involved see this apparent complication as a 'necessary evil', for overcoming the obstacles.

At the local level, local authorities, especially municipalities, experience the same difficulties in integrating administrative action from a traditionally sectoral management. Here too, practices almost everywhere[48] show that these integrated policies succeed mainly when they are in the hands of the mayor or the head of the municipal or inter-municipal executive, the only ones able to make 'an overall city policy'.

The Italian experience is presented in some detail (Box 4.18) to show, apart from particularities, that several ingredients are vital for the effectiveness of integrated urban development policies, in particular: clear objectives pursued by national policy, the elaboration of which has taken into account the limits of previous policies; synergies between the various echelons and stakeholders (the state, the regions, municipalities, the private sector, European support) resulting in cross-financing; the responsibility of municipalities for detailed planning and implementation of the projects, and thus for their success; and the flexibility of the procedure, making it possible to experiment with integrated thematic approaches and concerted actions in cities.

Box 4.18 Integrated urban development policies in Italy

In Italy, the first integrated urban renewal programmes (*Programmi integrati di intervento*) were launched through a 1992 law aimed at promoting the upgrading of the urban fabric and the urban environment by relying on previous local experience (e.g. Turin, Naples). The 1994 *Piano di ricupero urbano* (PRU) identifies urban spaces to be redeveloped (social housing estates) and provides for actions that associate public authorities with the private sector, without, however, implementing complementary economic and social measures. Faced with the deterioration of some neighbourhoods in city centres and surrounding suburbs, the Ministry of Public Works then launched the *Contratti di quartiere* policy (Neighbourhood contracts) through the 1997 finance law. It concerns mainly the areas with public housing built in the 1970s: 12 per cent of these are in town centres, 31 per cent in the first ring of suburbs (consolidated fabric), 48 per cent in the outer suburbs (recent fabric) and 9 per cent in peripheral areas.

The main innovations of *Contratti di quartiere* are the multidimensional approach and the methods for renewing neighbourhoods and diversifying their functions so as to reintegrate them into the city, while rejecting the concept of zoning. Apart from architectural rehabilitation and the organization of urban transport networks for example, an important social/economic field of action is included. Sectoral approaches for the town are integrated during the project's formulation and implementation, and procedures from ministries other than just Public Works, can be mobilized, in particular in the ministries of Economy, Education and Social Affairs.

As for the regulatory framework (a January 1998 decree), the choice of neighbourhoods depends on a call for tender launched by the Ministry of Public Works on two levels: tender documents are sent to their regional government by each interested city, the regional body then assesses each project's feasibility, grants an initial budget and sends a maximum of five dossiers to the Ministry for state funding. In the first series of contracts, 83 municipal proposals were selected at the regional level and 55 were funded by the central government. Implementation of the Neighbourhood Contracts is always the municipality's responsibility.

Proposals concern areas with degraded housing covered by a PRU or by an urban planning tool. Cities can choose one or several experimental topics from four quality objectives:

1 morphological (structural) quality of the urban fabric (re-enhancement of degraded fabrics, conservation and enhancement of historical fabrics, transformation with functional integration);
2 quality of the ecosystem (bio-architecture and urban ecology, resource savings, improvement of environmental quality);
3 urban quality and social actions (accessibility, new ways of using housing, particularly by vulnerable groups, professional inclusion of young people);
4 quality system (management and control of construction quality).

Launching Neighbourhood Contracts was facilitated by the local government reform of 1993 (election of mayors by direct public vote) and by the 1997 Bassanini Law dealing with the reorganization of administrative services, which set up several new measures: a 'single branch', and 'departmental conferences' to facilitate consultation between administrations; joint public–private companies; 'territorial pacts' for mobilizing different strategic actors at the local level; 'social round tables' at the municipal level. At the level of neighbourhoods, specific participatory forums arose such as 'neighbourhood workshops', sometimes true mechanisms for revitalizing neighbourhoods.

Cross-financing is mandatory. The Ministry of Public Works created a special fund for Neighbourhood Contracts, constituted from a withdrawal system equivalent to a 1 per cent building tax (about 300 million euros in 1997). Local governments allocate part of their own funds, which are fairly significant amounts since Italy decentralized. Other ministries act through agreements, with the Ministry of Public Works or with the municipalities concerned. Private companies also enter into the contractual procedures. This policy is complemented by the European URBAN programme: 16 cities selected in 1994 and 10 more for 2000–2006.

Source: Les contrats de quartier en Italie. Les exemples de Padoue, Rome, Turin, Parme et Venise. Rapport final pour la Délégation interministérielle à la ville. Paris, 2001 (www.ville.gouv.fr)

Mediterranean and Euro-Mediterranean cooperation: Beyond the challenges

In spite of Mediterranean diversity, improving the urban living environment concerns all countries in the region. Regional cooperation is one way of making progress and helping southern and eastern countries to engage in urban development that is equitable and respects human health and the environment.

Introducing the urban dimension in international cooperation

It is hard to gauge the flows of official development assistance (ODA) for the urban sector in the Mediterranean: the region is often split into various areas in which international donors operate. In addition, there is a specific drawback due to the fact that many funds concern actions that contribute indirectly to urban development, without allocating funds to projects with urban development as their main goal. Euro-Mediterranean cooperation is still seldom targeted at urban development.

Some (partial) trends can be drawn from the OECD's Development Assistance Committee (DAC) database. Between 1973 and 2000 ODA specifically concerning urban development represented only 0.55 *per cent of the total* ODA earmarked for the Mediterranean countries. In absolute figures, the cumulative total for the period was US$683 million (an average of US$26 million per year). The 1990s saw clear progress in aid for the urban sector (US$59 million per year compared with US$7.4 million per year in the 1980s). The aid falls under donations (US$526 million, 77 per cent of the total aid for the urban sector) and loans (US$158 million, 23 per cent). The aid covers urban planning and development projects, the rehabilitation of underprivileged neighbourhoods, and, more and more, activities to reinforce the management capabilities of local governments.

Aid from *multilateral agencies*[49] represents only 7 per cent of total urban ODA. In *bilateral cooperation* (93 per cent of the cumulative total), the US is the main donor for urban development (US$469 million committed, or 68 per cent of the total for urban-sector aid), followed by France (15 per cent of total aid or US$109 million, including US$101 million earmarked for Tunisia), Germany (4 per cent) and Spain (1 per cent).

During 1990–2000, Egypt was the main beneficiary of ODA in the urban sector in the SEMC (57 per cent, US$335 million), followed by Tunisia (17 per cent) and the Palestinian Territories (3 per cent). For the eastern Adriatic countries, rebuilding after the war, Bosnia-Herzegovina benefited most from aid to the urban sector (13 per cent of the commitments) and Albania (5 per cent).

As for financing by E*uropean institutions*, to date the European Investment Bank (EIB) has financed only a very limited number of urban development projects outside the EU,[50] and only two urban projects for the SEMC can be identified: a 300 million euro facility earmarked for rebuilding Izmit in Turkey after the 1999 earthquake, and 165 million euros for Algeria after the Algiers floods in 2001. However, EIB loans for infrastructure developments in cities (water and sewerage, urban transport) are significantly higher: about 1.4 thousand million euros for water distribution and sewerage projects in cities (or 16 per cent of total loans made to the SEMC during this period); 374 million euros for urban transport, particularly developing public transport such as the light metro in Tunis (30 million euros in 2000) and extending the Cairo underground (50 million euros in 2002). In total, nearly 2 thousand million euros (an average of 266 million euros per annum) would have gone to projects favouring cities between 1995 and 2002, a quarter of EIB loans for all sectors to the SEMC.

Finally, in the E*uro-Mediterranean* process, the urban dimension of development has been absent from MEDA's predominantly sectoral programmes (energy, transport, the environment), as shown by the small proportion allocated to urban development projects between 1995 and 2002, with only two projects: the renovation of the Balat and Fener neighbourhoods in Istanbul, classified as UNESCO World Heritage sites (7 million euros in 1998), and the improvement of insalubrious neighbourhoods in Tangiers, Morocco (7 million euros in 1999). On the other hand, among the sectoral sections of MEDA, several projects benefit cities: water distribution and large-scale sewerage (214 million euros committed), energy and urban environment (1.9 million euros in 2000), pilot projects in the programme for the environment (SMAP) concerning urban solid waste management or air quality improvement. In addition, after the suspension of the MED Urbs programme in 1996, the MEDA programme supports decentralized cooperation between cities and local governments through projects coordinated by Bordeaux, Rome, Genoa and Barcelona (5 million euros in 2005).

In summary, the urban sector share appears weak in the development aid flows. The share is more significant if the funding of various sectoral infrastructure projects that benefit cities is included, but it is still not possible to get a clear image of the real scale and even less the impact of this funding for the southern and eastern Mediterranean cities. In any case, the specificity and complexity of urban development issues are not taken into account in the prevailing sectoral approach of international financing.

In future, the EU's growing role in the financing of development in the Mediterranean, and the new Neighbourhood Policy that will enter into force in 2007, call for extending the European structural support

programmes (URBAN, Interreg) with specific funding for the urban areas of the southern and eastern Mediterranean countries that are in crisis.

Within the EU, where the urban dimension is not part of the Community competences because of the subsidiarity principle, urban policies are nevertheless at the heart of EU efforts to build a strong and competitive Europe while maintaining social cohesion. The F*ramework for action for sustainable urban development*, adopted by the Commission in 1998, recognizes the importance of the urban dimension in sectoral policies and stresses in particular the possibilities offered by the regional development programmes co-financed by the Structural Funds. Alongside the structural funds earmarked for European regions that are slow in their development or in decline,[51] the URBAN community initiative (Box 4.19) is exemplary.

Box 4.19 The URBAN programme: Giving a dynamic boost to European urban areas in crisis

URBAN is an instrument of European policies for cohesion aimed at revitalizing urban space and neighbourhoods in difficulty. Launched in 1994, the initiative comes under the European Regional Development Fund (ERDF).

In 2000–2006, URBAN II is supporting the formulation and implementation of innovative economic and social regeneration strategies in a limited number of small and medium-sized towns or neighbourhoods in big cities. These are 70 urban areas (a total of 2.2 million people throughout Europe) facing serious difficulties such as unemployment and criminality rates twice as high as the community average, and twice as many immigrants as in the average urban community. The 70 target areas include Granada in Spain, Bastia in France, Genoa, Carrara, Pescara and Taranto in Italy and Heraklion in Greece. The ERDF contribution is set at more than 700 million euros, which may turn into a total investment of 1.6 thousand million euros, when including local and national co-financing.

Two other programmes contribute to improving the targeting and effectiveness of URBAN programmes. Since 2000 the Urban Audit has made it possible to assess the quality of life in some 200 European cities of varying sizes through a series of urban indicators of socio-economics, the environment, education and training, participation in the life of the city, and culture and leisure issues. URBACT (a European network for exchanging experiences) highlights good practices and makes it possible to draw lessons from the strengths and weaknesses identified in the URBAN programmes.

Finally, a thematic strategy for the urban environment is to be proposed in 2005 for improving the living environment and reducing the impacts of EU-25 cities on the local and global environment (some 500 cities of more than 100,000 inhabitants).[52]

Insufficient city-to-city cooperation

Exchange and cooperation between cities within true urban networks have typified the history of this region since ancient times and until the emergence of nation states. Great geographers have highlighted the importance of such networks, and emphasized that cities and urban networks have strengthened the Mediterranean region. Today these are no more than a weak web. In the 1950s they were almost non-existent, the international influence of cities being minimal and often contrary to national laws. Over the past 30 years inter-city networks have re-emerged and now constitute an embryonic pattern that may contribute to rebuilding the future.

The web being woven today is part of global networks of local authorities. Since 2004 Barcelona has hosted the headquarters of United Cities and Local Governments, a new international town organization, born by merging FMCU (Fédération mondiale des Cités Unies), IULA (International Union for Local Authorities) and Metropolis.

International agencies also encourage town networking. For example, since 1988 the WHO Healthy Cities network has been bringing together 100 towns at the pan-European level, but also including Turkey and Israel, aiming to fully integrate health concerns into urban development. Since 1977 UNESCO has been encouraging the networking of small historical coastal towns in the Mediterranean and the Adriatic. And in 2004 Marseilles and the World Bank (Middle East and North Africa section) promote partnerships between some 20 European and Mediterranean cities aimed at identifying urban management projects that could lead to funding. Europe has given an important boost to twinning since 1945, and to north–south interaction supported by EU programmes such as MED Urbs and MED Campus (1992–1995), and, currently, MED Act. The Council of Europe has played an active role, but with limited funds. South–south interactions, however, currently represent only a very small portion (about 5 per cent) of inter-city exchanges.

Intra-Mediterranean exchanges have been developed, through thematic networks, for example on towns (the Urbama research and knowledge network on cities of the Arabic World), energy saving (Medener, between national energy-management agencies) and natural hazards (Stop Disasters, which aims to contribute in a more incisive manner to preventing natural disasters and helping affected Mediterranean towns). Other networks, such as Medcities, are more 'generalist' (Box 4.20).

Box 4.20 The Medcities network

The Medcities network of Mediterranean cities was founded in 1991 on an initiative by Metap (Mediterranean environmental technical assistance programme of the World Bank, the EIB, the

European Commission and the UNDP) to strengthen the environmental management capabilities of local administrations.

Preference was initially given to coastal cities other than capitals. In 2004, Medcities includes more than 25 cities: Barcelona (Spain), Marseilles (France), Monaco, Rome and Palermo (Italy), Koper (Slovenia), Dubrovnik (Croatia), Tirana (Albania), Thessalonica (Greece), Limassol and Larnaka (Cyprus), Gozo (Malta), Izmir and Silifke (Turkey), Latakia and Aleppo (Syria), Al-Mina and Tripoli (Lebanon), Haifa and Ashod (Israel), Alexandria (Egypt), Benghazi (Libya), Sousse and Sfax (Tunisia), and Tangiers and Tetouan (Morocco). Az Zarqa (Jordan) is also in the network.

The areas of cooperation have gradually been expanded, from carrying out environmental audits and plans (on urban solid waste, air quality, etc.) to projects on urban mobility, upgrading marginal quarters and preparing sustainable urban development strategies. Projects are financed mainly by the EU, but also by the cities themselves, Spanish development cooperation and the World Bank.

Sustainable development is a new cooperation area that could be developed between the 300 to 500 Mediterranean municipalities already engaged in an Agenda 21-type process. But this would imply going beyond 'sustainable development campaigns' or signing short-lived charts, and working in areas such as:

- training of municipal and regional personnel on sustainable development issues;
- promoting interfaces between activity sectors through joint projects, such as transport and urban planning, energy/urban transport and the greenhouse effect, risk prevention and urban planning/housing policies, water/sewerage and housing policies, poverty and the environment, and the environment and public health;
- mobilizing and better targeting of internal and external financing, access of cities to private funding under strict budgetary control;
- promoting multi-player actions (state, local governments, companies, associations) and forms of citizen participation;
- assessing and monitoring strategies and action plans (urban indicators).

Within the Mediterranean Action Plan, the Mediterranean Commission on Sustainable Development formulated a first set of orientations in 2001, stressing the initiatives taken by the Mediterranean countries for sustainable development with the new Barcelona Convention (1995), to which the Euro-Mediterranean process makes reference, and the need to reinforce cooperation networks among cities.

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With nearly 80 per cent of the population projected to be living in urban areas by 2030, the future of the Mediterranean region will depend largely on cities and the lifestyles of urban populations. The challenge is particularly great for the southern and eastern countries, with 100 million additional urban dwellers projected between 2000 and 2025. The challenges in the northern countries are somewhat different, with urban sprawl continuing to predominate, despite very moderate population growth.

Throughout the region, the major objectives for curbing urban trends and moving towards a more sustainable future are to *guide urban development*, *improve the living environment*, and *promote less wasteful and polluting lifestyles*. The necessary actions and policies, described throughout this chapter, relate to these three objectives; they are already being implemented in many Mediterranean cities and some countries.

The future will certainly rely on policies being implemented at the very *local level*: the entire city, the heart of the city, the neighbourhoods. Municipal and inter-municipal authorities can do much to induce changes, through more strategic urban planning, public participation and by taking into account the overall human, economic, environmental and cultural dimensions of urban issues; results may take 20–30 years to be seen. But city sizes, economic specialization, institutional capacities or weaknesses, regional and national contexts, will all govern the policies that need to be designed; room for manoeuvre differs between different cities and countries.

Faced with the immense challenges of sustainable development, however, cities will not be able to do everything alone. A change of scenario requires simultaneous efforts by cities, provinces or regions, and states, with Euro-Mediterranean support, if it is to create the necessary synergy and strive in the same direction.

At the *national level*, without regional development policies that favour medium-sized and inland cities, concentration and congestion in big metropolises and unbalanced urban structures will be accentuated. Without substantial efforts at the national/regional/local level aimed at improving the quality of life in cities, a certain 'urbanization in poverty' could take place with serious effects on societal balance, insecurity and increased environmental degradation.

At the *Mediterranean and Euro-Mediterranean level*, there remains a need for regional cooperation to cope with urban challenges. Without such cooperation, city networks and decentralized cooperation projects will continue to experience difficulties with longer term projects, and positive effects for cities and for countries will remain limited. Neither can decentralized cooperation alone cope with the challenges. The region would benefit from a Euro-Mediterranean cooperation programme that could mobilize national and EU support for medium-

sized towns and urban areas in crisis, and strive more effectively towards more sustainable development.

Notes

1 Population living in urban areas of more than 10,000 inhabitants.
2 In Tunis for example, 70 per cent of the households living in suburbs come from the town centre.
3 Attané and Courbage, 2001; *Plan Bleu*, 2001.
4 UNHSP, 2003.
5 International comparisons of urban statistics have always been very difficult, because of the variety and flexibility of definitions of 'urban' (in addition definitions change between censuses). By applying a standard definition worldwide, the *Géopolis* database, created by F. Moriconi-Ebrard, enables the problem to be surmounted and comparisons to be made between urban areas with more than 10,000 inhabitants. This is the base used in this chapter so that the population and growth of towns at the Mediterranean level can be compared.
6 It should not be forgotten that all classifications of this kind made to enable gross comparisons, are always somewhat arbitrary, and that a town that is classified as medium-sized in one country may be considered very large in another.
7 Cattan et al, 1999; Carrière, 2002.
8 Wiel, 1999.
9 Shanty towns in Arab countries began to host rural migrants in the inter-war period, and consist of waste-material dwellings, built on small plots and squatted land.
10 IFEN, 2003.
11 Huybrechts, 2001.
12 Netherlands, Great Britain, Norway, etc.
13 Dematteis and Bonavero, 1997.
14 Haeringer, 1999.
15 The European directive on major hazards from certain industrial activities, which since 1996 also applies to the storage of dangerous substances (the 'Seveso II' Directive).
16 United Nations Conference on the 'Prevention of natural disasters, land improvement and sustainable development', Paris, 17–19 June 1999.
17 Newman and Kenworthy, 1989.
18 Orfeuil, 2000.
19 World Road Statistics, 2003 (www.irfnet.org/wrs.asp).
20 A. Schafer, MIT, 1997.
21 Based on household surveys on mobility and other studies on transportation in these urban areas.
22 Data on Oran in Algeria, late 2000, indicate a very substantial proportion of walking journeys (63 per cent) whereas motorized transport amounted to 37 per cent of the total, which can be explained by poor access to cars in the context of an economic crisis, and by the crisis in the supply of public transport.
23 By way of comparison, the car market share (motorized travel done by cars) is 66 per cent in Paris, 75 per cent in Grenoble and Lyon, and 90 per cent in less dense cities such as Montpellier (Certu, 2000 www.certu.fr).
24 In Algiers, the latest household survey on mobility dates from 1990, but recent household surveys in Annaba and Constantine show that between 1987 and 2000, all-modes mobility is stagnant or regressing, while modal transfers take place from walking or private cars in favour of public transport, the supply of which has noticeably improved in this period. These changes in Algerian cities seem to run against the growing car use trend.
25 In 2000, Spain, France, Italy and Greece were responsible for 70 per cent of all CO_2 emissions in the region (see Chapters 2 & 3).
26 Italian municipalities are also setting up interesting time management strategies, in order to break up traffic jams in the rush hour.
27 This is the case for the Paris region (11 million inhabitants), with many administrative layers having responsibility for transport. Here central Government is responsible for the PDU.
28 ECMT, 2002.
29 Carrière, 2002.
30 Chaline, 2003.
31 Unesco, 2004.
32 EEA. *Environmental signals*, 2002
33 Siversten et al, 2001.
34 Hoek et al, 2002.
35 APHEIS, 2001.
36 Special dossier on air quality. *La Revue Durable*, January–February 2003.
37 Net consumption relates to quantities used, not rejected by the users. From Margat, 2004.
38 ESCWA, 2001; UNDP, 2002.
39 In Israel, the notion of 'level' is all relative. The responsibilities of municipalities (30,000 inhabitants), and of local and regional councils, vary according to the population represented.
40 The 16 Regions of Morocco are run by regional councils elected by indirect suffrage; however, very few financial resources have been granted to the Regions, which do not have their own administration either.
41 Bank of Provinces in Turkey, *Caisse Autonome des Municipalités* in the Lebanon, *Caisse des Prêts et de Soutien aux Collectivités Locales* in Tunisia; *Fonds commun des collectivités locales* in Algeria; *Fonds d'Équipement Communal* in Morocco.
42 In Turkey, the high rate of indebtedness of municipal authorities has led government to consider reforming the conditions under which local authorities have access to loans. In Algeria, the level of debt in *communes* was estimated at 22 billion dinars in 1999; in an attempt to bring this down to 2 billion dinars, the Algerian authorities decided at the end of 2001 to allocate more than 15 per cent of a budget that was initially intended to relaunch the national economy (Urdy 2003 from Ceneap 2002).
43 Delegated franchises and management are part of the 'French-type' system in force since the 19th century in the water sector; this system is widespread. The privatization or management by the private sector is the predominant model in Great Britain, less widespread as yet.
44 Multinational operators are in regular touch with the major companies of business lawyers; local authorities do not have similar legal advice.
45 University of Greenwich. Public services international research unit. www.psiru.org
46 C. Emelianoff, in *La Revue durable*, no 5, May-June, 2003 Fribourg (Suisse).
47 De Decker and Vranken et al., 2003; Jacquier, 2003.
48 Cf. *Villes du XXIe siècle. Quelles villes voulons-nous? Quelles villes aurons-nous?* Actes du colloque de La Rochelle, Certu, 2001.
49 International Development Association, UNDP, etc. In the CAD-OECD database, the file which makes it possible to make a sectoral breakdown of the projects, loans by the World Bank are not included.
50 From 1988 to 2001 the total number of urban development projects funded by the EIB within the EU amounted to 29.5 thousand million euros (10 per cent of the EIB's total loans, 2 thousand million per annum). Cf. Rapport d'évaluation. Projets d'aménagement urbain finances par la BEI à l'intérieur de l'UE. July 2003.
51 70 per cent of the European programmes coming under goals 1 and 2 (providing 15 thousand million euros for 2000–2006, or more than 2 thousand million per annum) deal with urban problems.
52 EC. *Towards a Thematic Strategy on Urban Environment*. COM (2004) 60 final.

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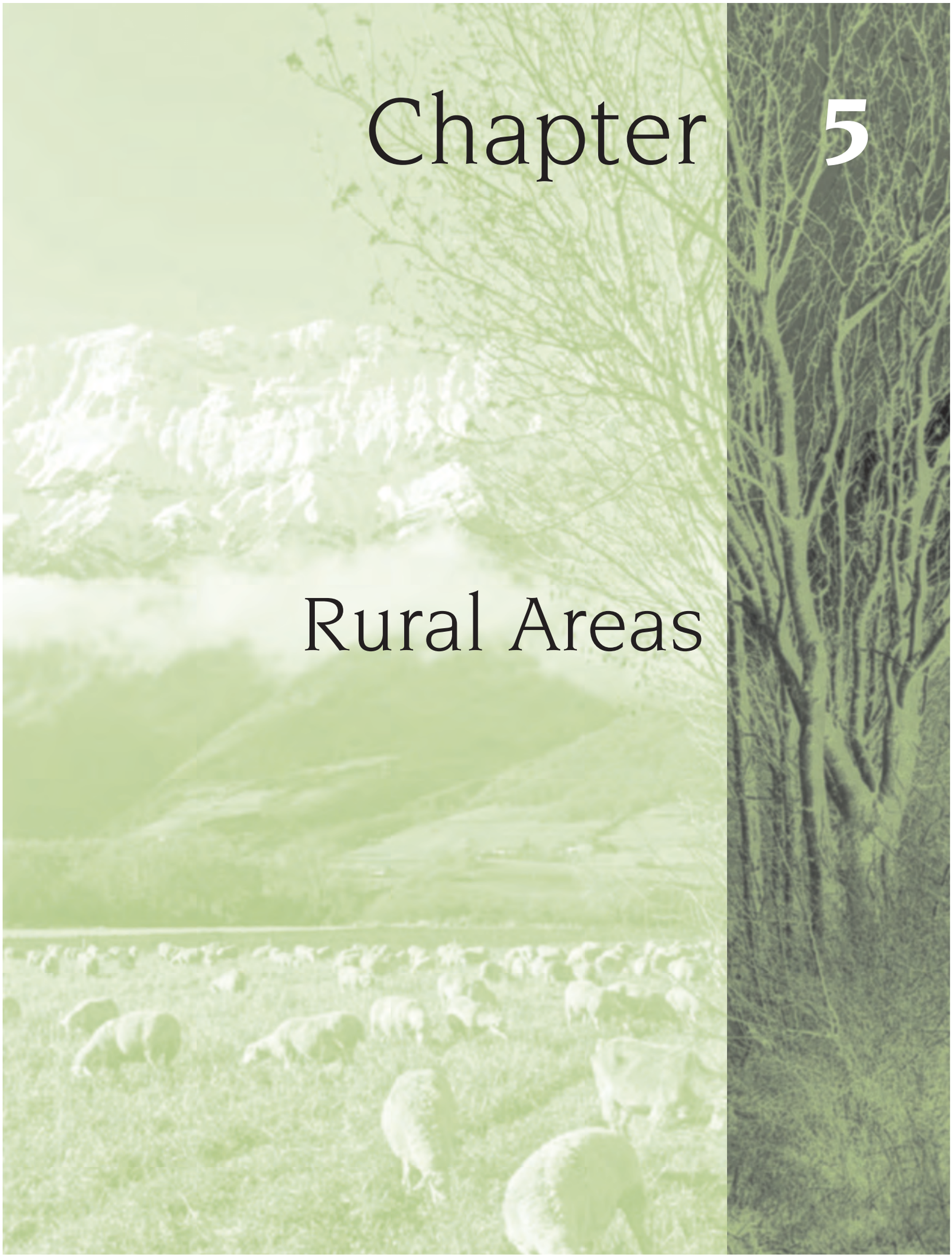


Chapter 5

Rural Areas

Over the past 10,000 years, mankind has transformed the landscapes around the Mediterranean into a large variety of characteristic rural regions (*'terroirs'* in French), resulting in a complex mosaic of gardens, arable fields, vineyards, olive groves and other fruit trees, pastureland, semi-natural woodlands, *macchia* and *garrigue* and dry grasslands. This transformation has been slow and gradual, rural areas typically being areas where it takes a very long time to change things.

However, Mediterranean rural areas have experienced radical changes over the past few decades:

- the old equilibrium, established over time between man and nature, has largely been disrupted, both in the northern and in the southern and eastern Mediterranean countries;
- today, what perhaps differentiates the EU Mediterranean countries most from the southern and eastern countries is the differences in standards of living in rural areas.

The main symptoms of the crisis in rural areas are the widening regional gap between the marginalized hinterland and the coveted agricultural plains; rural poverty in many southern, eastern and east Adriatic countries; and degradation of the environment and landscapes. For a superficial observer, this evidence is usually hidden behind the facades of new constructions and coastal tourist resorts. But the dust carried by the wind from areas undergoing desertification, uprooted rural populations that end up in the suburbs of big cities in the south and east and who are often likely candidates for emigration to Europe, forest fires, floods and growing tensions over water resources are there to remind us of another reality.

This serious crisis affects the value of a priceless heritage and is a source of increased risks and instability. As well as degrading vital ecological systems and aggravating poverty with its related risks, it threatens biodiversity and landscapes that are exceptional on the global scale, and the very identity of the Mediterranean region and its wide range of valuable know-how (landscapes, traditions and products). It also has serious economic repercussions, since environmental degradation, poverty, rural migration and marginalization of many areas weigh heavily on national economies.

With globalization and the liberalization of agricultural trade presently under discussion, there is a risk of an increase in these difficulties for many fragile rural areas in the south and east, which could have repercussions well beyond these areas.

However, Mediterranean rural areas are also areas of the future. The undeniable, although late, 'rural revival' that characterizes many rural areas in the developed countries of the northern shore and some recent agricultural advances, both in the north and in the south and east, bear witness to this. This revival depends on the mobilization of local and professional actors and the implementation of adapted policies. It is stimulated by the establishment of new relationships with cities in response to new demands (recreational, residential, quality products). This development leads to a growing distinction between 'urban-influenced' rural areas, those governed by 'rural market towns', and 'remote' rural areas. These new dynamics are not necessarily positive. Increasing use of private cars and the demand for land in the countryside lead to significant urban encroachment into agricultural lands and lifestyles that are highly taxing on the rural environment.

The whole issue of sustainable rural development is therefore posed to decision-makers involved in achieving Euro-Mediterranean stability and prosperity. Action is urgently needed since the break points are sometimes very close, especially in ecological terms. There is a need for more awareness raising, more stimulation of public opinion, and for redirecting or improving management policies.

In meeting these challenges, the two shores of the Mediterranean are unified by an ecological and socio-economic interdependence and the need to succeed in reconciling environment and development. Despite what separates them, on the global scale they form an entity that is held together by multiple bonds. This entity will only become part of the globalization process, and have enough weight in it, if its *identity* and its *geographical unity* are reinforced through sustainable partnerships and effective solidarity in development aid.

The originality, fragility and diversity of Mediterranean rural areas

Rural areas, living areas where vegetation cover continues to evolve and retains a certain reversibility, provide basic functions that range from *production* (agriculture, grazing and forestry) to *protection* of vital ecological functions (water cycle, soils and biodiversity).

The rural areas in the region owe their uniqueness to the specific Mediterranean climate and vegetation. Because of summer droughts, which become more pronounced the further south one goes, and the high variability in precipitation, the issue of water supply for cultivated and natural vegetation (pasture and woodlands) is always crucial. Dry farming, rarely giving high yields, is only possible when there is sufficient rainfall.

Another essential characteristic is the diversity of soils and the large contrasts between vast mountain ranges, hills and the high steppe-like plains, and less extensive but highly prized coastal and fluvial plains. Due to the mountainous nature of the relief (except in

Egypt and Libya) and the scarcity of large plains, a sharp contrast exists in local climatic conditions, which leads to great diversity in local situations.

Such diversity is no doubt a source of wealth, but environmental constraints (low availability of fertile soil and water, summer droughts and irregularities in the water regime, mountainous relief) weigh heavily on agriculture and rural dwellers. They explain the efforts that have always been made to enhance soils and control water.

Rural landscapes built over time

Farming was born in the eastern Mediterranean in the 8th millennium BC. By the 4th millennium BC, controlling flood waters, and later irrigation, made it possible to found great agrarian empires around the large rivers in Egypt and Mesopotamia (the Nile, Tigris and Euphrates). Outside these privileged regions, in mountains, hills, dry plains and plateaux, it is the transition from cultivation through 'slash and burn' to more permanent systems 'with light animal traction' that has, since antiquity, shaped the rural landscapes, a heritage that has not always survived to the present day. During this long period, Mediterranean rural land has been organized into four major, complementary components: the *hortus* (intensively cultivated home gardens for fruit, vegetables and various other household plants), the *ager* (grain fields planted in two-year crop rotation with fallow periods), the *silva* (forests providing fuelwood and grazing land), and the *saltus* (more or less wooded pasture land, where cultivation of annual crops is sometimes possible). Where small plains existed as isolated 'islands', agricultural development has contributed in a decisive manner to the development of the ancient city-states (compact towns depending on agriculture and maritime trade), and later to those of the Middle Ages. The art of irrigation progressed greatly with Arab civilization and expansion.

Agricultural progress in the north European Middle Ages, shifting to cultivation with heavy animal traction and three-year crop rotations, did not benefit the Mediterranean, but contributed significantly to the economic and political supremacy of northern Europe. Intensification in the Mediterranean was limited to the development of *terraced cultivation* on slopes, *irrigation* and *arboriculture*. The development of the unhealthy plains, which required high capital investment, was long and difficult, holding back progress in the southern and eastern Mediterranean, for example in the Mitidja near Algiers (early 20th century), the Salonika plain (around 1925), and the Ebro delta and the Pontine marshes (just prior to the Second World War). This development, together with other events that have marked recent history (wars, colonization, decolonization, collective farming, liberalization, globalization) have had profound consequences on land tenure systems, water management, production systems and migration. European colonization of the Maghreb plains led to the start of modernization in these areas, but also pushed indigenous peoples towards the steppes and mountains. These peoples did not always regain their former rights after decolonization.

Since the 1960s the development of *irrigated lands* and *specialized crops* such as olive orchards, vineyards, citrus and other fruit, vegetables and flowers, has become a major trend in all Mediterranean countries. In the developed northern countries this change has gone hand in hand with increasing *abandonment* of less productive and thus less competitive areas. In the developing southern and eastern countries with high population growth, however, stress on the marginal lands has never been so high, despite low and often shrinking yields because of desertification.

Biodiversity and rural landscapes of global value

The rural Mediterranean areas are rich in biodiversity and landscapes of high international value. The climates in alternating geologic periods, and the great geographical diversity in environmental conditions (soils and climates) have favoured an exceptional floral wealth that has adapted to the diversity of 'ecological niches'. With 25,000 species of seed-plants, the region contains 10 per cent of the world's plant species on only 1.6 per cent of the land surface. The number of endemic species (13,000) is particularly high on the islands and in the mountains. This wealth, and the stresses associated with it, makes the region a *global biodiversity hot spot*. In contrast to other hot spots, where vegetation is still mainly 'natural', the Mediterranean has been 'inhabited' for thousands of years. Areas with real natural vegetation (in line with climax conditions) account for a maximum of 50,000km^2, or 2.1 per cent of the total area of the eco-region. With the exception of these relict areas, the region's landscapes are thus a fairly remarkable example of *co-evolution* between man and nature. To be conserved, both the landscapes and the rich biodiversity of these semi-natural environments require specific pastoral, agricultural or forest management, which is relatively exceptional on the worldwide scale.

The eco-region is also one of the eight most important centres in the world from which cultivated plants originate. It is the *cradle of plants* that provide a decisive share of the world's food production (wheat, barley, rye, oats, lentils, cabbage, vineyards, alfalfa, leek, almonds, etc.). It also possesses a large number of cultivars (selected varieties of cultivated plants) and domestic animal breeds.

Rural Mediterranean landscapes, with their originally high ecological diversity, are the result of action by societies,

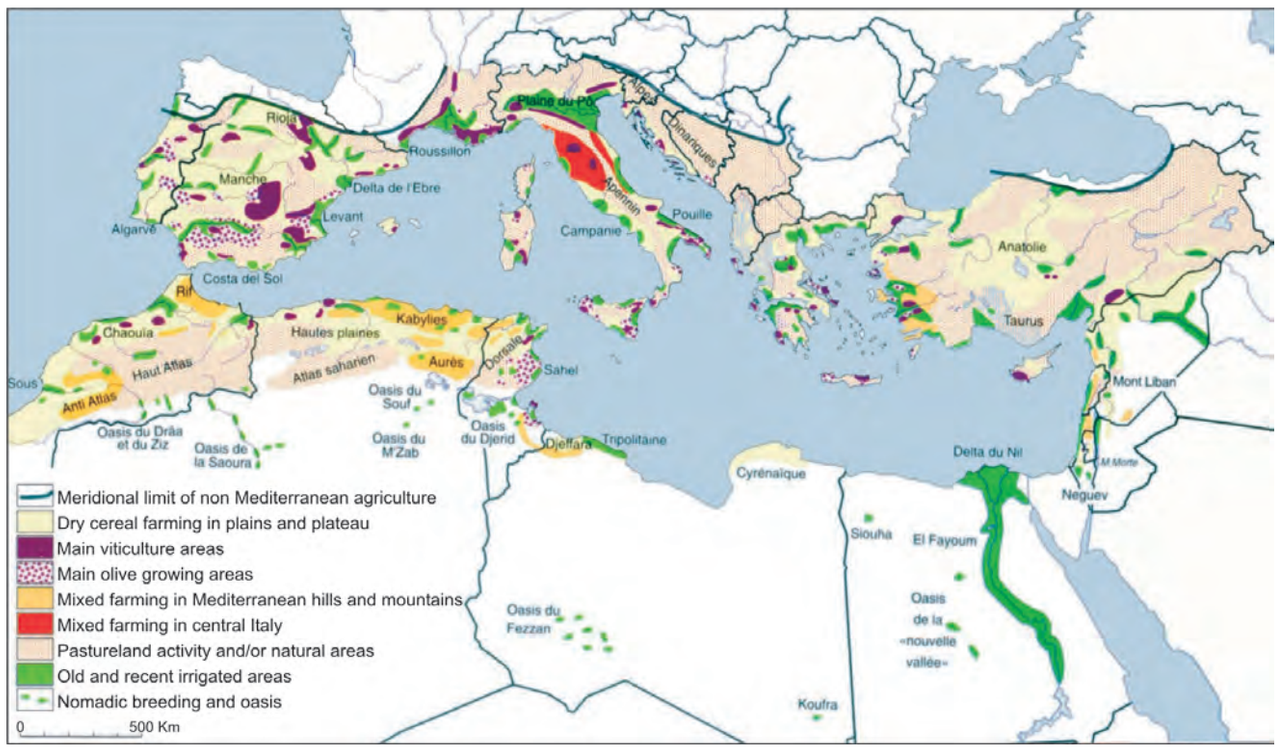
which themselves also have a rich cultural diversity. All this diversity results in the typical natural and rural landscapes of the region. This 'unity in diversity', both natural and cultural, is a very valuable heritage. In particular the rural Mediterranean contains some of the world's most beautiful 'cultural' landscapes (for example the landscapes of Tuscany, Provence, Puglia, the Cap Bon Peninsula, Cyrenaica, the Iberian dehesas, the mountains and valleys of France's Cévennes, Morocco and Lebanon, the Syrian and Anatolian foothills, the 'sea' of olive trees of Delphi, the Greek and Croatian islands, and the oases in North Africa). These landscapes embody the region's long history and its cultural and natural diversity. Their beauty, which is a considerable *tourist and cultural asset*, and the need for their preservation, are still insufficiently perceived by communities or taken into consideration by decision-makers.

Fragile areas

Rural Mediterranean areas are fragile landscapes, vulnerable to many pressures. These are linked to climate (variability, droughts) and soils (restricted amount of fertile, easily tilled lands), but also have an economic origin.

Natural fragility originates from specific, serious *risks* that are characteristic for these environments. Risks include: *water erosion* of soils that are often shallow and occur on steep slopes; *wind erosion* in semi-arid or arid areas subject to desiccating winds; serious *droughts* even in usually well-watered areas because of the climate's large inter-annual variability; *flooding*, even in usually water-poor areas because of torrential rains; *salinization* or alkalinization of some irrigated soils when poorly drained or infiltrated by saline groundwater; and *forest fires* due to drought and wind. To adapt to these constraints, Mediterranean societies have managed to invent and develop local technological and governance solutions (terracing of slopes, small water works, procedures for collective management of limited resources, property and customary rights, specific agricultural and forestry applications such as arboriculture and floral and perfume-flower cultivation). However, these solutions are based on cheap labour and could only develop in economies that had no competition from other regions not experiencing such constraints. E*conomic vulnerability* has been the result. It appeared as soon as these regions were affected by population, political, legal, and technological developments and when societies and economies opened up; all trends that characterized the 20th century. One of the most unsustainable consequences was the destabilization of many rural societies and the imbalance in ecosystems.

Figure 5.1 The Mediterranean's main agricultural and natural systems



Source: Méditerranée, vol 97, no 3–4, 2001

Abandoning good cultivation practices and land maintenance, consequences of either agricultural abandonment (in the north) or overexploitation (in the south and east), often had very negative impacts on rural areas: increased erosion of non-maintained terraces, salinization due to poor irrigation practices, degradation of plant cover and soils due to over-grazing or improper tillage, loss of biological and landscape diversity, and large forest fires. However, the abandonment of agricultural practices has also had positive *'biological revivals'* when very degraded areas, too marginal to sustain agriculture, are restored, thus favouring a return of forests with very extensive management.

Diversity in rural areas and in issues

The specific Mediterranean character explains the large regional diversity of Mediterranean rural areas. Figure 5.1 shows this inheritance in a schematic way. It gives a good picture of the current distribution of the main agricultural and 'natural' systems in the region. The map covers most, if not all, the rural areas of the region (as well as some countries not bordering the Mediterranean such as Portugal). Only a small part of the agricultural and rural areas of France and the north-eastern Adriatic countries are Mediterranean. To avoid too large statistical distortions, only the southern part of France will be considered as far as possible in the rest of this chapter, that is only the three regions bordering the Mediterranean: Provence-Alpes-Côte d'Azur, Languedoc-Roussillon and Corsica, together accounting for 12 per cent of France's land area.

Using farming intensity as a differentiating criterion, the major M*editerranean agro-systems* can roughly be divided into two main groups:

1 The first group corresponds to the fertile areas: coastal and fluvial plains, hills and oases. These include large irrigation schemes, large rain-fed agricultural systems in areas with more than 400mm of rain, suburban agricultural areas and the specific oasis systems. These areas are generally highly populated and intensively farmed. The land is owned mainly by farmers and residents. The main issues in terms of sustainability are related to sustainable water management and irrigation (risks of exhaustion and pollution of water resources, risks of salinization, and insufficient value given to rain and irrigation water), and to the gradual encroachment of rural areas by urban sprawl and infrastructure expansion. This encroachment threatens the last 'natural' areas of the plains if not protected (forests and wetlands), but even farmland itself and, more generally, the rural character and quality of the surroundings of suburban areas. Apart from safeguarding the last natural environments, a sustainable management of these fertile areas will depend on the individual discipline of landowners in water management and in maintaining the agricultural aptitude of land, provided that political mobilization and appropriate policies with regulations and incentives are put in place.

2 The second group corresponds mainly to areas with permanent handicaps, *semi-arid areas* and *mountains*. Semi-arid zones are typical of the southern and eastern Mediterranean and include plains, plateaux, dry mountainous areas and steppes. Marginal farming interferes with pastoral economies that predominate in the steppe regions. The Mediterranean mountains are generally areas with an agro-sylvo-pastoral civilization. Both in the north and the south, they play an important role as 'water towers' for the entire population.

The main problems in these inland areas (mountainous and semi-arid zones) in terms of sustainability are social, economic and cultural marginalization, soil degradation (erosion, desertification), deforestation and loss of biodiversity in the south and east, and abandonment of cultivated and grazing land in the north. These problems trigger others, such as increasing 'natural' hazards (landslides, floods, forest fires), or the silting-up of downstream reservoirs, and the more general problem, relevant in all rural areas, of the population distribution in the countries (urban/rural population balance).

In the north these inland areas are mostly privately owned and are being increasingly abandoned by their owners, the land returning to its natural, vegetal state. In such situations, sustainable management of the area cannot rely on individual initiatives, since they lack both the means and the incentives for managing the territorial heritage. The solution can therefore only come from a collective approach to the problem, making the landowners accountable within the framework of long-term management schemes, while ensuring an appropriate mobilization of development funds. In the southern and eastern countries, the areas corresponding to the second group of agro-systems are still largely *used collectively*, including wooded areas. Where farming is possible, this collective use is challenged by the strong trend towards land privatization. However, ecological constraints in these vast areas offer no choice other than collective use, the only viable option. Several innovative experiences in participatory management of catchment areas, forests and natural pastureland are given below to illustrate this point.

This *diversity of territories* potential and issues call for different approaches and responses. These require a proper identification of the issues through a

quantification of past, present and future socio-economic and ecological developments for each of the major agro-systems. However, despite the enormous number of studies, maps and statistics available, this is still an exercise in its infancy. The paradox comes from the fact that the immense quantity of data about ecosystems is generally not combined with socio-economic information. Each approach develops outputs while using incompatible principles with the other approach; one uses bio-geographic zones and the other administrative boundaries. Consequently, even simple questions about socio-economic issues in either of the agro-ecological zones cannot be answered. What, for example, is the value of mountains in the entire Mediterranean Basin in terms of population, farm sizes or surface? Data are often available to formulate the answers, but experience shows that, with rare exceptions, quantifying studies are not made, because the problem of incompatibility has not been solved.

Within this context, the analysis of major indicators (both retrospective and future developments towards 2025) dealing with rural and agricultural population (see the next section), degradation in rural areas (the third section), and agricultural and food perspectives (the fourth section), can only be generic. Through further analyses and examples, an attempt will be made to highlight a few major 'territory'-specific challenges (the fifth section). The focus will be mainly on the second group components: the semi-arid and mountainous areas that are the most extensive and most threatened rural areas. The 'sustainability' of suburban rural areas will also be looked at briefly, while a full chapter of this report tackles the issue of water management. A final section will highlight the main goals and conditions of an alternative scenario for sustainable rural development in the region.

Rural and agricultural population: Divergent and unsustainable developments

In 2000 the region[1] had 133 million rural dwellers and 83 million farmers. The criteria and definitions used in each Mediterranean country to distinguish 'rural' from 'urban' differ widely, for example numbers of people not included in urban areas classified as 'cities' or 'municipalities', the number of residents of municipalities, the size of gathered populations, the population density, the level of service infrastructure, the agricultural population as a percentage of the active workforce, and the population thresholds (ranging from 400 residents in Albania to 10,000 in Italy). This makes international comparisons difficult. To enable comparisons, we will use the *Géopolis* database (the 10,000 resident threshold) or, when possible, the population density criteria. The OECD considers an area to be 'rural' when there are fewer than 150 residents per km^2; this has the advantage of illustrating the typical rural characteristic of low building density. It should be noted that the OECD statistics differ considerably from the FAO data from countries. FAO data are used here for data relating to agricultural populations.

Rural and agricultural populations have long been considered as one and the same. This historical situation changed considerably in Mediterranean Europe during the 20th century. The proportion of farmers as a percentage of the rural population is now no more than 28 per cent (the agricultural population is 12 million, the rural 43 million). In the southern and eastern countries, however, the two populations are still widely blended with a proportion of 79 per cent (71 million farmers and 88 million rural residents), although agriculture is no longer the only source of income. Rural poverty is such that it must be countered through job mobility and the search for income outside the agricultural sector, including emigration.

In the north, a collapse of agricultural manpower and the start of a 'rural revival'

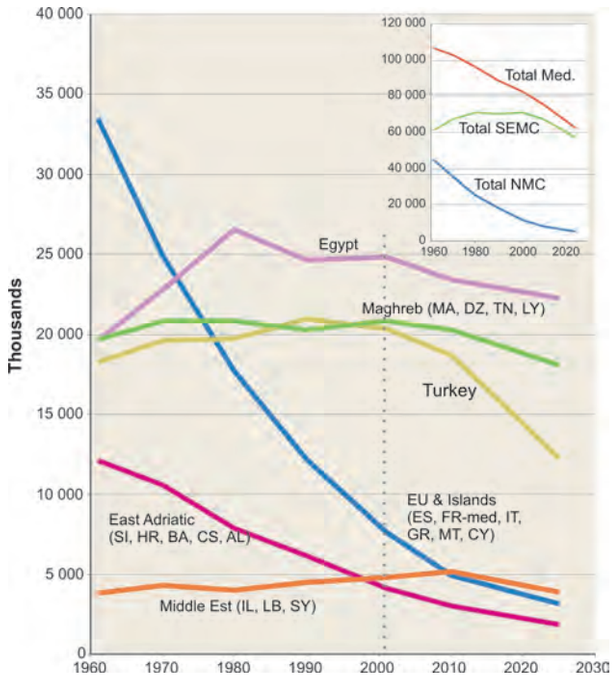
The collapse of agricultural manpower

The total agricultural population in the northern Mediterranean countries (NMC) fell from 46 million in 1960 to 12 million in 2000, 74 per cent in 40 years. The drop has been particularly high in the EU-Med countries (Spain, Mediterranean France, Italy, Greece, Malta, Cyprus and Slovenia), but has also been significant in the eastern Adriatic (Figure 5.2). The percentage of farmers in the total active population fell from 35.7 per cent to only 7.4 per cent in 2000 (3.3 per cent in France as a whole and 5.3 per cent in Italy, despite the economic importance of agriculture in both countries).

Changes often occurred long ago and may be profound, depending on the country. Mediterranean France was the most and earliest-affected region (starting at the end of the 19th century), followed by Italy (since 1950), Spain, Greece, Slovenia and Croatia (since 1960) and Cyprus (since 1970). The drop has only just begun in Albania.

Despite this rapid reduction, the agricultural share of total employment in the EU-Med regions (especially those on the fringes, i.e. Greece, the Mezzogiorno, Sardinia and Andalusia) is still two to three times higher than the EU average because of the relative importance of multi-activity and the remarkably strong attachment that many Mediterranean people (especially in Greece) continue to have with their native villages. However, analysis of age groups shows a sharp *ageing* of farmers

Figure 5.2 Total agricultural population in the Mediterranean countries, trends and projections to 2025



Source: FAO data, *Plan Bleu* projections

(the percentage of individual farmers aged 55 and over is 38 per cent in France, 53 per cent in Spain, 56 per cent in Greece and 62 per cent in Italy). This means that the large reduction in the number of farm workers will continue over the next two decades, including Malta and Cyprus (where the number of active farmers fell from 98,000 in 1961 to 33,000 in 2000 and is shrinking by 3 per cent per year).

The agricultural population of the northern countries is characterized by high economic stratification. Farm size distribution shows a great disparity and a high percentage of *small farms* (Table 5.1). The percentage of farms of 1–5 hectares is 55 per cent in Spain, 75 per cent in Greece and 78 per cent in Italy (compared with only 27 per cent in France).

Such a structuring of the farming sector is largely contrary to northern Europe's actual directions (including non-Mediterranean France) which are mainly very capital intensive and large-scale. On the other hand, it is in line with options based on intensification and enhanced quality.

From rural migration to rural revival

The collapse of northern Mediterranean agricultural populations has also resulted in a fall in other rural populations, which has strengthened *urbanization and 'coastal overdevelopment'* (concentration of population and activities along the coasts). However, after a very sharp drop in the agricultural population, there has been some stabilization of rural populations (even an increase in France). This shows some success in rural economic diversification efforts.

A comparative analysis of population changes in the Languedoc-Roussillon of France, the Marche of south-east Italy and Andalusia in Spain over the past century reveals the scale of rural migration, the time lags in countries, and the relative 'rural revival' characteristic of recent times (Figures 5.3 and 5.4).

In Languedoc, the rural population began to shrink at the end of the 19th century and led to a profound devitalization of rural areas, especially in the mountains. The 'rural revival' apparent in the past 20 years bears witness to the new 'attractiveness' of rural areas in an urbanized France that is seeking a better quality of life. In the Italian region of Marche, the drop only began in 1950 but was steep (much more so than in Tuscany) and lasted 20 years. Although less numerous than a century ago, the rural population has since stabilized, despite a continuing fall in the agricultural population. The same trends have been seen in Andalusia, although with a ten-year time-lag.

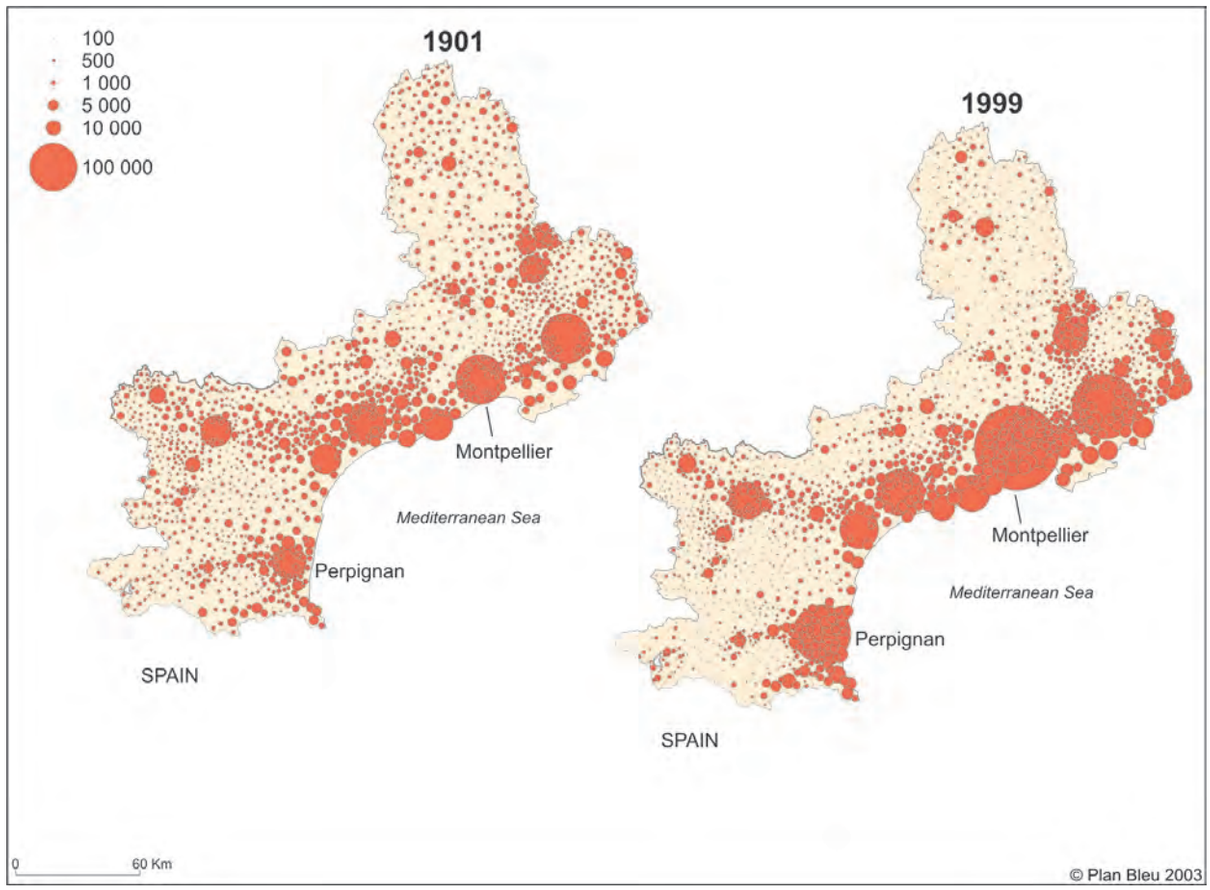
On a countrywide scale, this change in the rural world is confirmed, although with differences in trends: there has been a clear growth in the rural population during the past 20 years in Mediterranean France; stabilized

Table 5.1 Farm size distribution in EU Mediterranean countries

	Spain		France (total)		Greece		Italy	
Size (ha)	% UAA	% farms	% UAA	% farms	% UAA	% farms	% UAA	% farms
1–5	6	55	1	27	31	75	20	78
5–20	14	28	6	22	23	22	25	16
20–50	14	9	21	24	38	3	22	4
50–100	14	4	32	17	8	1	12	1
> 100	52	44	40	10	< 1	< 1	21	1

Note: UAA: Usable Agricultural Area.

Figure 5.3 The population of the Languedoc-Roussillon, France, in 1901 and in 1999



Source: INSEE data (www.insee.fr)

populations in Italy and Greece for 30 years and in Cyprus for 10 years. Spain continues to lose its rural population (a decrease of 2.3 million people since 1970) and this has only just begun to show signs of stabilization. Changes are equally striking in the eastern Adriatic, with a sharp decrease in Croatia (2.1 million now compared with 2.6 million 20 years ago) and in Bosnia-Herzegovina (2.1 million compared with 2.9 million). A fall is beginning in Albania and Serbia-Montenegro, but the rural population in Slovenia remains the same.

These overall figures hide important internal differences: the rural population has again become relatively dense in rural areas near cities and on agricultural plains (increase in residential functions), whereas the density has remained low or very low further inland, particularly in remote mountain areas.

Nevertheless, in the more developed countries, the population and economic revival is affecting even the remotest rural areas.

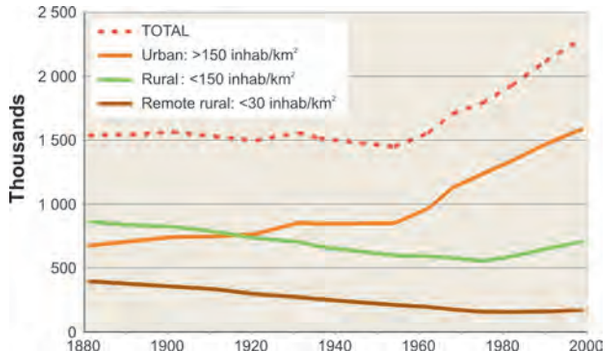
Towards a new social structure in rural areas

Farmers in northern developed countries are only a small and ever decreasing proportion of the rural population. Their farms continue to grow, and farmers are less and less concerned about the remaining, more marginal land that has been abandoned (left fallow or returned to woodland). They are often becoming '*multifunctional entrepreneurs*', with varying parts of their income derived from activities other than farming. Income supplements come mainly from food processing and agro-tourism. In Cyprus, for example, only 25 per cent of farmers make their living exclusively from agricultural work.

The activities of non-agricultural rural residents are becoming more and more diversified. With the collapse of the agricultural labour force, *labourers* have often become the largest professional category (important in the building sector, increasing in the food-processing industry, and decreasing in traditional activities such as textiles, leather and furniture). Moreover, there is a large

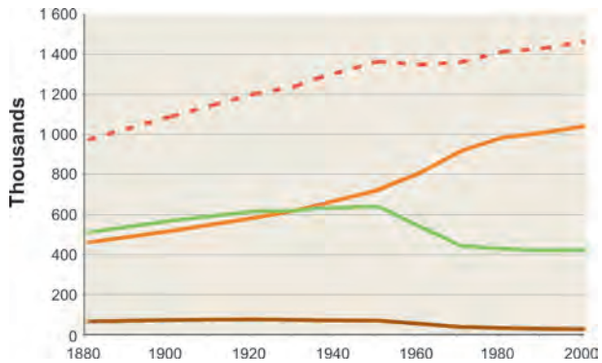
Figure 5.4 Urban, rural and 'remote' rural populations in three EU Mediterranean regions

Population of Languedoc-Roussillon (France) municipalities since 1881



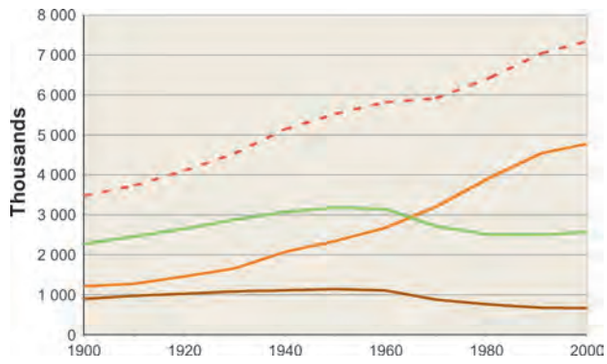
Source: INSEE

Population of Marche (Italy) municipalities since 1881



Source: ISTAT

Population of Andalusia (Spain) municipalities since 1900



Source: INE

number of *retired households*, *holiday homes*, and, in urban-dominated rural areas, many middle-class young couples with children.

In recent years there has been a remarkable growth in 'executive and upper intellectual professions', especially in France, where this group represented 20 per cent of the rural working population in 1990, and is still growing. *Tourist facilities in rural environments* are also increasing: 415,000 B&B rooms and furnished tourist apartments in 1988 in Mediterranean France (with a spectacular increase of 631 per cent in eight years) and 342,000 camp sites, including small ones in nature areas, compared with only 146,000 hotel rooms.[2] Tourist stays are less and less focused on 'topical' activities (the main ones being hiking and visits to cultural sites). What matters is the living environment, reception on a human scale, friendliness, a variety of activities and the quality of products.

The intense relationships established with cities and the convergence between rural and urban lifestyles have not prevented the continuation of marked differences. *Differences between urban and rural dwellers* remain steady and even increasing in the field of public services: reduction in public transport, closing of primary schools, cinemas, small businesses, local bank branches, post offices, etc. Although household incomes remain lower than in cities, rural dwellers benefit from lower unemployment rates and cheaper housing and food (a significant part of expendable income). In suburban areas, households demonstrate their difference from towns by willingly buying directly from the farm.

H*unting* remains a very important social and cultural activity, but often sets 'traditional' rural dwellers up against 'neo-rural' and town dwellers. Friction also exists between hunters, a growing percentage of whom no longer have their primary residence where they hunt, and farmers and foresters who are victims of the increasing damage caused by larger fauna. Also general opinions about managing forests and nature differ.

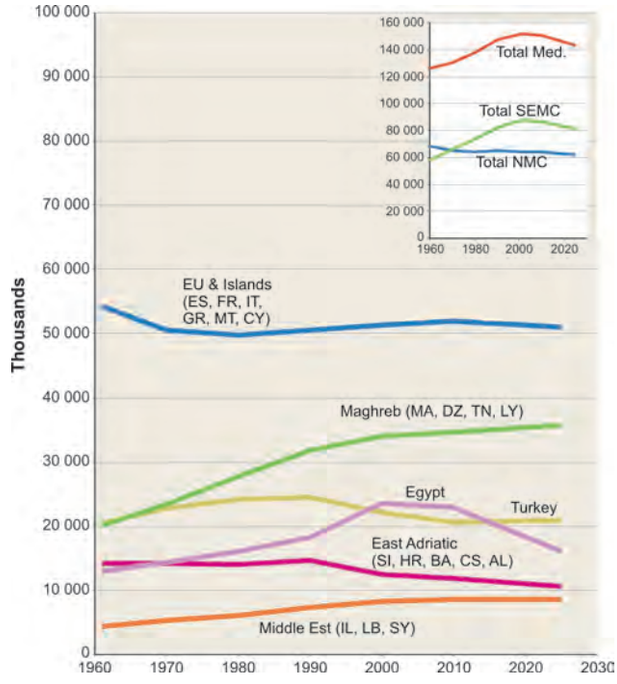
The fragmentation of the rural population in the north into categories with different concerns (of a professional, environmental, aesthetic and cultural nature) creates specific problems when formulating local development strategies, which should be based on a common, shared interest and vision for the future. However, the new social diversity is also an opportunity for innovation and convergence between the many actors now involved in rural areas. The dynamics of associations, the emergence of new generations of elected officials representing this diversity, and innovative businesses bear witness to an undeniable renewal in many rural regions, even remote ones. Added to that are the effects of a certain cultural renaissance that tends to create regional identities, sometimes exclusive ones, but fortunately, often being open and creating attractive environments for tourism and local activities.

A sharp decrease in agricultural employment by 2025, with the rural population remaining stable

In the baseline scenario, the current trend of a large decrease in the agricultural labour force continues. For the four EU-Mediterranean countries[3] this is projected to decrease from 3.6 million in 2000 to 2.25 million by 2010 and 1.43 million by 2025. The percentage of the working farm population in 2025 is projected to be less than 1.5 per cent in France and 2 per cent in Italy. Increasing farm sizes and abandoned farmland will have many negative consequences in terms of sustainability. The geographically increasingly concentrated farming systems will be decreasingly able to maintain the quality of landscapes. The decrease in the agricultural labour force will reduce professional community solidarity and the ability of the agricultural world to resist urban sprawl, especially on the coastal plains. Mountain herders, even less numerous, will have to fall back to difficult, risky techniques such as large-scale pastureland fires. To compensate, society will increasingly have to assume land management responsibilities, using public funds (for river, footpath and hedgerow maintenance, forest management, fire-fighting and the regulation of large fauna).

On the other hand, the baseline scenario confirms a stabilization of the rural population and economic diversification (Figure 5.5).

Figure 5.5 The rural population in Mediterranean countries: trends and projections to 2025[4]



Source: Attané and Courbage, *Plan Bleu* 2001 (see Statistical Annex)

Despite the drop in the agricultural population, the total rural population of the four EU-Mediterranean countries is projected to remain fairly stable (Box 5.1). An increase is not excluded if the French example (with a new attractiveness of rural areas) were to be widely followed by other Northern countries. The impact of population changes will differ between areas: positive in intermediate and 'remote' areas, which will succeed in their economic and cultural revival; negative in other areas (particularly in some remote mountain areas), which will see little in the way of a revival, but rather a stronger decline; and negative for the suburban rural areas, where encroachment of farmland and loss of 'rural character' will increase sharply.

Box 5.1 Four possible scenarios for the rural areas in the developed Mediterranean countries

With the constant decrease in the number of farmers and the ever increasing demand for countryside, the future of rural areas in developed countries is called into question everywhere. A recent prospective exercise for France, but widely applicable in other northern countries, describes four possible scenarios to 2020. The trend scenario is a liberal one with a reduction of EU Common Agricultural Policy (CAP) funding and farming, and an evolution towards a '*generalized residential countryside*'. It meets the short-term demands of the middle classes, but is costly in environmental terms (an all-car scenario with increasing areas of built-up and other artificial land). It also comes with growing social inequality (dreams of a life in the countryside remain inaccessible to the poorer classes) and social risks (growing urban insecurity). The second scenario, '*sustainable cities and rural agribusiness*', is one of sudden change. It would see residential development being jeopardized by restrictive laws, and a conversion towards eco-friendly farming and agricultural policies, which remain or become strong again. Governments, big cities and a 're-shaped' farming profession would be the driving actors. Agriculture would integrate environmental concerns, combining scientific progress and the 'green lung' function for major urban areas. Served by public transport, edge cities would become denser. The third scenario, '*sustainable cities and nature marketing*', is a variation on the second, where government intervention would recede, farming would not succeed in its environmental transition, and environmental markets would become more widespread. The fourth scenario, '*industrious and competitive countryside*', shows a rural life with local initiatives, entrepreneurs and lively territories, while urban areas are in crisis. This scenario would see weakened central power (reduced state influence) and strong local powers. A collective economic identity would grow around rural centres, small towns and rural areas thanks to active and diversified entrepreneurship. The risks of this dynamic scenario are the creation of inequalities between rural regions, and the undermining of salaried middle classes, which have until now been relatively protected.

Source: DATAR, 2003

In the south and east, large and vulnerable populations: Agricultural duality, poverty and rural migration

Very large agricultural populations and major internal disparities

In the southern and eastern Mediterranean countries (SEMC), agricultural populations have not fallen as in the north. On the contrary, they have and continue to increase in absolute terms. The total agricultural labour force in the SEMC was 32.4 million people in 2000 (compared with 25.4 million in 1960), while the total agricultural population reached 71 million (compared with 61 million in 1960).

Changes, however, vary between countries: both the agricultural labour force and the total agricultural population in Syria, Egypt and Algeria are growing. The agricultural labour force in Turkey, Morocco and Tunisia is still growing, while the overall agricultural population has now stabilized. Lebanon and Libya have recorded a spectacular drop. Israel has recorded a smaller decline.

Despite this increase in absolute terms, the *relative* percentage of the agricultural labour force has decreased considerably, because of strong urban growth. In 2001 it nevertheless remained very high in Turkey (46 per cent), Morocco (36 per cent) and Egypt (33 per cent), high in Syria (28 per cent), Tunisia (24 per cent) and Algeria (24 per cent), but was very low in Israel (2.7 per cent) and Lebanon (3.7 per cent).[5]

These overall figures hide extremely large internal differences as shown by the data on farm structures (Table 5.2).

The developing countries are characterized by an *agricultural duality* where modern, competitive farming co-exists with subsistence farming, and duality still tends to increase. Land and capital concentration on one hand, and the fragmentation of small-holder farms on the other, can be observed. The large farms (>20ha), which represent less than 2 per cent of farms in Lebanon, 5 per cent in Turkey and 12 per cent in Tunisia, contain 20 per cent, 35 per cent and 61 per cent, respectively, of the usable agricultural area. At the other extreme, small-holders with 0–5ha are in the great majority (97 per cent of all farms in Lebanon, 68 per cent in Turkey and 53 per cent in Tunisia), but possess only a small part of the usable agricultural area (55 per cent, 24 per cent and 9 per cent respectively).

In a context of natural resource scarcity (land, water) and economic insecurity, *agrarian structures* have been disrupted, suffering from increasing fragmentation. By comparing census data for 1962 and 1995 in Tunisia, it is apparent that the number of small farms (less than 5ha) increased in a spectacular way (89 per cent) during that period. In Morocco the total number of farms remained stable between 1974 and 1996 (1.43 million); the number of large farms increased slightly (110,000 in 1996 compared with 102,000 in 1974); the number of pastoral farms dropped sharply through a settling process (from 307,000 to 65,000 between 1974 and 1996). A large percentage of farms are still subsistence farms. Particularly poor farmers with land under the viability threshold (less than 3ha for drylands or 1ha for irrigated land) have no survival strategy other than to seek other income through temporary migratory work. Farms of less than 3ha (41 per cent of farms) cover only 5 per cent of total irrigated land.

The 'duality' of agrarian structures and territories has been reinforced by the lack of equitable land policies and excessive polarization of public investments. Concentration in landownership and capital is occurring everywhere and tends to be amplified, including in the steppe regions with large-scale cattle raising. Although irrigated areas have become islands of relative prosperity (agricultural intensification, collective equipment), rain-fed farming areas are suffering from marginalization, which also has a cumulative effect (lack of economic dynamics, lack of infrastructures). An aggravation of social and regional inequalities can thus be observed.

Table 5.2 Agrarian structures in selected southern and eastern Mediterranean countries

	Turkey		Tunisia		Lebanon	
Size (ha)	%UAA	% farms	%UAA	%farms	% UAA	% farms
0–5	24	68	9	53	55	97
5–10	20	18	15	20	14	5
10–20	21	9	15	15	11	<1
20–50	20	4	24	9	11	<1
> 50	15	1	37	3	9	<1

Source: Plan Bleu from CIHEAM; Ministère de l'agriculture du Liban; FAO

The scale of rural poverty in the SEMC

In the SEMC, the *rural population* is still mostly identified with the agricultural population (for example 78 per cent of the rural households in Morocco[6]). Despite much rural migration, in Turkey and Morocco in particular, the rural population has increased in absolute terms. This increase was much less than that of the urban population, despite fertility rates that are significantly higher in the country than in towns, thus confirming the scale of rural migration. However, there are big differences between countries. Egypt, Syria, the Palestinian Territories and Algeria have recorded a high and continuing growth in rural population, with a slower growth in Israel and Libya. On the other hand, after very large increases over the past few decades, the rural population in Turkey has begun a sharp decline in the past decade (being a country where the scale of rural migration and its related impacts are worrying, especially the extremely fast growth of the Istanbul urban area). In Tunisia, Morocco and Lebanon the rural population has stabilized.

Egypt seems to be a special case, since rural migration seems almost to have stopped. This could be explained by several factors: farming is all irrigated (thus suffering less from drought, while yields are much higher), the 'usable' national territory is densely populated, has a good transport system and operates like a vast 'conurbation', and urban poverty is now as severe as rural poverty.

The major issue in most of the developing Mediterranean countries (and in some eastern Adriatic countries) is *rural poverty*, which manifests itself in monetary poverty, educational poverty (in particular illiteracy), and basic services poverty (Box 5.2). Almost all indicators show a very great inequality with urban dwellers, even though the rise of urban poverty is tempering this situation.

Box 5.2 Rural poverty in the Mediterranean developing countries, the magnitude of the disparities with urban dwellers

- Percentage of the population living under the poverty line: 30 per cent of rural Algerians in 1995 against 15 per cent of urban dwellers, 27 per cent against 12 per cent in Morocco in 1998–1999, 13.9 per cent against 3.6 per cent in Tunisia in 1995, 29.6 per cent against 20.1 per cent in Albania in 2002, 19.9 per cent against 13.8 per cent in Bosnia-Herzegovina in 2001–2002.
- Access to drinking water in 2000: 56 per cent of rural dwellers in Morocco against 98 per cent of urban dwellers, 58 per cent against 92 per cent in Tunisia, 82 per cent against 94 per cent in Algeria.
- Access to sewage in 2000: 42 per cent of rural dwellers in Morocco against 100 per cent of city dwellers, 47 per cent against 90 per cent in Algeria, 81 per cent against 98 per cent in Syria, 70 per cent against 98 per cent in Turkey, and 87 per cent against 100 per cent in Lebanon.
- Access to electricity: 26 per cent of rural dwellers in Morocco in 2000 against 91 per cent of urban dwellers, 77 per cent against 98 per cent in the Middle East.
- Access to health services (1990–1996): 50 per cent of rural Moroccans against 100 per cent of urban dwellers, 84 per cent against 96 per cent in Syria, 85 per cent against 98 per cent in Lebanon, and 95 per cent against 100 per cent in Algeria.
- Schooling rate in primary education: 77 per cent of rural children in Morocco against 93 per cent in towns.
- Schooling rate in secondary education: 8 per cent in rural Morocco against 49 per cent in towns, and 50 per cent against 78 per cent in Turkey. In Albania, only 3 out of 10 children attend secondary school in rural areas, compared to 7 in Tirana.
- Rate of adult illiteracy: 81 per cent of farmers and 79 per cent of rural Moroccans in 1994 against 41 per cent of city dwellers, 71 per cent in rural Algeria against 43 per cent in 1987, 60 per cent against 32 per cent in Tunisia in 1989, 17 per cent against 12 per cent in Lebanon, 63 per cent of illiterate women and 36 per cent of illiterate men in rural Egypt against 34 per cent and 20 per cent respectively in towns.

Source: UNSD Millennium Indicators; Statistics Global Report on Human Settlements 2001; World Resources 1998–1999; World Development Indicators 2004; UNESCO yearbooks; national statistics institutes, UNDP

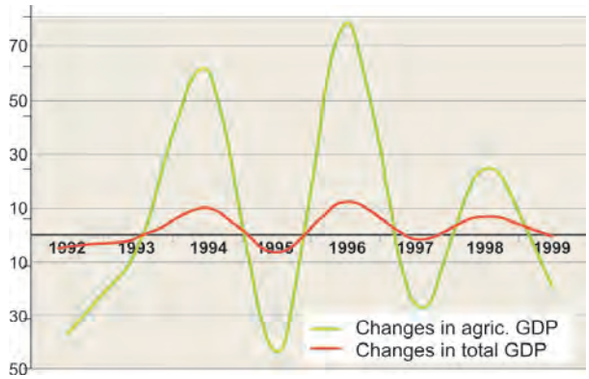
Such gaps are perhaps demonstrative of a lack of consideration for rural populations by the dominant urban elites. Important efforts have recently been started, however, to better equip countrysides in countries where such deficits have accumulated. A greater effort is underway towards equity between rural and urban areas, and a better understanding of challenges for the national economies. For example in Morocco, a plan for grouped supply of drinking water was launched for the rural population in 1995 (PAGER), funded by many donors, charging higher water prices to consumers. This plan aims at filling a major gap in access to drinking water: from 14 per cent access in 1990 to 97 per cent by 2007. In Tunisia, in 2003, the access rate to drinking water was 86 per cent in rural areas (against 100 per cent in urban areas).[7]

The continuing degradation of natural resources (desertification) and the rise in the number of droughts over the past decade have increased poverty and affect most national economies in the region. The fluctuations in wheat yields since 1990 show the magnitude of the reduction, excluding Egypt (where farming is less vulnerable because it is entirely irrigated).

Lost crops mean lost income. Moreover, in subsistence farming, crop loss can force farmers to borrow in order to make ends meet. This leads to household debts

and an increased vulnerability of smallholders, who are sometimes even forced to sell their land. These losses weigh very heavily on all national economies, as shown by the comparative development of agricultural and overall GDP in Morocco between 1992 and 1999 (Figure 5.6).

Figure 5.6 Drought-related fluctuations in agricultural and total GDP in Morocco, 1992–1999 (annual %)



Source: Direction de la statistique, 2000 in Reiffers, 2000

Increasing poverty through free trade?

The liberalization of agricultural trade, under negotiation between countries at various levels of development, could lead to an increase in rural poverty. Liberalization has been on the agenda since the Marrakech Uruguay Round farm agreements (WTO in 1994), the implementation that same year of the North-American Free Trade Agreement (NAFTA), expanded to include agriculture, and the signing of agreements between the EU and countries such as Mexico and Chile, and between the US and Jordan or Morocco. Although agriculture is still not included in the Euro-Mediterranean agreements, negotiations are underway for more effective free trade with the southern and eastern partners. Free trade, such as that between the US and Mexico, could open currently protected cereal-crop farming and cattle-raising to competition. These systems have very different land tenure structures and set-up conditions in terms of natural, human, technological and institutional capital.

In several developing Mediterranean countries, import custom rates on cereals in 2003 averaged between 10 and 77 per cent.[8] Such protective measures are in addition to internal support for the consumption of these products, a strategic measure to maintain social stability. High grain prices provide an annual income for middle-class farmers on good agricultural lands and affect countries' manufacturing competitiveness, but also enable the economic survival of millions of poor farmers. These protective measures are, however, not comparable with those of the US or the EU, which provide average subsidies per producer per year of 21,000 and 17,000 euros, respectively (average 2000–2002, OECD).

Developments in Mexico after NAFTA came into force in 1994, and observed by the Commission for Environmental Cooperation (a tripartite commission comprising the US, Canada and Mexico), confirm the potential risks in terms of sustainability for fragile rural areas in developing countries entering north–south free trade zones and competing in essential agricultural production (cereals and livestock) (Box 5.3). The loss of income of small Mexican corn producers, due to lower prices after the gradual de-protection of tariffs, has led to growing demands for re-examining the agreement or coupling free trade with structural funds. National policies (direct aid to farmers and rural development) were then implemented to support the necessary transition.

Box 5.3 The impact of NAFTA on Mexican agriculture and the environment

Impacts include:

- a strong growth in trade, including agricultural trade. The export of Canadian tomatoes to the US has increased by 3000 per cent, and the sales of American beef and veal to Mexico by 400 per cent, followed by grains, animal fodder and vegetables;
- vertical integration of the agricultural sector is especially rapid, particularly in Mexico where it is stimulated by American investment;
- the gradual adoption of modern agricultural production methods and the resulting specialization, even on small farms, has lead to a simplification and mechanization of production methods. Local resources (manpower, traditional seed, subsistence farming, natural pesticides and fertilizers, and locally produced fodder) are gradually substituted by commercial products (machines, hybrid cultivars, chemical products, and industrial animal feed) that are in general more harmful to the environment;
- a growing dependence on genetically modified crops, which is considered a risk to the long-term stability of agricultural production, as well as a threat of epidemics caused by plant diseases or parasites;
- agricultural production is less and less diversified, removing the stabilizing effects of such diversity (increased dependence of farmers on social assistance programmes);
- a drop in income in absolute terms (GDP per capita) in the poor southern regions of Mexico since 1994. The growth of rural poverty is considered a major cause of environmental degradation in general, of land degradation and loss of

biodiversity (both habitats and species) in particular. An increased loss of biodiversity will be all the more worrying since it concerns a region containing 10 per cent of the world's biodiversity, and which is losing 600,000ha of forest land per year;

- the macroeconomic effects of production concentration, market integration and specialization are otherwise hard to measure. Some think that the predicted benefits have not necessarily materialized, since the savings realized through lower prices are benefiting the food processors and distributors and not the consumers.

Source: Commission for Environmental Cooperation of North America (CEC), 2002

Recent P*lan* B*leu* studies confirm that a drop in cereal prices not accompanied by compensation for farmers would lead to a vicious circle of *impoverishment* for subsistence and semi-subsistence farms (the majority) without alternatives (Box 5.4).

Box 5.4 The impact of free trade on rain-fed agriculture in Morocco

A study carried out by *Plan Bleu* shows that an immediate alignment of Morocco's cereal prices with world prices would probably result in:

- a 20 per cent drop in usable agricultural area for cereals;
- a drop in the area actually used for soft wheat, durum wheat and sweet corn;
- an actual increase in the area for growing barley.

Subsistence and semi-subsistence farms of less than 5ha (67 per cent of the total number of farms) would be the most threatened, given the area devoted to soft wheat (33 per cent of the UAA, low margin per quintal and their dependence on the market).

Source: Jorio in PNUE-PAM-*Plan Bleu*, 2002

It is therefore legitimate to fear that *non-regulated* liberalization of international trade in agricultural products may have very negative effects on fragile rural regions in some southern and eastern Mediterranean countries, in particular rain-fed farming countries that have a large population of poor farmers, so in fact on the whole region. The risks of such a scenario (increasing poverty and instability) call for consideration of an alternative scenario.

Given the magnitude of the social and food security challenges, and the risks of instability in several rural southern and eastern countries, it is likely that their shift to agricultural free trade will be gradual or at least partial. The *transitional forms set out by the* WTO make this possible: by accepting the principle of taking aspects other than the commercial agricultural ones into account, and by a special, differentiated treatment of developing countries through a more gradual abolition of protective tariffs and internal support. Such measures might serve as a basis for vulnerable countries (even if they are not WTO members) to negotiate their transition to agricultural free trade, knowing that no obligation other than a contractual one would be required of sovereign countries. A concerted Euro-Mediterranean approach, founded on a mutual recognition of the legitimate interests of the partners and the common interest of the region, would be an important progress in bringing together the viewpoints of rich and developing countries, and influence negotiations where, until now, the Mediterranean appears to be divided.

Between now and 2025: A stabilized rural population and the start of a reduction in the agricultural labour force

FAO projections point to a still limited reduction in the total *agricultural population* in the southern and eastern countries (from 71 to 67.5 million by 2010) despite an increase in the agricultural labour force (from 32.4 to 34.2 million). By 2025, the Blue Plan baseline scenario assumes a sharper decrease in both the agricultural population and the labour force, which may reach 57.1 and 28.3 million, respectively, figures that still remain pretty high. Changes will vary according to the countries, in some of which (Algeria, Syria, etc.) total agricultural population is still projected to grow in absolute terms until 2010 or 2015, whereas the decline observed in Turkey is expected to be confirmed (and should speed up with the scheduled integration into the EU).

Despite the moderate projected decrease in agriculture population, all various available projections predict a rather stable, even increasing rural population in absolute terms. Egypt is again an exception, where the projected decrease in the rural population will not result from rural migration but from a growth of rural villages into 'towns' with over 10,000 residents, while still maintaining a not particularly urban character.

The baseline scenario in the developing countries is therefore one of *large stable rural 'agricultural' populations* (and therefore stress on natural resources), in particular up to 2015. Unless there are major improvements in agriculture and above all in economic diversification, rural poverty (which undermines the development of national economies and results in migration to cities and emigration) is projected to continue despite current efforts for better equipping the countryside.

Land dynamics and the extent of environmental degradation

The region is characterized by the speed at which changes in land use are occurring and by the scale of the

observed environmental degradation. Some forms of degradation are common to both shores, others are more sub-region-specific depending on differences in socio-economic, population and environmental conditions.

Cultivated lands, pastureland and forest: Pressures in the south and east, abandonment in the north

Cultivated land, pastureland and forests occupy similar land cover areas in the eco-region. Their relative percentages are, however, unequal, depending on the country (Figure 5.7).

Arable land (wheat, etc.) and permanent crops (vines and fruit trees) cover limited areas. They represent only 102 million ha (41 million ha in the NMC, or 32 per cent of the total land area, and 61 million ha in the SEMC, or 9 per cent).

Pasture land, on the other hand, is quite extensive with some 118 million ha of permanent meadows and pasture lands (27 million in the NMC and 91 million in the SEMC).

Forests occupy 91 million ha, including some 34.2 million ha of 'other woodlands', that is mainly areas covered with low-grade wood and shrubland (including *macchia* and *garrigues*). They are very unevenly distributed in the eco-region with 42 per cent forest cover in the NMC (from Spain to Turkey) compared with only 4.7 per cent in the SEMC (7 per cent in Lebanon and 1.6 per cent in Algeria).

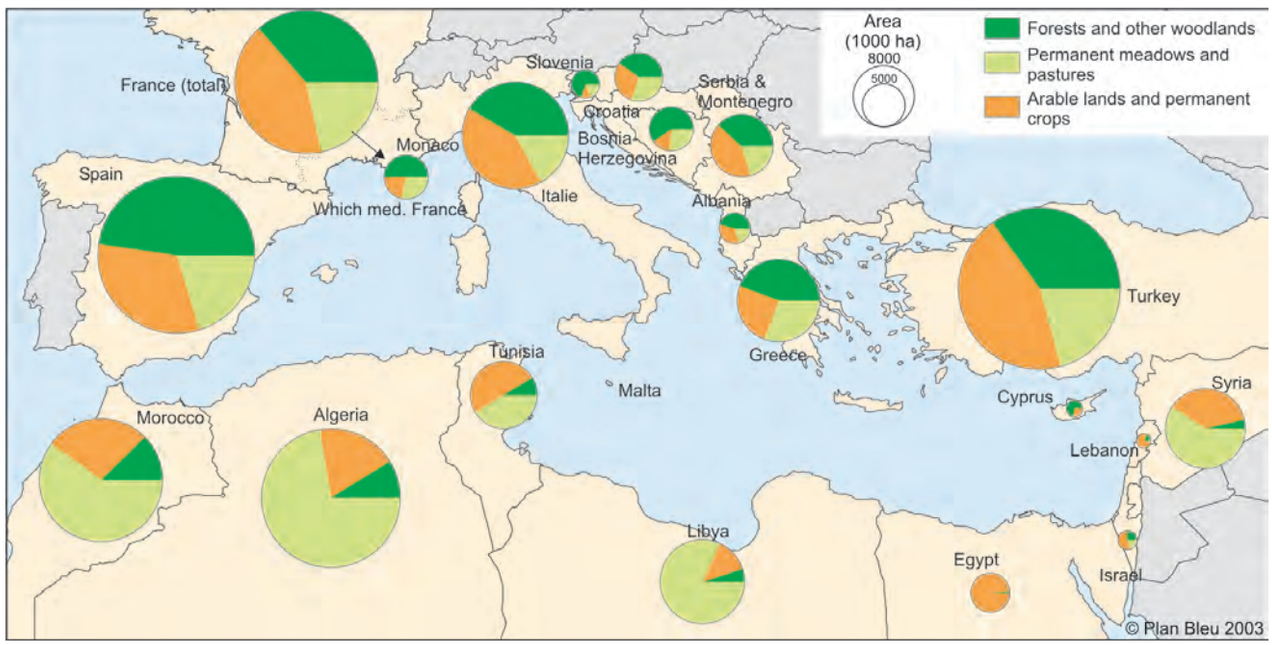
Cultivated land: The importance of permanent crops

Most arable land is used for *grain crops* (43.5 million ha, including 28.6 million ha of durum wheat). P*ermanent crops* (18 million ha) are increasing rapidly and include 7.7 million ha of olive trees and 3.6 million ha of vineyards. They are major components of the Mediterranean landscape.

With population growth in the south and east, the amount of arable land per capita (Figure 5.8) has become extremely low in several countries (less than 0.06ha/cap in Israel, Lebanon, Egypt, Malta, and the Palestinian Territories). The fall is rapid in all SEMC. Also in the NMC, arable land per capita is decreasing due to abandonment and urban sprawl (0.14ha in 2000 in Italy compared with 0.25ha in 1961).

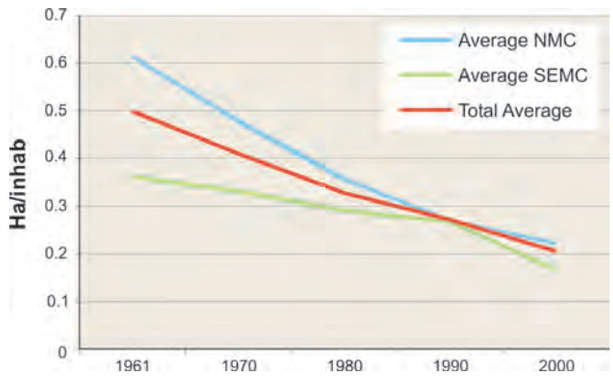
In the *south and east*, the total amount of cultivated land (arable land plus permanent crops) increased from 55 million ha in 1960 to 61.2 million in 2000. Land hunger has led to a strong growth in cultivated land, in particular in the five North African countries. The increase over the past 40 years is considerable: Morocco (40 per cent), Egypt (28 per cent), Tunisia (18 per cent), Algeria (16 per cent) and Libya (9 per cent). The crop rotation rhythm has diminished over the past few years since the possibilities of bringing new land into cultivation are finite. However, new farmland includes pastoral areas, forests and deserts. This new land is of much poorer quality than arable land lost to

Figure 5.7 The relative percentage of forest, cultivated land and pasturelands



Source: FAO

Figure 5.8 Arable land per capita



Source: World Bank

urbanization. In several southern and eastern countries, the pressure will remain very high at least up to 2015, which will lead to increased degradation of land resources (deforestation and desertification).

In the N*orth*, on the other hand, the area under permanent crops in the four EU-Mediterranean countries is stable or slightly increasing, while arable land is continuing to drop sharply (from 27.8 million ha in 1990 to 24.6 in 2000). The decrease is particularly sharp in Italy (38 per cent in 40 years). It is not insignificant in Spain either, where it has accelerated over the past few years (13 per cent in ten years), and in Mediterranean France. It has also fallen in Bosnia-Herzegovina, although for other reasons. Some countries have recorded significant drops after a continuous rise: Turkey (an increase of 13 per cent from 1960 to 1980 followed by a decrease by 6.3 per cent from 1980 to 2000) and Greece (an increase by 5.5 per cent from 1960 to 1980 and a decrease by 2.5 per cent from 1980 to 2000).

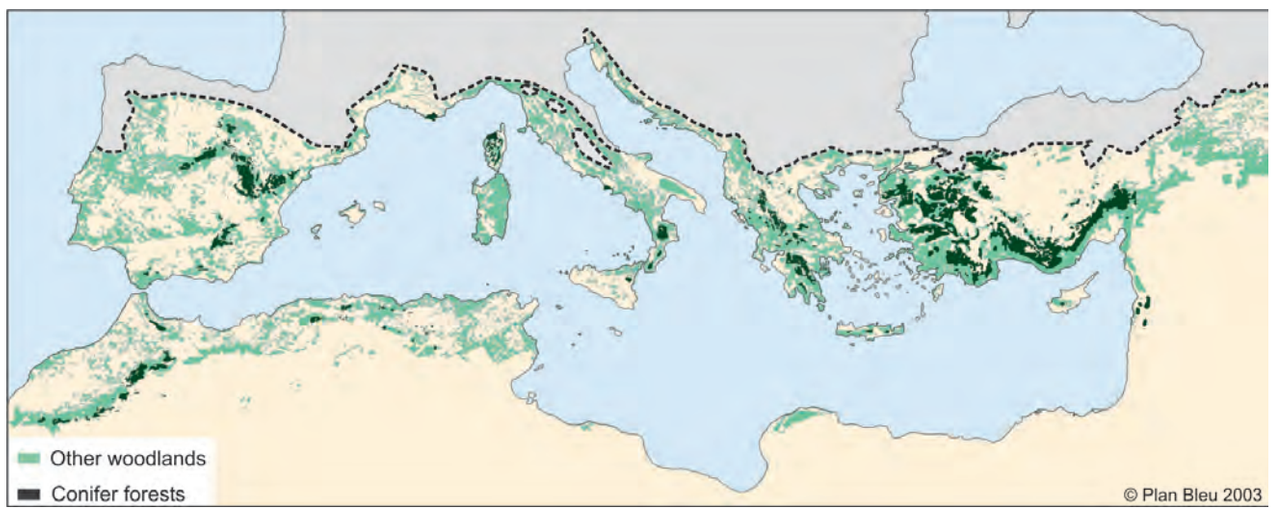
Pastureland, a major component of the Mediterranean landscape

Pastureland corresponds to the old *saltus*, and is still an important component of the Mediterranean eco-region, whereas it has almost completely vanished from the agricultural regions of northern Europe. Vast grazing lands (plateaux and steppes) are found mostly in Maghreb: Algeria with 31.5 million ha of 'permanent meadows and pastures', Morocco with 21 million, Libya with 13.3 million, Turkey with 12.4 million, Spain with 11.5 million and Syria with 8.4 million.

The natural grazing lands in the NMC were largely vanished from the rural landscape when the extensive, migratory herding of the old days disappeared. Considerable reductions in grazing land (2 million ha) also occurred between 1980 and 2000. A main consequence is that the abandoned land is gained by dense shrubs, which, in the absence of repeated fires, may evolve towards forests. In areas where extensive herding has continued, population density becomes too low for the herders to be able to properly manage the lands as they used to. Although there is a lively debate on this issue, the extensive herders of Corsica and the Pyrenees have, for example, been accused of causing many forest fires, since burning pastures is a necessary but hard-to-control practice in these conditions.

Grazing land in the SEMC on the other hand, has maintained its importance as a basic resource with

Figure 5.9 Wood cover in the Mediterranean region



Source: Plan Bleu, from UNEP-WCMC (www.unep-wcmc.org)

considerable and *extensive grazing by sheep and goats*. This component of the rural areas is, like the others, subject to population pressures, manifested in the overexploitation of grassland resources by livestock densities that are too high (in the Maghreb countries the number of sheep and goats is estimated at 50 million). Traditional practices for managing pastoral lands that ensured the maintenance of main ecological balances are no longer applied. Social frameworks have mostly disintegrated and the collective grazing lands tend to be increasingly privatized. Some experiences (see the section entitled 'Territorial challenges in the Mediterranean', p282) show that approaches exist that may lead to the restoration and sustainable management of these resources.

Woodlands: Degraded in the south, risks of forest fires in the north

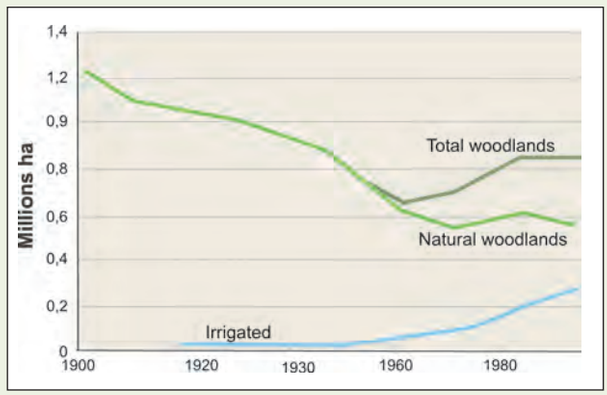
In the southern and eastern countries: are woodlands increasing or declining?

In the southern and eastern Mediterranean, a first look at data on woodland areas shows that, with the exception of Lebanon, the forested area is stabilizing in Morocco, Tunisia, Syria and Turkey (and even increasing in Algeria, by 1.3 per cent per year) after a long period of decline (Figure 5.9, Box 5.5). This interpretation, however, requires some caution, because 'forest land' covers widely varying situations. Stabilization or increases in North Africa and the Near East result mostly from *reforestation*. This also explains the large annual increases recorded over the past few years in forest-poor countries such as Israel (4.9 per cent), Libya (1.4 per cent) and Egypt (3.3 per cent). Therefore, the need to be cautious with these figures, since forest statistics include replanted areas, even if the survival rate of planted trees is very low.

For *natural forests*, in contrast, the picture is much less encouraging. In general, the naturally wooded area is declining, while the composition of the wooded land is degrading. Many forest areas with tall trees are changing into shrublands such as *macchia* or *garrigue*, or habitats are being fragmented by increasingly large clearings, which nevertheless continue to be counted in the statistical category of 'forest land' (Box 5.6).

Box 5.5 Changes in forest land and irrigated areas in Tunisia over a century

The graph below shows a two-stage change in Tunisia. The decrease in forest area, especially significant between 1900 and 1970 (more than 500,000ha was cleared) is explained mainly by strong population growth not combined with sufficient economic diversification, and by mechanization of the best lands in the plains. This led to marginalization of a large part of the farming community, forcing many to fall back on clearing and exploiting marginal lands. Since 1970 the change (which started as early as the 1950s) has been characterized mostly by agricultural intensification through irrigation. Pressures on marginal lands remain very high, however, and the loss of natural forest is partly compensated by considerable reforestation.



Source: Blue Plan from Auclair, 1997

Box 5.6 Shrub encroachment

Shrublands are areas composed of low-grade woody plants, often very dense (including *macchia* in acid soil, *garrigue* in calcareous soils and other types of shrubs). Shrub encroachment is a process in which taller trees gradually disappear while shrubs increase. Once degradation is well advanced or when the natural conditions are very hard, the shrub stage is often overtaken or even skipped, turning into steppe land, which can lead to bare soil or to the formation of a mosaic of grass or brush tufts separated by bare soil, a condition that is hard to reverse. Shrublands originate from old overexploited forests because of rural poverty (practices such as the cultivation of marginal lands that are susceptible to erosion, over-grazing by goats, and overexploitation for fuel wood) or from degraded forest because of (too) frequent forest fires; they can also occur on former agricultural or pastoral land that has been abandoned after rural migration (or simply abandoned) and naturally recovered by vegetation. A large percentage (34.5 million ha) of the 'other wooded land' class (FAO classification) in the region corresponds to shrubland, which is found all around the Mediterranean. These areas are therefore an expression of a particular part of Mediterranean history: forest degradation and/or the regression of agricultural and pastoral land.

There is thus a discrepancy between the impression (based on statistics) that the forest situation is generally improving in the SEMC, and the sometimes very alarming findings of many specialists who estimate that forest decline could reach 2–4 per cent per year in a number of these countries. Given the 'land hunger',

which is projected to continue in the south (and to a lesser degree in the east) until at least 2015, it is likely that the pressure on forest land will remain very strong and result in *continuous* and sometimes irreversible *degradation*, unless appropriate policies are developed.

In the North, increasing wooded areas and risks of forest fires

In the NMC, recent changes have seen a large or very large increase in forest cover: 0.9 per cent per year in Greece, 0.6 per cent per year in Spain, more than 10 per cent in 12 years in most of Mediterranean France (sometimes even 28 per cent), and 3.7 per cent per year in Cyprus between 1990 and 2000. The exceptions are Albania with a 0.8 per cent decrease per year between 1990 and 2000 and Serbia-Montenegro (with a 0.1 per cent decrease). Here abandonment of farmland, as seen in the other countries, is still a very recent process.

This rapid increase in forest cover has partly been the result of continuous reforestation policies, very often carried out or subsidized by the state to re-occupy abandoned private land with marketable woody vegetation (mainly Austrian pine). However, a large part of the re-vegetation has occurred spontaneously, when *dense shrubs* and *macchia* – with little commercial value – encroach on abandoned agricultural land.

Given the projected fall in the number of farmers between now and 2025, and the change in farming practices, this very rapid growth of forests and shrublands is expected to continue at a similar rate. This 'repossession' of rural areas by a wooded biomass with positive economic and ecological effects is contrasted by negative effects such as the formation of 'closed' landscapes or under-forest layers with low differentiation. But above all, the resulting *increased risks of major forest fires* have and will continue to have the most important ecological, economic and human impacts at both social and political levels. The gravity of these risks is confirmed by recent data showing a rise in the number of fires. Between 1990 and 2000, 40,000 fires were recorded per year on average (including over 17,500 fires in Spain and 11,000 in Italy) compared with 31,000 between 1981 and 1988, or 30 per cent more in ten years. On the other hand, although the number of fires has increased, the burned surface (about 400,000ha per year), which had continued to rise for several decades, is on the decline. This may be due to improved fire-fighting efficiency. Despite this progress, the baseline scenario, which assumes a decrease in cultivation and grazing, and also global warming, shows a growing risk of forest fires, including major, very hard-to-contain fires. The disastrous fires in the summer of 2003 in France (in the Var) and Portugal remind us of the likelihood of such a scenario. Searches for a shift towards a lower-risk scenario would imply a certain reorientation of forest management by, where possible, supporting grass land, sylvo-pastoralism and choosing less inflammable tree species (like Iberian *dehesas*). A forest with some grazing and holm oak or cork oak, and well-managed plantations of almond trees, olive trees or vineyards within peri-urban forests, is less inflammable than a pine forest or shrubland. Experiments in the frame of contracts with local authorities and livestock farmers are being carried out in several countries.

Another consequence of reforestation and increasing shrubland areas in the north is increasing water consumption (more competition between forests, cities and irrigated agriculture), and the very rapid and uncontrolled growth in the number of *large ungulates* (wild boar, deer). The latter are a source of increased pressure on some rare plant species (bulbous) and cause increasing damage to agriculture, forestry and road users (collisions).

Irrigated land, growth and salinization

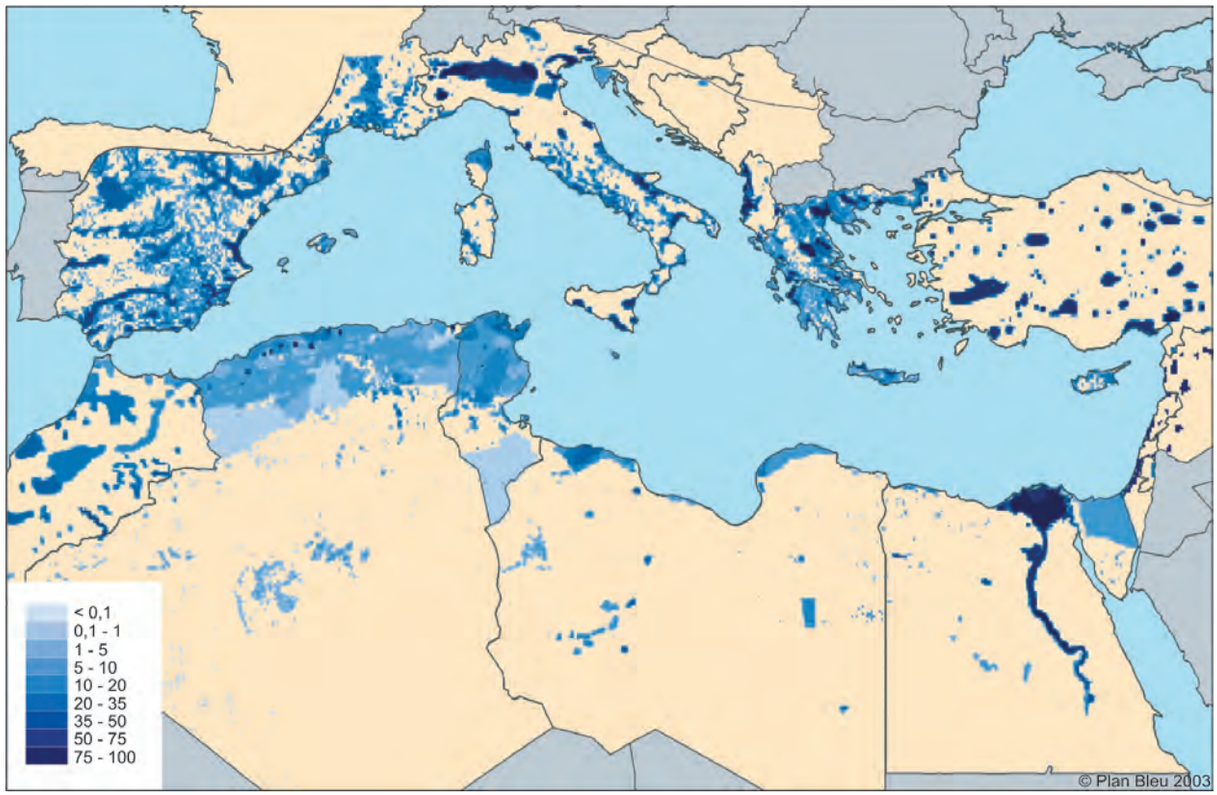
The total irrigated area is large (20.5 million ha, 8.5 million in the north and 12 million in the south), but only represents 20 per cent of total arable land and permanent crops. The areas are unevenly distributed:

- *Egypt*, with 100 per cent of its cultivated land irrigated, remains unique. The issue of rural development is therefore different from that in the other Mediterranean countries where dryland farming and pastureland generally predominate.
- Apart from Albania, the percentage of irrigated land in the *eastern Adriatic countries*, Slovenia, Serbia-Montenegro, Croatia and Bosnia-Herzegovina, is very low (less than 1.5 per cent).
- Irrigation occupies a relatively important place in most of the *other Mediterranean countries* (Figure 5.10): the Gaza Strip (63 per cent of arable land and permanent crops), Albania (49 per cent), Israel (46 per cent), Greece (38 per cent), Lebanon (31 per cent), Mediterranean France (30 per cent), Cyprus (27 per cent), Italy (25 per cent), Syria (23 per cent), Malta (22 per cent), Libya (22 per cent), Spain (20 per cent), Turkey (17 per cent), Morocco (13 per cent), Tunisia (8 per cent) and Algeria (7 per cent).

The irrigated area has about *doubled* in 40 years, accounting for 20.5 million ha in 2000, compared with 11 million in 1961. The biggest increases in absolute terms were in Turkey (3.2 million ha), Spain (1.7 million ha), Mediterranean France, Greece and Syria. Growth was also very strong in Maghreb (1.39 million ha, including 0.43 million in Morocco and 0.35 million in Libya).

This development is important for both its direct and indirect economic effects (the creation of areas of relative prosperity), and is projected to continue in those coun-

Figure 5.10 Percentage of irrigated lands in the Mediterranean in 1995



Source: FAO

tries that still have potential for new exploitation and continue to devote a significant percentage of their public resources to major water works. Although Tunisia has already reached its limits and Syria is making little headway, since its potential was quickly used up, the spread of new irrigated areas is projected to increase from 10 per cent (Algeria and Lebanon) to 20 per cent or more (Morocco, Egypt and Libya). The large projects in the eastern Sahara, such as the 'Great Artificial River' in Libya (inaugurated in 1991 and 1997) and the 'New Valley' in Egypt, contribute to this but have not yet led to the expected agricultural development. Farming areas under development are limited to those in Syrte (10,000ha) and Suluq to the south of Benghazi (32,000ha) in Libya, and in the Peace Canal (170,000ha to the east of Suez) and the Tushka depression (200,000ha) in Egypt.

Turkey deserves closer inspection, since its irrigated area could increase by nearly 1.5 million ha without using up its potential (a one-third increase involving lands in the Mediterranean bio-climatic area but located outside the catchment area). More than half of the expansion of irrigated areas in the south and east would be due to Turkey which is already becoming the biggest regional agricultural producer, both in terms of area and potential, able to energize an original strategy. The expensive mobilization of its water resources should not, however, be dissociated from Syria's and Iraq's needs, these two countries being located downstream of the Turkish basins of the Tigris and Euphrates Rivers. Growth in irrigated area is also expected to remain strong in the EU-Med countries. Table 5.3 summarizes projections to 2025.

However, it is clear that this growth in major irrigation can only increase the pressure on water resources and ecosystems that are already highly degraded. It will thus make water demand management measures indispensable.

It will also increase the risks of *soil salinization*, the main form of degradation of irrigated land. The main aggravating factors to be considered are: the invasion of coastal fresh water aquifers by sea water; irrigation of land with water with too high a concentration of salt; water-logging due to a rise in the ground water table; and the rise of salt-water tables because of poor drainage. The figures, often differing by source, show high levels of degradation, especially in Turkey (1.5 million ha) and Egypt (1.2 million ha) (Box 5.7).

Table 5.3 Land and water used by agriculture, 2000–2025

Country	Total UAA		Irrigated area (ha)			
	2000/2025 % per year	% potential used 2025	2000	2010	2025	% potential in 2025
EU Med +islands	–0.2	—	10,482	11,000	13,000	—
EAC	0.4	—	369	450	500	—
Turkey	0.3	81	4500	4900	5800	70
Syria	0.5	74	1211	1205	1250	100
Lebanon	0.3	98	104	120	150	80
Egypt	1.0	97	3291	3700	4200	98
Mashrek	0.3	—	4606	5025	5600	98
Libya	0.4	36	470	520	580	80
Tunisia	0.4	96	380	402	450	100
Algeria	0.5	62	560	590	630	88
Morocco	0.3	75	1305	1390	1540	95
Maghreb	0.4	—	2715	2902	3200	91

Source: Blue Plan; Labonne, FAO

Box 5.7 Some data on the aggravation of soil salinization

Turkey: 1.5 million ha have become unsuitable for farming because of salinization,[9] that is 33 per cent of the total irrigated area in 2000.

Egypt: 35 per cent of the cultivated land suffers from salinity.[10] FAO indicates that 1,210,000ha have become saline, or 37 per cent of the total irrigated area in 2000.[11]

Syria: 60,000ha have become saline (FAO[12]); national sources indicate that 125,000ha are affected (5 and 10 per cent, respectively, of the total irrigated area in 2000).

Algeria: *sebkhas* and *chotts* have gained several thousand ha.

EU-Med: 1 million ha have been affected by salinization. In France, salinity and alkalinity affect about 100,000ha,[13] 4.5 per cent of total irrigated land in 2000. In Italy salt crusts during droughts would affect some 800,000ha;[14] according to FAO, 300,000ha are affected by salinization (30 and 11 per cent, respectively, of the total irrigated area in 2000). In Greece, 150,000ha of soils in the plains have very high salinity, 10 per cent of the total irrigated area in 2000. In Spain, saline soils are said to cover 190,000ha (FAO: 240,000ha) and salinization would affect 3.5 per cent of irrigated lands.[15]

Israel: irrigation without sufficient drainage has salinated about 300ha, and the intrusion of salt sea water in fresh water aquifers is endangering soils in the coastal areas.[16] According to FAO, 100,000ha, or 25 per cent of the country's cultivated area (52 per cent of the total irrigated land in 2000), are affected by salinity.

The lack of comparable data, both in area and in time, makes a quantitative projection for 2025 difficult, but the risks of worsening salinization are real and will force countries and irrigating organizations to make much greater efforts to achieve sustainable management of irrigated land (*drainage and irrigation water control*).

Box 5.8 Tunisia's 1000 hillside-lakes programme

The '1000 hillside-lakes' programme (which is planning to build 2000 groundwater-recharge sites and 2000 water-spreading works) was launched with EU support within the framework of Tunisia's 1991/2000 strategy. Hillside water retention combines surface water harvesting and protection from water erosion. These constructions are being built as priorities in semi-arid areas for the benefit of small farms. Because of their medium size they may be a good vector in the decentralized management of rural development. A mid-term evaluation (1995) showed that the programme was progressing satisfactorily, although a significant problem was that of the little use of water by the beneficiaries, probably due to their low level of participation in the design and management of the works. More recently, greater attention has been given to awareness-raising and participation, since when the water began to be better used.

Source: Labonne, 2003

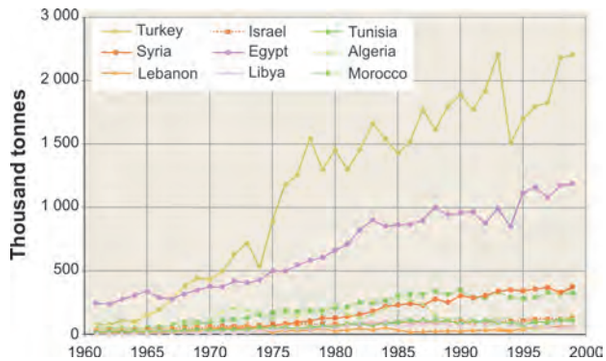
By continuing to concentrate most resources (water, capital and technology) on a limited part of a country's area, the development of major water works also risks accentuating *internal dualities* between the high potential irrigated areas and the rain-fed farming areas, drylands

and mountains. Some countries have fortunately begun to introduce more balanced policies by investing in small and medium-sized water works or improving the *agricultural management of run-off water*, as in Tunisia with its 1000 hillside-lakes programme (Box 5.8). A shift towards an alternative scenario would require this kind of approach to become more common.

Agricultural pollution

France, Israel and Egypt are among the biggest fertilizer users in the world, with more than 260kg per ha per year. The *overall use of fertilizers* in the northern countries has stabilized and even decreased since 1990 after a phase of strong growth between 1960 and 1990. The southern and eastern countries have experienced some slowdown in the growth in fertilizer consumption since 1990, particularly following structural adjustment programmes, which have led to a suppression of aid (Figure 5.11). Nonetheless, apart from the Maghreb countries, there is continuing growth in overall fertilizer use (an increase of 4 per cent per year in Syria, 2 per cent per year in Turkey and Israel, and 1.3 per cent in Egypt between 1985 and 1997).

Figure 5.11 Fertilizer consumption



Source: World Bank, WDI 2002

Pesticides were long overshadowed by nitrogen fertilizers, but because of their high persistence they are becoming a growing concern for health institutes and consumers. Data on their use and presence in the environment are very scarce. Since 1960, 620,000 tonnes of 200 different kinds of pesticides have been used in Egypt.[17] In France, pesticide use reached 85,000 tonnes in 2002. It seems to have stabilized over the past ten years, despite a recent drop. The costs incurred are very high, since 20 per cent of households receive water that no longer complies with drinking water standards. Surveys have also shown that the entire coastline is contaminated. Lastly, it is estimated that more than 6.5 million ha of vineyards, orchards, corn and industrial crop areas could experience worrying releases of heavy metals if the pH were to increase.

With the reforms of the Common Agricultural Policy (CAP), the promotion of an 'agriculture respectful of the environment' and progress in organic farming (Box 5.12 p277), fertilizer and pesticide use in Mediterranean Europe should be stabilizing, if not reducing. In the southern and eastern countries, where fertilizer and pesticide use is still relatively low, use will probably increase with agricultural intensification to meet increased food demand. Fertilizer use could increase by 70 per cent in the east up to 2025 (especially in Turkey) and 50 per cent in the south.

The development of specialized cultivation and irrigation (flowers, fruit and vegetables) has been one of the factors in the increase of agriculture based pollution on all Mediterranean shores. Food processing, such as olive oil production, can also cause serious pollution (Box 5.9).

Box 5.9 The development of olive-growing and the environment in the Mediterranean

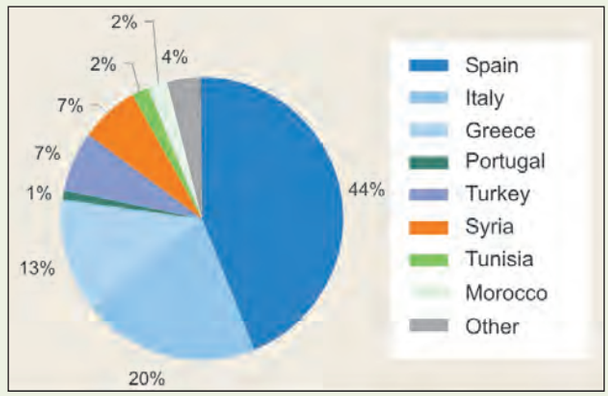
Olive groves are a major component of the identity, landscape and biological diversity of the Mediterranean region, and olive-growing has contributed much to the region's history (including technological). Olive culture also has a strong social component since labour costs represent about 80 per cent of the oil's production costs. In the EU, this sector is responsible for 2.5 million jobs and providing a livelihood for nearly 8 million people, spread over 5.4 million hectares.

In 2003, 95 per cent of world olive-oil production (more than 2.5 million tonnes) was in the Mediterranean. Over the past 40 years the world market for olive oil has undergone a sharp rise in production and consumption, which has practically doubled, while trade has increased by a factor of five. Syria is a notable example, with production that has increased 33 times in the coastal region and 10 times in the whole country in 30 years (1970–2000). Olive oil's reputation as a healthy product has become a determining factor in the increasing consumption. For the past 15 years new markets have opened up where consumption has increased by 8–10 per cent per year, for example in the US, France, Canada, Australia and Japan. These non-traditional markets now represent 14 per cent of the world market compared with 8 per cent in 1990.

The continuous increase in production (encouraged in the EU by the CAP) can have serious impacts on the environment: soil erosion in olive orchards, over-consumption of water in irrigated olive groves, the spreading of fertilizers and pesticides (which will alter the quality of soils and water), and deterioration of river water quality (due to largely non-biodegradable 'black liquor' wastewater from the oil production process). The CAP reforms now underway

(decoupling aid from production, eco-conditionality) should make it possible to reduce the negative environmental impacts and strengthen the positive effects of olive groves (biodiversity and landscapes). Starting in 2005, EU product-support, about 1300 euros per tonne, will be converted into income-support (a single payment per farm) and olive-groves support (per hectare or per tree).

Main olive-oil producing countries in 2003



Source: from FAO data (http://faostat.fao.org/)

Promoting technology for black wastewater treatment is needed to reduce its very negative impact on rivers and downstream users. Lagooning made it possible to considerably improve the water quality of the very polluted Sebou wadi (Fes, Morocco). Research projects are underway in several countries to perfect new techniques (biological treatment, electro-coagulation and bio-methane processing, electro-chemical treatment of wastewater, etc.) that will make it possible to recover biogas (methane), and upgrade sludge to compost or cattle fodder. Research and promotion of two-step extraction processes (instead of three) is to be encouraged. This would make it possible to reduce the production of black wastewater by half and significantly limit the amount of water used.

Source: Benyahia, N. and Zein, K. (2003) Analyse des problèmes de l'induxtrie de l'huile d'olive et solutions récemment développées. Contributuin spéciale de Sustainable Business Associates (Suisee) á SESEC II (www.sba-int.ch/)

Soil degradation by erosion and desertification

The term *desertification* should be understood as the *'degradation of lands in arid, semi-arid and dry sub-humid areas following on various factors, including climatic variations and human activity'*. It is thus not an 'advance of the desert' but a process of gradual loss of soil productivity and reduction of plant cover attributable mainly to *human* activities in dry areas – where the aridity index or the precipitation/evapo-transpiration ratio (P/ETP) is less than 0.65. When less protected by plant cover, soil becomes more susceptible to *water and wind erosion*, which leads to its gradual degradation. The main consequences are a loss of fertility and a degraded soil moisture regime, which in turn will have a negative effect on plant life and production. A spiral of degradation is created, which can lead, without intervention, to irreversible desertification.

Estimates of the magnitude of desertification and its degree of irreversibility are often contradictory and highly disputed. Nonetheless, the gravity of the phenomenon in the region is now widely accepted. According to estimates of the early 1990s, 80 per cent of arid and semi-arid areas in the SEMC are affected. In these areas, pastureland (84 per cent) and rain-fed arable land (74 per cent) are the most affected, but also irrigated lands, especially through salinization. Desertification also damages 63 per cent of the Mediterranean Europe arid land in Spain, Greece and Italy (Table 5.4).

Of 245 million ha likely to be affected by desertification in the Mediterranean, more than 188 million ha (77 per cent) were already more or less degraded in 1990.

National data on the extent and nature of soil degradation are still very incomplete and relatively unreliable, but confirm the gravity and magnitude of the phenomenon (Box 5.10), in particular of degradation due to water and wind erosion.

Table 5.4 Arid lands affected by desertification

	SEMC		NMC	
	Arid zones (million ha)	**% affected by desertification**	**Arid zones (million ha)**	**% affected by desertification**
Pastureland	150.5	84	25.6	72
Rain-fed crops	42.6	74	12.6	71
Irrigated lands	6.9	20	6.9	17
Total	**200.0**	**80**	**45.1**	**63**

Source: H.E. Dregne (1984) quoted in *Plan Bleu* 2003b

Box 5.10 The magnitude of soil degradation in various countries

Cyprus: 112,000ha of cultivated land was affected in 1995–1997 (56 per cent of the total cultivated area); 42 per cent of meadows and pastureland and 79 per cent of arable land may be affected.
Algeria: 21 per cent of cultivated land, or 8.4 million ha affected in 1985, 19 per cent of meadows and pastureland (6 million ha) and 79 per cent of forests and other woodlands (2.9 million ha).
Morocco: 89 per cent of cultivated land, or 8.2 million ha and 13.4 million ha of meadows and pastureland affected (1995–1999).
Syria: 3.2 million ha in Syria are affected (1995–1997), including 1.1 million ha by water erosion, 1.6 million ha by wind erosion, 408,000ha by shifting dunes and 125,000ha by salinization.
Tunisia: 3.5 million ha are affected, or 21 per cent of the total land area (1995–1997). According to a recent study,[18] annual soil losses through various degradation processes are estimated at 37,000ha, of which 13,000ha would be irreversibly lost.
Turkey: Erosion is considered to be one of the most serious problems for the rural environment. Water erosion affects 57.1 million ha, wind erosion 466,000ha. In all, 73 per cent of cultivated land would be affected, and 1000 million tonnes of soil would be lost each year. Although countermeasure programmes began 25 years ago, they have so far treated only 2.2 million ha.

Source: national sources, Eurostat, *Plan Bleu*

The main *causes* of degradation are deforestation, overgrazing, cultivation, overexploitation of biomass, industrial activities and public works. Available data and analyses do not indicate any reversal of trends. The baseline scenario assumes that, with continued human pressure and inappropriate agricultural practices, desertification in arid areas in developing countries will continue to spread.

The adoption in 1996 of the United Nations Convention to Combat Desertification and Drought (UNCDD) is intended to be an initial response on an international scale, but the mid- and long-term effects remain uncertain. An estimate of the technical *costs* of prevention, improvement and restoration of lands degraded by desertification (pasturelands, cultivated land, irrigated land) in North Africa and Mediterranean Europe has been assessed by *Plan Bleu* at about US$1.2 thousand million per year. This only indicative figure is rarely compared with the losses of production induced by degradation and the indirect costs. The fundamental issue remains the need to combat poverty through sustainable rural development, so as to have an impact on desertification. This battle cannot be fought through technical measures to prevent soil degradation and restore degraded land alone, it has to be part of an integrated and holistic process. During the World Summit in Johannesburg in 2002, the Global Environment Facility (GEF) agreed to contribute to financing the implementation of the Convention. Its implementation at the national level will not be without problems. The recently developed national action plans reveal a certain dispersion of content and methods and insufficient diagnoses and evaluation.

Loss of agricultural land and rural character resulting from urbanization and new infrastructures

The irreversible loss of a significant part of the best agricultural land to *artificial land cover* is a serious and worrying trend in the south and the east, but particularly in the north (Box 5.11).

Box 5.11 Loss of high quality agricultural land and rural character in the Mediterranean region

Between 1960 and 1990 **Egypt** lost 315,000ha of high quality land (10,000ha per year), especially in the Cairo region, losses that have continued since 1990 at about 12,500ha per year. In 42 years these losses represent nearly 14 per cent of agricultural lands (recorded in 1994). In **Malta** the percentage is 37 per cent in 90 years. In **Lebanon**, 7 per cent of cultivated land and 15 per cent of irrigated land has been lost over the past two decades. In **Turkey**, 150,000ha of high quality land was lost between 1978 and 1998 (or 0.54 per cent of the land). In **Algeria**, 140,000ha have been lost around greater Algiers. In **Cyprus**, 3200ha around Nicosia in 16 years (between 1985 and 2001). In **Tunisia** the growth of Sfax since 1992 has taken 9000ha of vegetable gardens. In **France** half of market gardening and horticulture is located in 'urban centres' (urban units of 5000 jobs or more). These centres have lost 200,000ha of suburban agricultural land in 12 years (between 1988 and 2000), or a 12 per cent UAA loss (six times more than losses in intermediate or isolated rural areas). In rural areas in **Israel,** all the more precious because they are limited, construction activities drastically increased in the 1990s following town-dweller demands for country houses, the demand of farm workers who had to abandon farming due to increased labour productivity, and, above all, the demand created by the large number of immigrants from the former USSR (nearly 600,000 arrivals between 1989 and 1995).[19]

The loss of cultivated land is especially rapid in **coastal areas**. On the Marbella–Malaga Andalusian coast, for instance, the percentage fell from 26 to 9 per cent (a loss of 64 per cent) in 15 years (1975–1990) (see Chapter 6). On France's Côte d'Azur (a 2-km strip), it fell from 12 to 8 per cent of total cultivated land in the same period (a loss of one-third). In contrast, forest areas, being more efficiently protected, have resisted better.

Source: Plan Bleu, from various national sources

Such losses are projected to continue, especially on coastal plains, resulting in a *nearly irreversible loss of about 1.7 million hectares* of high-quality agricultural land between 2000 and 2025 (a N1 country-level figure, to be compared with 20.5 million irrigated ha), as well as highly valuable natural areas. Apart from the loss of agricultural potential (and job possibilities in the long term), this trend has considerable consequences for ecosystems, landscapes and the living environment. By gradually destroying rural areas that surround cities, both separating and linking them, it reduces the infiltration capacity of soils (reduced permeability), thus contributing to increased risks of flooding. It also fragments ecosystems and reduces the area still covered by natural habitats, with heavy consequences for biodiversity.

Biodiversity and landscapes: Loss of an invaluable heritage

Despite their present and future ecological and economic value, Mediterranean landscapes and biodiversity are now considered to be largely degraded or *under threat*.

Many *species* have become either vulnerable or scarce through the ever-increasing degradation (quality) and reduction (quantity) of their habitat. This is the case for birds, mammals (for example the *dorcas* gazelle in Morocco, wild goats, Anatolian mountain sheep, and the ibex of Spain and the Pyrenees), reptiles, amphibians and invertebrates, and flora. Nearly 3000 of the 4777 plant species endemic to a single Mediterranean country (not including Syria, Lebanon and Turkey) are today considered rare, 180 endangered, and 344 vulnerable.[20] Vulnerability is especially high and worrying on the *islands*. Island stocks, typically having a clearly higher proportion of endemic species, group small populations. The percentage of threatened species on the islands is high (28 per cent of the flora in Malta, 13 per cent in Crete, 12 per cent in the Balearics and Corsica, and 8 per cent in Sardinia). On Crete, for example, of 1820 plant species, 150 of which are endemic, 238 are threatened, of which about 100 are endemic.

Such degradation is largely the result of the serious trends previously noted

In the SEMC, where pasturelands and forests are still overexploited by humans, analyses of plant-life show that a number of very rare groups of plants have completely disappeared or occur only in a residual form, especially in cork-oak forests, evergreen oak forests and cedar forests. Some forested landscapes of the eastern Mediterranean and North Africa, admired since antiquity, have regressed in a terrible way (the cedars of Lebanon, Syria and Cyprus, the B*abor* oak groves of Algeria, the indigenous fir trees of Anatolia and Little Kabylia, etc.).

In the NMC, in contrast, the main threat to biodiversity (especially landscapes) is the gradual disappearance of open rural environments and traditional agricultural practices. The abandonment of agricultural and pastoral land at first allowed for the re-growth of forests (some of which have become very beautiful), and thus favoured the return of some rare animal species (wolves and large prey birds) and plant species dependent on shade and moist soil (orchids and various bulbous plants). However, it also led to a noteworthy and increasing *loss* of plant *species diversity* through overgrowing and suffocation of shrubbery and fields where the most remarkable species are often found. However, this loss, related to the 'mosaic' effect, is less serious than the loss of species in the south. The gradual invasion of open spaces, orchards and cultivated terraces by shrubs is also a cause of *landscape degradation*. Territory-specific quality, so important for the Mediterranean future, is also changed by advertising and encroachment on agricultural land in rural suburban areas, due to urbanization and the development of infrastructures.

In the north, south and east, a rapid degradation in *agricultural biodiversity* is also to be regretted. The continuous decline since the 1930s and the near-extinction of native varieties of wheat cultivated in Greece is a good example. In Italy, the alarm bell has been sounded in the past few years by the disappearance of a very large numbers of fruit cultivars, wiped out by the few big varieties demanded by the big sales outlets. The situation is just as serious for domestic animal breeds: of the 263 bovine breeds listed in the Mediterranean 78 have disappeared and 73 are endangered.

The response to this degradation generally consists of creating protected areas for conservation (national and regional parks, biosphere reserves, and reserves and sites of ecological interest). Several countries have committed themselves to such programmes over the past few decades (albeit unequally, see Figure 5.12). The part of the eco-region covered with protected areas amounted to 5.3 per cent in 2004, whereas the fourth World Parks Congress aimed for a 10 per cent coverage by 2003, and 12.7 per cent of the total area is protected on a world scale.[21]

A number of these areas fall under the World Conservation Union IV and V categories, which well expresses the Mediterranean region's specificity (the importance of semi-natural areas resulting from co-evolution of man and nature). However, few of these protected areas have the authority or the funding and other means to ensure the conservation of biodiversity and landscapes, and associate local communities, enabling them to effectively derive benefits from protection and thus become genuine 'laboratories' for sustainable development, as is sometimes the case in the north.

In the EU region, where the protection of nature and development are closely linked, the adoption of directives (on birds, habitats, etc.) has not been without its difficulties. The latest decisions about the CAP, providing for agri-environmental funding, should facilitate the implementation of Natura 2000 (the European network of nature reserves, which aims to preserve the biodiversity of rural areas and forests), an important programme, since 80 per cent of plant communities considered by the Habitats Directive are present in the EU-Med countries.

The costs of degradation

Poor management of rural areas induces considerable costs, which remain largely under-evaluated.

First there are *direct costs* to the rural population involved. The drop in production capacity due to soil degradation (desertification) represents an average annual cost of about 3000 million euros for the Mediterranean countries (Table 5.5), based on an estimate that only takes part of the direct costs into account.

Deforestation and degradation of pastureland and soils also lead to *indirect costs* that are much larger than the direct costs. One of the major consequences of desertification for the southern countries is the accelerated silting-up of reservoirs, considerably shortening their life-expectancy (see Chapter 1). In Morocco, the annual cost of degradation of watersheds (erosion, silting-up of reservoirs and increases in management costs) has been evaluated at 10,000 million Dirhams (925 million euros).

Table 5.5 Annual losses in agricultural production on degraded lands (million US$)

	Irrigated lands	Rain-fed cropland	Pasturelands	Total MED
SEMC	356	1201	888	2445
NMC	293	338	129	759
Total	649	1538	1017	3204

Source: Plan Bleu, based on UNEP

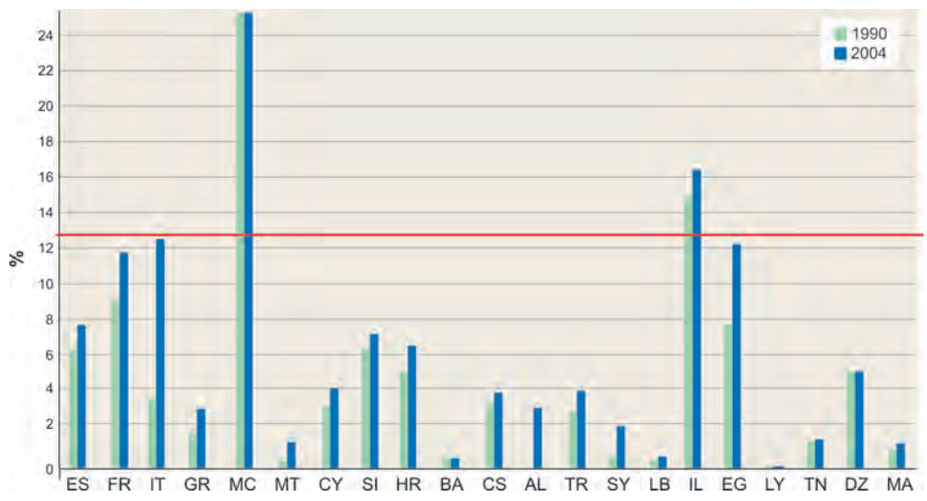
Note: Estimate based on the average values adopted by UNEP in 1992 for moderately affected land (annual loss per hectare is evaluated at $250, $38 and $7 respectively for irrigated land, rain-fed farmland and pastureland). As far as the NMC are concerned, a recent report for the European Commission reinforces this, giving an estimate of 748 million euros for the four EU-Med countries.

Management deficits for watersheds, sealing of soils by urban sprawl and infrastructures, channelling and other water works in rivers and a reduction of natural areas for water spreading, all explain the growth in hydro-meteorological risks (floods and landslides), which are particularly serious in the region. In Italy, for example, it has been estimated that floods and landslides in the past 20 years have impacted on more than 70,000 people and caused damage estimated at a minimum of 11,000 million euros.

Forest and scrub fires create considerable costs for society: material destruction, fatalities and fire-fighting costs. In countries that have developed modern fire-fighting systems (land-based engines and powerful airplanes), the costs have been estimated at about 150 euros per hectare of forest per year, or total annual costs of about 1000 million euros for the whole region. In the SEMC the risks of fires and related costs are fortunately lower, because of a larger human presence, maintenance of grazing land in forests and the regular collection of firewood by local people, but even here the risks are not negligible.

The uncontrolled development of large fauna in the developed countries involves other significant costs. In France, where the wild boar population has increased more than tenfold in a few years (Mediterranean France being the most affected region with a third of the national total), more than 15,000 collisions between cars and big mammals occurred in 1994,

Figure 5.12 Growth in protected area coverage in the Mediterranean (according to the UN list of protected areas)



Source: IUCN, 2004.

Note: The red line indicates the percentage of protected area on a worldwide scale in 2004.

three times more than in 1986, and insurance payouts for damaged crops rose to 18.3 million euros in 1999.

The costs of degradation and the related economic consequences (water regime deregulation, silting-up of reservoirs, rural impoverishment and increased regional imbalances, forest fire protection, loss of long-term potential for development of biotechnologies, etc.) remain *insufficiently evaluated*. A recent estimate by the World Bank/METAP dealing only with degradation of soils, forests and biodiversity and part of the incurred costs showed an annual loss of 1.36 per cent of GDP in Algeria, 1.21 per cent in Egypt, 0.3 per cent in Morocco and 0.32 per cent in Tunisia.

In addition, the accumulated effects and synergies of all these impacts on the environment should be considered. The different degradations of rural areas are indeed often interrelated within the ecosystem (soils, water, biodiversity and landscapes). A number of these impacts are *irreversible* or nearly so: the loss of arable land due to an increase in artificial land cover forms (especially damaging when it concerns high quality land), the disappearance of species and cultivars, desertification in arid areas of the south and east, the exhaustion of non-renewable water resources. The degradation of traditional rural landscapes, and the loss of know-how related to them, also have or are about to reach a point of no return.

Food and agriculture outlooks

The primary function of rural areas is still to produce food. In the Mediterranean this is all the more important because of its virtuous dietary regimes with special energy profiles and health qualities. At the same time, changes in food demand (quantity and composition) partly condition agricultural development and consequently rural area development.

When considering the future, one important question relates to the possible impact of an evolution towards free regional, even global, agricultural trade. This complex question cannot be dealt with without highlighting two major characteristics of the region: the growing disparity in productivity between the northern, and the southern and eastern shores, and the limits imposed on production by the scarcity of natural resources (soil and water). It also leads to the question of the evolution of agricultural performance and society's demands on agriculture. All these different factors will contribute to the future of agriculture in the region.

Growing gaps between north/south productivity and agricultural trade deficits

Everywhere in the Mediterranean Basin agriculture has been and remains a well-organized sector, either under direct administration by states or, as in the EU, through a synergy between states and professional organizations. Since the 1980s, there has been a general convergence towards liberalization with a gradual and peaceful opening up of markets. This is all the more remarkable because agriculture carries strong cultural, social and political values.

In the EU-M*ed countries*, the EU enlargement and the multilateral negotiations within the WTO framework have led to a greater consideration of world markets and an ever greater effort of decoupling price support from income support. The relationships between agriculture and processing activities have been gradually freed from state intervention; industrial coordination is taking on sophisticated forms, and calls for the organization of professionals following complex regulations.

In the *southern and eastern countries*, liberalization has been favoured by internal and external factors, in particular by agricultural structural-adjustment programmes, which have often posed serious social problems. Liberalization has promoted the emergence of a new entrepreneurial spirit. In several countries, the private sector has begun to play an ever-more active role in the promising markets for strong value-added agriculture, including organic farming.

The situation is much more difficult in the poor or bruised *eastern Adriatic* countries, where war and the abrupt collapse of the socialist system have ruined the regulatory structures of the economy, while the market has so far not been able to put anything in its place. In Bosnia-Herzegovina, for example, the land currently in production is only two-thirds of the area used in 1991, but the new-found stability and the new mid-term strategy adopted for agriculture should make it possible for the sector to recover gradually.

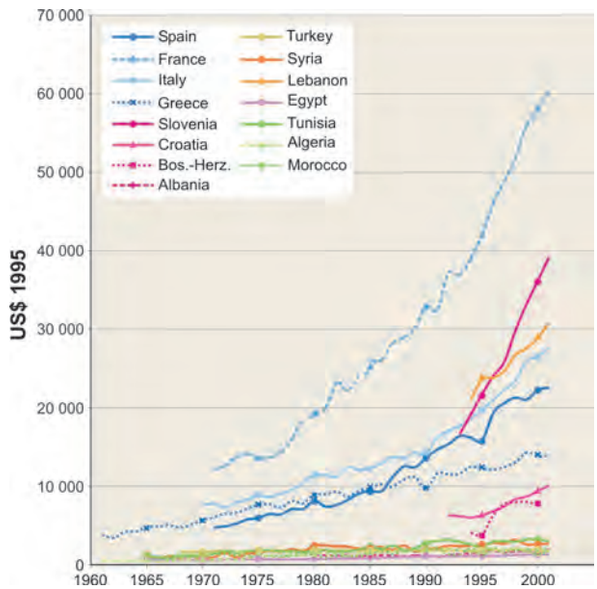
There is reason to believe that this general transition towards a market economy will be confirmed and amplified over the next two decades.

Despite this convergence towards a market economy, Mediterranean agricultural developments over the past two decades have been marked by a growing gap in productivity between the northern and southern and eastern shores, and by deficits in the agricultural trade balance.

An analysis of *agricultural productivity* (value-added per worker in 2001, in 1995 US$) shows large disparities, varying from 1 to 45 (US$1300 in Egypt and US$60,000 in France) (Figure 5.13). These disparities illustrate the persistence of traditional farming essentially oriented towards food crops and home consumption on the one hand, and the dominant commercial agricultural sector with high technological input in the EU-Med countries, on the other. Productivity per worker is particularly low (US$2000 and even less) in Egypt, Morocco, Turkey, Albania and Algeria. Although better in Syria (US$2700)

and Tunisia (US$3100), it is still far from what is observed in Spain (US$23,000), Italy (US$28,000) and Slovenia (US$39,000). Bosnia-Herzegovina (US$7700) and Croatia (US$10000) are in between. Another cause for concern is the increase in disparities. Productivity has nearly doubled in France in only 11 years (between 1990 and 2001), and disparities have become even greater with most countries (those with Turkey have nearly doubled), including Greece.

Figure 5.13 Agriculture value-added per worker

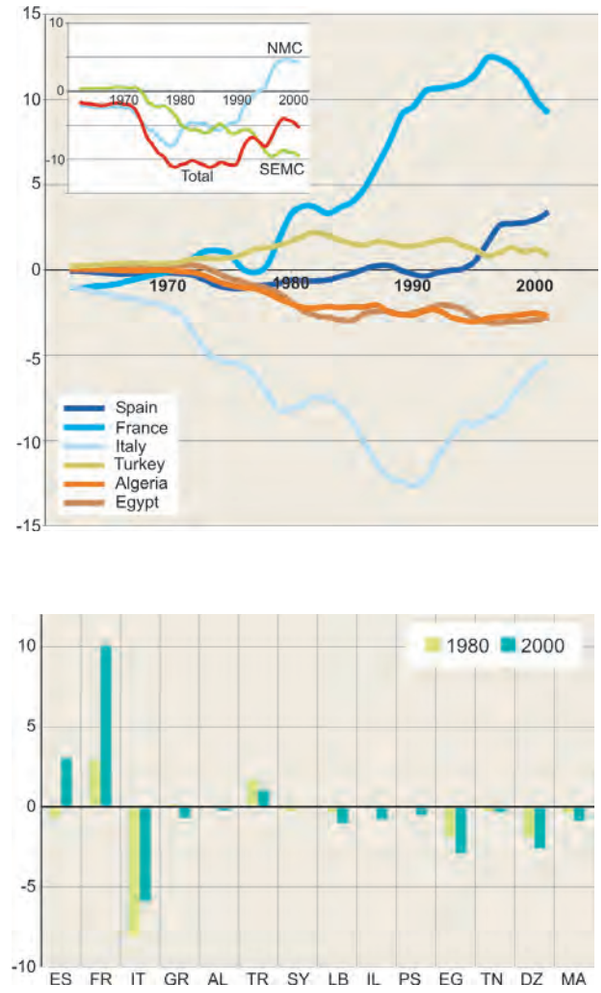


Source: World Bank, World Development Indicators, 2003

Furthermore, soil and water resource scarcity in a context of strong population growth, explains the *growing deficit in the agricultural trade balance* in practically all SEMC (Figure 5.14) and the importance of cereal imports (US$4000 million in 1996–2000, or 10.7 per cent of the world's imports). The overall balance for these countries went from plus US$500 million in 1970 to minus US$9.7 thousand million in 2001. The deficit is especially high in Algeria (US$2.7 thousand million in 2001), Egypt (US$2.8 thousand million), Libya, Israel, Lebanon and Morocco. Only Turkey, more endowed in water and land, shows a positive balance (US$800 million in 2001), as does Syria occasionally. Between 1996 and 2000, 34 per cent of the EU cereal exports went to the SEMC. However, the EU share of this market remains relatively small (21 per cent on average over those 5 years), because of competition between the large worldwide producers, where bilateral aid to importing countries plays a role.

On the northern shore, the balance sheet would also be very negative if France were removed from the calculation, since agriculture in France occurs only marginally in its Mediterranean regions. Only Spain has a positive balance and is progressing. Greece is on the decline, Italy has a very negative balance and the East Adriatic countries are all in deficit.

Figure 5.14 Agricultural trade balance in the Mediterranean countries: 1970–2001



Source: Plan Bleu from FAOSTAT

Benefits and decline of the Mediterranean diet

The Mediterranean food regime

Food is one of the major components of the Mediterranean identity, while at the same time reflecting its biodiversity. The extreme blending of cultures over the centuries did not lead to more uniformity, but to increased food and culinary variation. This diversity is due to clear differences in dietary regimes between countries, but also to increasing differences in income,

and, consequently, to differences in the share of household budgets devoted to food.

Given the benefits of the Mediterranean diet for health, now confirmed by epidemiological studies, some common characteristics in this diversity deserve to be highlighted. The Mediterranean model is attracting new and noteworthy interest at international level. In the 1970s and 1980s, the American diet was considered the best example to follow, throwing the Mediterranean diet into turmoil and, indirectly, its agricultural production and rural areas. But this tendency has started to turn around on a global scale during the past ten years. Stimulated by the medical community, Anglo-Saxon countries and the WHO have stepped up information campaigns to promote the Mediterranean model and its specific products in order to limit the growing social costs of major endemic diseases (cardioascular diseases, some cancers). Their recommendations are based on the diet of the 1960s in Crete and southern Italy; a time when the benefits of the Mediterranean diet were greater, since these societies combined a low calorie input with sustained physical activity.

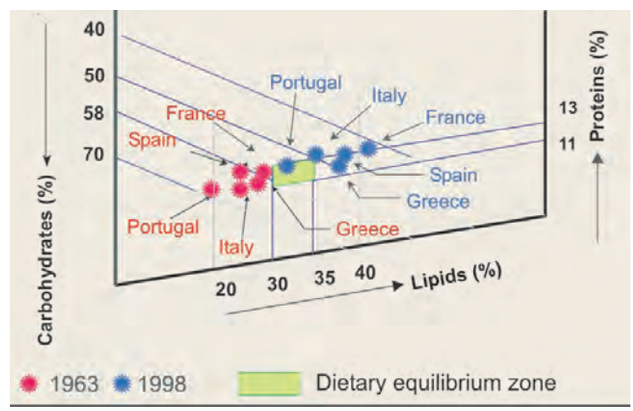
Traditionally frugal, the Mediterranean diet is characterized by *typical products*: a high consumption of highly varied plant products, that is cereals, leguminous plants, vegetables and fruit (fresh and dried); low consumption of milk, meat (especially bovine meat) and animal fat, but fresh cheese, yoghurt, fermented milk, fish, olive oil and the meat of goats and sheep; extensive use of aromatic herbs, spices, lemon and vinegar; and moderate consumption of alcohol, consumed during meals. A convivial atmosphere during meals (many doctors are increasingly stressing conviviality and pleasure as determining factors for good health), as well as an adaptation to natural conditions by following the seasons, are benefits to be added. This adaptation to nature, developed under the influence of the Hippocratic medical system, was widely disseminated and popularized throughout the region by Medieval Jewish and Moslem doctors. It remains present in popular culture today. In contrast to what is happening in the northern world, a large percentage of women in the Mediterranean generally cook every day and actively pass on of their knowledge to future generations.

The percentage of *animal calories* in the Mediterranean diet is low (12 per cent in the south and east, 25 per cent in the eastern Adriatic and 35 per cent in the EU-Med countries, compared with an average of 45 per cent in OECD countries in 2000). This results in much lower pressure on the land, since about seven plant calories are required to produce one animal calorie. Thus, the average intake for a consumer in an OECD country (3365 calories) translates into 12,450 cal in plant-equivalent, whereas the consumption of a southern Mediterranean person (3210 cal) translates into only 5155 cal in plant-equivalent (less than half), and the consumption of a EU-Med person (3564 cal) to 9550 calories plant-equivalent (two-thirds). In other words, one and a half to two times more agricultural land would be required to feed the Mediterranean people if their diet were to imitate that of the present 'north-western' model.

Regional disparities and decline of the health model

In the *developed countries* of the *northern shore*, the healthy diet model that was developed over centuries, has been replaced by a model of excess, in calories, with animal products (22–38 per cent of energy intake in 1995 compared with 13–30 per cent in 1960), and fat (32–40 per cent in 1998 compared with 20–30 per cent in 1960). Despite growing international interest in the Mediterranean diet, the northern shore continues to imitate the northern European and American model (Figure 5.15). The shift from a 'biological rationale' to an 'economic rationale' in agricultural production has also encouraged the introduction of food and practices foreign to the Mediterranean culture. At the same time lifestyles have changed remarkably with accelerated urbanization. This explains why the difference between the originally lower mortality rate from cardiovascular diseases and cancers and the longer life expectancy of the residents of France's Languedoc-Roussillon region, and the higher figures in the rest of France, is gradually disappearing. Obesity rates are now approaching those of other French regions.

Figure 5.15 The evolution of food intake in the northern Mediterranean countries



Source: Padilla, 2002; *Plan Bleu*

In the *developing countries* of the *south and east*, improvements, supported by active health and food policies, have made it possible to fill some of the dietary deficits of the 1960s. Yet, despite progress in animal production, food intake remains far from the equilibrium zone as defined by international dietary standards. Despite the

absence of recent surveys, a deterioration of the dietary situation cannot be excluded after the structural adjustments and privatizations of the 1990s, which led to some disengagement by states and a marginalization of part of the population. As on the northern shore, lifestyles and consumption patterns that are foreign to the region are to some extent imitated. This is expressed in Tunisia, for example, by a sharp decrease in durum wheat (to the benefit of soft wheat, the consumption of which doubled between 1968 and 1995) and a large increase in the number of overweight people.

The *eastern Adriatic* shows strong disparities that are increasing in several countries when comparing 2000 with 1963. Poverty-related food insecurity is still a basic problem in several regions. In Albania, the average food intake is 2521 kcal per inhabitant per day in 2000.[22] The rural poor spend the greatest part of their household budget on food (66 per cent) and less for non-food products (21.2 per cent) as compared to the shares respectively of 48 per cent and 25 per cent (of the relatively wealthy) in Tirana.[23]

A *paradox baseline scenario*

In the baseline scenario, the developed countries in the Mediterranean, which have already reached food satiety, are projected to maintain consumption at the same level (3565 calories) with a slight rise in the relative percentage of cereals and a slight fall in that of meat. The SEMC would reach a *food intake* of about 3350 calories with a sharp drop in cereals, which would represent only 1500–1600 calories per day. The eastern Adriatic transition countries would reach 3200 calories. These projections would lead to an increase in food demand between 2005 and 2025, as a cereal-equivalent, of 36.5 per cent in the southern and eastern Mediterranean, 9.5 per cent in the eastern Adriatic and 8 per cent in the northern Mediterranean. This would lead to increased pressure on land and/or trade deficits.

In this scenario, the *decline* of the Mediterranean health model would be confirmed, while paradoxically also confirming the international interest in the Mediterranean diet, and a revival of interest in the region in typical quality products like the *'Tupi'*, a Catalonian cheese once considered a rustic food of primary necessity, which has now become a valued product.

In this baseline scenario, one can fear, however, that the distribution of Mediterranean products (typified by their freshness and authenticity) may be restricted by new *world standards* for food security, under discussion at present in the large food distribution sector. The new 'Global Food Safety Initiative', which comprises 65 per cent of global distribution, aims to market only products adhering to a certified reference (ISO and HACCP standards, Codex alimentarius). This would mean that products not guaranteed by such standards would run the risks of scandal and law suits for distributors in cases of food poisoning. For this reason, some major distribution chains may be led to revise their present commitments in promoting local products in Mediterranean countries and the regions where they set up shop.

Europe: Questioning the high productivity agricultural model and the transition towards a 'rational' agriculture

The rural world of Mediterranean Europe has changed more in 40 years than in several centuries. This is due first to the change from farming based on a 'biological' rationale (the choice of crop production and systems depending on the environmental conditions) to farming based on a new 'delocalized' economic rationale (adapting to broader markets). The new dominant agricultural model is built on the basis of chemical inputs, mechanization, specialization, and concentration and integration with upstream and downstream activities. This high productivity agricultural model, which characterized the 1989 *Plan Bleu* trend scenarios, was encouraged by the implementation of a common market and the Common Agricultural Policy (CAP). Although the CAP has reached and even surpassed its initial objectives (increased yields and production to meet interior food demand with both quantity and low prices), this new dominant agricultural model has also generated serious perverse long-term effects:

- the excessive abandonment of many rural areas, which, no longer maintained for farming, have seen their economies collapse and their environment and landscapes degraded;
- the very strong and rapid fall in the agricultural labour force with all its direct and indirect effects (uprooted populations, broken social bonds, regional imbalances and unemployment);
- the problem of future generations on farms (ever more difficult);
- serious degradation of water and soil induced by pollution, mechanization and the separation of arable farming from animal husbandry (soil compression and loss of fertility, resumption of erosion);
- the loss of biodiversity; increase in transport and the resulting environmental costs; and increases in some long-term risks.

The magnitude of the negative environmental, social and territorial impacts shows the market's difficulty in *internalizing the costs* of the positive and negative externalities of agriculture. The prices of products and inputs do not reflect the scarcity of the natural resources used (especially water), or the services provided by agriculture that have no direct commercial value but

receive an important social and environmental demand (for example the demand for quality agrarian landscapes is growing as illustrated in Europe by the development of flourishing rural tourism), or the cost of environmental degradation, some of which is irreversible (loss of biodiversity). And agricultural policies, instead of trying to reconcile the market and sustainability, have all too often amplified these costs by encouraging unsustainable practices.

This model is thus no longer considered acceptable by a part of European society, who have ceased to accept the direction given to very high public subsidies (47 thousand million euros) that favour big industrial farms at the expense of smallholders. This criticism was revived sharply in the mid 1990s with the objective or subjective questions of food insecurity.

Growing awareness of the negative impacts of the dominant agricultural high-productivity model has recently had several major repercussions in Europe, which have led in particular to:

- A nascent consensus on the need to factor-in the *multifunctional dimension of agriculture*.
- The development of an *alternative agriculture* (organic, sustainable, with solidarity, small farms) where the objectives are not maximum yield but optimal production depending on the environment's conditions but still through modern processes (mechanization, marketing). The producer is remunerated by the consumer with a price that corresponds to the health and ecological quality of the products, while also rewarding the long-term maintenance of the soil's health and fertility and that of the ecosystem, in particular by a balanced management of organic matter. This implies a continuation of developments in consumption of organic products, which today represent a significant and growing share of the market (in France today 16.5 per cent of customers regularly buy organic products, and 28 per cent occasionally). In response to this growing demand, many EU-Med countries, but also southern and eastern countries are promoting the development of organic agriculture (Box 5.12).

Box 5.12 Organic agriculture in Europe and the Mediterranean. An example of success in Egypt: The Sekem Group

Stimulated by strong European demand (a 10 thousand million euro market and growing strongly), organic agriculture has recorded strong growth mainly in the Mediterranean, in Scandinavia and in some central and eastern European countries. Germany, a large importer, has set a goal of 20 per cent of its total agricultural land for organic production by 2010. With 1.23 million ha (or 11.4 per cent of cultivated land), Italy is the leader both in Europe and in the Mediterranean region. Growth is very strong in Spain (485,000ha, 1.7 per cent), in Mediterranean France (32,000ha, 3.2 per cent compared with 2.1 per cent at the national level) and in Slovenia (5000ha, 2.5 per cent); development has started in Greece (31,000ha, or 0.8 per cent in 2001 compared with 1500ha in 1997). The increase in organic farming in the EU has been supervised and stimulated through rules (directive 2092/91) and transition subsidies.

Significant progress has also been observed in the south and east, particularly in Israel (70,000ha, 1.7 per cent), Egypt (15,000ha, 0.5 per cent), Tunisia (18,000, 0.4 per cent) Turkey (57,000ha, 0.2 per cent), Morocco (12,000ha, 0.1 per cent) and Lebanon (300ha, 0.1 per cent).

Thanks to the Sekem group, Egypt offers a quite remarkable success story. Specializing in bio-dynamic agriculture (drugs derived from plants, fruit and vegetables, cotton), the Sekem Group was founded in 1977 on a 70-hectare desert area near Cairo. Sekem is an example of a social and environmental project based on north/south knowledge and partnerships (investment, certification and fair trade). Today it is a network of strong companies with 2000 employees, active in, among other things, agriculture, production, craftsmanship and pharmaceuticals. It has its own nurseries, schools and apprentice workshops. A pioneer in producing organic cotton (since 1990), Sekem is behind the founding of the Egyptian Bio-dynamic Association that promotes the development of organic agriculture on nearly 4000 hectares throughout the country on over 400 small and medium-sized farms.

All EU countries, Slovenia, Turkey, Israel, Lebanon and Tunisia have fully operational regulations; in Croatia and Egypt regulations exist but are not yet fully implemented.

Source: IFOAM, 2003 (www.ifoam.org).

- The promotion of *'agriculture respectful of the environment'*. Proposed by agronomic research and supported by the agri-business sector, it aims to limit the present model's environmental impact by a controlled management of inputs (efficient irrigation, reduced use of mineral fertilizers and pesticides).
- *Gradual reform of the* CAP so that agricultural subsidies lead to more compatibility between the market and sustainability, especially by factoring in multifunctionality, that is the positive and negative externalities of agriculture. Subsidies thus spent will find support from the public and better ensure their legitimacy.

Along these lines, the European Council of Ministers of agriculture, in June 2003, took a number of decisions towards reforming the CAP. These moves rely on two principles: *'decoupling'* and *'eco-conditionality'*. Decoupling financial assistance will lead to a gradual decrease in various subsidies for production to the benefit of a single subsidy set up according to farm area and the

amount of former subsidies. In addition, subsidies allotted to large farms will be reduced and the resulting released funds will be used for a more dynamic rural development policy. Moreover, a systematic application of an 'eco-conditionality' approach is made compulsory. This means that access to such a single subsidy will in future depend on the respect of 18 health, environmental and animal safety rules, as well as effective land management to avoid abandonment. However, the ambitious nature of this reform remains constrained by the budgetary discipline that has been adopted. In the context of the EU enlargement to 25 countries, a reduction is predicted in the actual allocation of subsidies.

Systematically applying the eco-conditionality principle to an agriculture that depends heavily on subsidies, together with the efforts currently being made in training and extension to help farmers improve their practices, should lead the present dominant model towards an *efficient agriculture* that is *more respectful of the environment* (lower water, fertilizer and pesticide use per quantity produced and less aggressive cultivation methods for the soil).

However, respecting pollution standards and rational water use alone will not be enough. With the continued fall in the number of farmers, and the growing problems of transmitting capital (the continuity of production tools), abandonment of farms and geographic concentration, urban sprawl and the separation of arable farming and animal husbandry will probably continue, which will not be without consequences. The problem of long-term *sustainability* of European agriculture and the evolution of the social contract between consumers, citizens, tax-payers and farmers will persist.

Pressures from civil society, strengthened decentralization and local initiatives, and 'territory-specific' projects and policies, supported by the CAP second pillar, should promote *innovation* and the necessary *plurality* of approaches. Moreover, regions, towns, rural communities and protected areas are increasingly engaged in the defence and promotion of sustainable agriculture by means of a whole range of tools, including land tenure (up to full control through land purchase). Agri-environmental aid will positively contribute to this development by better remunerating the production of amenities (the management of landscapes and biodiversity), which are important for Mediterranean development (agriculture/tourism synergy).

The south and east: An unfavourable trend despite some progress

Production growth, despite droughts and environmental degradation

In the south and east, despite the quantities imported, *cereals* remain the main group of crops in terms of cultivated areas, number of farmers and as staple food. For most of the countries, cereal production is a vital national issue in terms of food security, not to mention jobs and the present lack of credible alternatives for most areas and producers. The expansion of cultivated areas, consequent on population growth, is, however, a source of harmful pressure for soils.

A*nimal production* is the second basic production pillar. This is a combination of an extensive traditional red-meat production system (sheep, goats and cattle) complemented by concentrated food supplements, and an intensive, indoor white meat production system, known as a 'corn-soya' system imported from developed countries. These two animal production forms result in over-grazing and erosion problems, as well as local pollution. Dairy production, mainly by small family herds, has made good progress. Some countries have become self-sufficient (Tunisia, Syria and Egypt) by solving problems of milk collection and protecting their borders against powdered milk imports.

As well as these basic production forms, *vegetable* and *orchard crops* have continued to progress (olive trees and market-garden products such as tomatoes and potatoes play a growing role). They represent nearly 50 per cent of the production value (43.9 per cent in Algeria, 53.4 per cent in Tunisia, 53.4 per cent in Libya, 47.7 per cent in Egypt, 75.6 per cent in Lebanon, 37.6 per cent in Syria, and 46.0 per cent in Turkey). Their development has been bolstered by developing irrigation and through reforms, in particular land reforms. Today they use a large percentage of fertile lands and irrigation water. In some oases, growth has been very strong (Box 5.13). Unlike staple products, these do not benefit from direct agricultural subsidies. They have the advantage of offering much work, but the drawback of inducing a growing use of water and chemical inputs (fertilizers and pesticides). Almost all the marketing is in national markets, while exports only involve a few countries and products (citrus, tomatoes, flowers and olive oil).

Box 5.13 Oasis: Laboratories for land reform and agricultural renewal

After a long period of decline, oasis farming, considered to have no future 40 years ago, has undergone an amazing development over the past three decades (date palms, vegetables, either in open fields or under plastic tunnels). The opening up to the market economy, the remarkable progress in transport infrastructure and the discovery of very large deep-lying aquifers have contributed to this development.

But this renewal also owes much to land reform. Initial development with a social objective strictly organized by governments in the 1970s and 1980s led to overly restricted land allotments (1ha plots). It was followed by the creation of large or very large private properties (20–100ha plots in

Algeria and more than 200ha in Egypt), which corresponded to a new phase of reduced state intervention, often with disappointing results. Then small and middle-sized farms emerged in some countries, large enough (about 5ha) to be very efficient. These farms, which have managed to combine tradition and innovation, peasant wisdom and openness to modern ideas, have been largely responsible for the remarkable development of oasis farming in Algeria. This is illustrated by the date-palm development (12 million trees in 2000 compared with just 5.5 million in 1959, with yields increasing to 50–80kg per tree compared with 30kg in 1959), and market-garden development (for example, El Ghrouss municipality has become one of the busiest markets in Algeria for fresh vegetables, with 800 vehicles per day).[24]

These land reforms have made oasis farming today a sort of technical, agricultural and social laboratory. However, this form of farming accounts for only a very modest percentage of national economies, and the sustainability of this development is not guaranteed. Current urban, agricultural and tourism development is threatening the environmental integrity of many oases. The decrease in water tables (observed everywhere), salinization of soils and the increased amount of waste are worrying signs that should inspire a reorientation of development with a better long-term understanding.

Generally speaking, agricultural production, despite degradation of the natural capital, has grown significantly over the past 20 years because of the mobilization of natural and human resources and technological progress. On the whole, productivity (average production per farm worker) has increased (Table 5.6) despite the disturbing effects of drought (very severe in Turkey and Morocco in 2000) and, for the first time in many years, agricultural growth rates are keeping up with those of population.

Table 5.6 The evolution of production indices per capita in a selection of SEMC

	Turkey	Syria	Egypt	Tunisia	Algeria	Morocco
1980	97	138	96	93	93	71
1990	102	105	101	97	93	94
2000	92	117	125	108	100	76

Source: FAO

The *'technological trend'* (a proxi-indicator of agricultural progress) that made this growth possible was about 2 per cent in 2000. It is projected to remain high at least up to 2010, since the scope for progress is large given the expected growth of irrigation and the agronomic improvements that are still possible. After 2010 it is expected to fall as the waterworks potential will by then be realized, leaving less scope for further progress. This would allow many SEMC to increase their agricultural production by half by 2025, thus helping them to maintain *self-sufficiency* without major changes.

Most of the growth in agricultural production will go to feeding the population, leaving only a small percentage for export (Table 5.7). Exports will have to be targeted and concentrate on higher added-value items to bring some relief to an agricultural trade balance that will continue to degrade because of improving diets (Turkey as an exporter is a special case).

Table 5.7 Technological trend and agricultural production growth in SEMC

Technological trend (all production in per cent per year)

Country	1990 –2000	1960 –2000	2000 –2010	2010 –2025
Turkey	1.6	2.1	1.1	0.8
Israel and Pal. Aut.	3.3	2.2	0.9	0.7
Syria	5.4	1.5	1.7	1.2
Lebanon	1.0	3.0	1.8	1.1
Egypt	2.6	1.8	1.1	0.8
Mashrek	—	—	*1.3*	*1.0*
Libya	3.5	4.6	1.9	1.2
Tunisia	1.3	1.9	1.3	1.1
Algeria	5.0	1.3	1.5	1.2
Morocco	0.7	1.7	1.6	1.2
Maghreb	—	—	*1.5*	*1.2*

Agricultural production growth (%)

Country	1990 –2000	1960 –2000	2000 –2010	2010 –2025
Turkey	1.3	2.8	1.4	1.2
Israel and Pal. Aut.	1.0	2.0	1.4	1.1
Syria	4.0	3.3	2.2	1.8
Lebanon	3.0	2.2	1.9	1.7
Egypt	4.1	2.6	1.8	1.7
Mashrek	—	—	*1.9*	*1.7*
Libya	3.8	4.7	2.4	1.5
Tunisia	0.6	3.0	1.8	1.6
Algeria	2.7	1.1	2.4	1.6
Morocco	0.5	2.7	1.9	1.5
Maghreb	—	—	*2.1*	*1.6*

Source: FAO, *Plan Bleu*, Labonne, 2003

What opportunities will be there with agricultural free trade?

Fruit and vegetables, olive oil, flowers and cotton are the only possible sources of 'agricultural' currency for the

south and east. The SEMC would like to benefit from the liberalization of agricultural trade that is presently under discussion, to give value to their *comparative advantages* with these products, and to compensate somewhat for the short-term negative impact of the Euro-Mediterranean free-trade zone on their industrial fabric. The EU is one of the major economic powers most open to importing agricultural products from developing countries. However, the EU still imposes quotas and high tariffs at the entrance to its markets (between 40 and 85 per cent for the SEMC's most sensitive agricultural products, especially high value-added products such as fruit and vegetables and their processing). Their reduction or suppression would make greater specialization possible.

To make such a hope and specialization come true, several constraints and challenges have to be taken into account:

- *real export potential* will remain modest because of the growth in internal demand and the reduced availability of land and water (except for Turkey);
- access to markets and payment for export products require high capacity in *logistical* and marketing *organization* (packaging, transport). These are very developed in the EU and Israel, but remain limited in the developing and transition countries. This weakness reduces competitiveness, especially in exports. An example is the date sector, the export price of which is US$5.45 per kg from Israel and only US$2.25 from Tunisia and US$1.6 from Algeria. These price differences are not due to intrinsic quality variations but to management capacities (organization, management control), marketing (eco-labelling, advertising) and quality control (certification). It is clear that quality and safety are rewarded and that originality of the offer (high quality varieties of organic dates) can open up interesting niches;
- *comparative advantages* are relative. The cost price 'delivered to the European market' of Almeria tomatoes (Andalusia) and tomatoes from Souss Massa (near Agadir) are similar (Morocco's advantage of cheaper manpower is compensated by Spain's advantage in transport costs);
- the hoped-for benefits of free trade (in terms of increasing exports, incomes and a better allocation of resources through specialization) have not occurred everywhere. Countries involved in free trade that have succeeded in their transition to a higher development level (Spain, Portugal, Greece as well as the South-East Asian countries) have generally been able to do so only through much *aid or protective tariffs*. Such a transition has also had significant impacts in terms of sustainability (Box 5.14);

Box 5.14 The entry of Spain and Greece into the common agricultural market, EU aid and sustainability

Spain's entry into the European Community meant a radical change in competitive conditions for the other Mediterranean countries. The CAP (Common Agricultural Policy) promoted a clear strengthening of Spanish agricultural specialization (Spain's share in the import of fruit and vegetables in the rest of the EU increased from 4 per cent in 1970 to nearly 14 per cent in 2000; that of the third Mediterranean countries fell from 6 per cent to 4 per cent).

EU aid is intended for agricultural modernization and structural purposes for countries or regions whose development is lagging behind or that are handicapped by natural conditions (mainly fragile rural regions). With 8.8 and 1.8 thousand million euros of structural funds and 5.9 and 2.64 thousand million euros of agricultural funds received in 2002, respectively, Spain and Greece are among the prime beneficiaries. In total, Greece recorded a net budgetary balance of 3.4 thousand million euros with the EU in 2002 (2.4 per cent of national GDP), and agricultural subsidies amounted to 39 per cent of farm income.

This support has created distortions in competitiveness with third countries. Despite the structural funds and a successful transition through much aid, entry into the EU has not been without negative effects in terms of sustainability: a worsening trade balance and a loss of agricultural jobs not compensated by new jobs in other sectors (in Greece); the creation of strong regional disparities between the plains of intensive agriculture and inland areas, a strong intensification of water use and chemicals (in Spain); and loss of biodiversity, abandonment of environment-friendly traditional agrarian systems and strong specialization in particularly polluting fields such as intensive pig breeding and poultry raising.

Source: EC. Allocation of 2002 EU operating expenditure by Member State (http://europa.eu.int/comm/budget)

- the EU's already significant technological and organization progress will increase even more with the continuing development of *precision agriculture* in southern Europe. This technology relies on the biological resources of production, involving sharp work on phenomena such as plant nutrition and assimilation (including the role played by light), and genetic improvement of varieties (for example seedless red watermelons). Techniques for controlling environmental conditions (such as crop protection, integrated pest control, the timing of water and nutrient inputs, neutral substrates in hydroponics and aeroponics) have been tested and extended. All this is extremely costly in terms of research, training, extension, operational implementation and sub-sector organization. The province of Andalusia alone could, technically speaking, have over 30,000ha under

cultivation in the next ten years using plastic tunnels for producing several million tonnes of fruit, vegetables and flowers, benefiting from the necessary certificates for marketing across Europe. Funding possibilities exist in the country; research, extension and training are already very active, and organizing the entire sub-sectors (*filières*), from the beginning to the end of the production line, has had several restructuring rounds in a number of years.

It is therefore doubtful that the legitimate SEMC hopes of an easy entrance into European markets for their fruit and vegetables, due to market liberalization and the stagnation, if not the drop in yields resulting from protection of the European environment, will be fulfilled. Limited in number, joint ventures between the two shores would be more complementary rather than replacements, and only take place in a low-risk context (security for the northern investors).

Through exports, the SEMC may be able to exploit a few niche markets for *specific products* (some winter fruits and vegetables, organic produce, typical produce), provided that nearby markets able to pay for quality (i.e. in the EU) are reasonably open, that these products are identified and/or protected by authenticated source labels, and that adapted development policies are implemented, as well as promotional and effective marketing networks (there is an important potential role here for joint ventures and for the promotion of 'Mediterranean' food). Countries that already have established export positions (Morocco and Turkey) and, above all, those that have a strong logistical capacity (Israel) should be able to benefit more than the others, who will have problems getting a foot in the door. The example in Egypt (Box 5.12, p277) indicates, however, that some progress is possible in all countries.

The risks of an unsustainable baseline scenario

The baseline scenario for agriculture in the southern and eastern Mediterranean countries is therefore one of production growth stimulated by internal liberalization, agronomic progress and the development of domestic markets and irrigated lands, despite environmental degradation and recurrent and highly punitive droughts. In this scenario, various bilateral trade agreements are assumed to be negotiated (between southern countries, with the EU and the US, etc.) applying the principle of reciprocity and (almost entirely) excluding sustainable development objectives. Development issues and the multiple roles of agriculture (rural employment, the environment, food security) would not be properly taken into account in these agreements. For example, to adhere to the quotas imposed on exports to the EU, farmers are led to growing out-of-season crops, not adapted to the region, which leads to extremely high consumption of water and chemicals. At the same time, a number of seasonal fruits and vegetables, and typical and competitive products of the region (figs, pomegranates, cactus plants, etc.) cannot be exported since they are not included in the agreements. Moreover, for lack of adapted policies (lack of information, technology, organization, capital or preferential access to the European market), the desirable development of organic farming is greatly impeded.

Even if this de-protection is gradual, the risk of the baseline scenario is an *increase* in the already observed *negative trends*, in particular an accentuation of the *internal dualities* and *pressures on resources* that are characteristic of the region:

- risk of impoverishment and social vulnerability of the mass of small farmers, growing marginalization of the least productive areas;
- intensification in the most fertile and best infra-structure-equipped areas and a concentration of means on the minority of farms that have diverse incomes;
- increased pressure on natural resources: degradation of marginal lands (accentuation of survival strategies) as well as some irrigated lands (pollution, salinization), increased water consumption and reduced biodiversity.

These risks would increase even more with a lack of, or insufficiently active rural development and income-support policies and support for upgrading farms. Indeed, only a resolute implementation of such policies would enable the risks to be reduced and the opportunities enhanced.

With the anticipated profits from agricultural exports being harder to realize because of technical and financial difficulties, and with hopes of sufficient qualified manpower to massively adopt precision agriculture, there will be a strong temptation in the south and east to accept *genetically modified organisms* (GMOs) for the major crops, in particular to reinforce their resistance to water stress. The EU's position in defending the multifunctionality of agriculture and on GMOs may therefore risk losing support from the south and east in international bodies. In any case, an assessment of the possible risks of GMOs spreading in the region is necessary (Box 5.15).

Box 5.15 A necessary assessment of the possible impacts of GMOs in the Mediterranean

Since their marketing in 1996, the area cultivated with genetically modified crops has increased very rapidly on a global scale to reach approximately 58.7 million ha in 2002. Nearly all (99 per cent) of these transgenic crops are produced

by only four countries: the US (39 million ha or 66 per cent of the total area cultivated with GMOs), Argentina (13.5 million ha, 23 per cent), Canada (3.5 million ha, 6 per cent) and China (2.1 million ha, 4 per cent). Sixteen products and GMOs are currently on the market at the EU level where no significant area is cultivated with GMOs, except in Spain.

Considering the population projections for 2025 for the Mediterranean Basin, it is likely that import or cultivation of GMOs could develop in the region. What would the impacts be on the Mediterranean ecosystem if genetically modified crops were cultivated? Would modified plants that, for instance, have been given good water stress resistance behave like invasive species, threatening the very existence of local species?

It would be necessary that each Mediterranean country acquires expertise in order to evaluate the release of GMOs into the environment, and that regional systems are put in place for an exchange of information and experience, in view of preserving the extremely valuable and fragile biodiversity of the region.

Territorial challenges in the Mediterranean

Southern and eastern Mediterranean arid regions: The battle to save lands and emerge from poverty

Aridity is a dominant constraint in a large part of the Mediterranean region, although with varying intensity. In the north its impact is limited to Spain (and a small part of Greece), while most of the southern and eastern countries are affected, except the wet mountains and the plains and hills that receive more than 400mm of rain per year.

Aridity poses different types of problems that policies have tried to counter, but the results are still not conclusive. The first problem is erosion and land degradation, which has become the dominant theme in combating desertification. A second is climate hazards and recurring droughts. A third is human pressures with increased impacts on the environment due to social changes and their effects on land tenure. New approaches to these problems are currently orienting development policies towards options that make the actual users more responsible, but they run up against the inheritance of 'interventionist' development policies that have prevailed for so long.

Land degradation: Inappropriate technical responses

The *drylands* of the southern and eastern Mediterranean, pastoral or forested areas and rain-deprived agricultural areas, are economically and politically marginalized and ecologically degraded. At the end of the 1990s the situation in the developing countries was discouraging: an increasingly degraded environment (desertification), people getting poorer, and in general terms, a failure of policies for protecting and restoring land and vegetation. Degradation is generalized and has got worse with droughts and structural adjustment programmes that have further reduced the meagre government credits devoted to rural areas, considered as 'not very profitable'.

Yet *soil conservation policies* have a long history in the Mediterranean. They began in the Mediterranean part of France in the 19th century with the *restoration of mountain lands*, the main objective being to protect towns and land located downstream of disastrous floods. After state-approved expropriation, exemplary and large-scale works were carried out (dams, micro-water catchments, reforestation). Problems of poor livestock raisers were resolved through migration to industrial towns and the colonies. In the southern and eastern Mediterranean drylands, *soil protection and restoration*, first implemented by the foresters in Algeria, then throughout the region, consisted of building bench terraces parallel to contour in order to regenerate agriculture and reduce the serious problems of sedimentation of water reservoirs downstream.

Soil and water conservation approaches, implemented since then, combine public works (gully correction and stabilization, stone ridges, banks of consolidated earth and hillside water retention works) with advice to farmers. At the same time, agronomists and pastoralists have tried to promote technical solutions (better pasture management, control of pasture carrying capacity, dry farming, introduction of new fodder crops, etc.).

The results of these efforts have generally been disappointing, and many projects have not achieved their objectives. A survey carried out in Algeria showed, for example, that of the 350,000ha of land with conservation works, more than 20 per cent vanished and more than 60 per cent were damaged, because they were never maintained. Similarly, attempts to reduce the number of animals or to sell grass in an authoritarian manner generally failed. Another example, the introduction of *atriplex*, on which many pastoralists based or are still basing disproportionate hopes, has never truly broken through, despite the food qualities of this fodder crop. For example, in Syria only 3000 of the 35,000ha planted ten years ago, are still holding out.

The causes for poor effectiveness or outright failure in combating desertification in the 1990s can be summarized as follows:

- the problem of desertification was not considered in the overall context of socio-economic development, and actions were not integrated into rural development programmes;

- the approach was sometimes not appropriate to the problems (there was a lack of understanding of processes and insufficient diagnoses);
- actions were developed with little reference to people's needs, priorities or know-how;
- poor coordination between agencies, and insufficient de-concentration/decentralization;
- a preference for investment in more fertile areas, unless for strategic or political reasons.

Because the prescribed solutions did not take the various actors into account, experts and public authorities ran up against difficulties in transferring the technical rationale into social reality. In woodlands, serious disputes developed between local people and forestry services.

Responses to climate hazards and droughts

For the past decade drought has become a structural phenomenon that is hard to cope with in economic and social terms. Governments have had to implement *drought prevention plans*, especially to safeguard livestock. The most common policy consists of subsidies for rehabilitating herds and *feed supplementation*, this one being a normal practice in marginal areas. Nevertheless, such state aid also comes with some perverse effects: it reduces efforts by livestock farmers to cope with climate hazards and reintroduces an animal pressure before pastures have been able to recover. Moreover, it promotes the use of often far-away markets (for inputs and livestock sales), thus increasing the dependency of local economies. Reduction of herd mobility and motorization, which are resistance mechanisms to climate hazards, mainly benefit the big livestock farmers.

Exploiting groundwater (by digging wells with motorized pumps) is another response to droughts. However, its development has generally been poorly regulated, and has led to *overexploitation of groundwater aquifers* over recent years. For example, in some regions of central and southern Tunisia, where new administrative procedures have considerably accelerated the official privatization of collective lands, more than 7000 wells have been dug in 15 years. There has also been considerable expansion of orchards into the steppe, as a response to climate hazards. This phenomenon, of an unforeseen scale, is due to land purchases by local families with external resources (emigration, trade) or by city dwellers.

Faced with the increased recurrence of droughts, some governments have turned to more *sustainable policies of climate hazard management* by developing forecasting instruments.

Concerning livestock-raising, policies are turning to early culls and storing feed supplements to save the reproductive capital. Some projects (as in western Morocco) have succeeded, with the participation of local users, in obtaining crop rotation and opening pastureland depending on its forage potential, according to conditions during the year. Longer-term measures are being studied to introduce cereal supplement irrigation (an already widely practised measure in Spain and Tunisia), and better rainwater management. Ad hoc measures are also planned to encourage cereal irrigation when the risk of shortage becomes clear. Barley crops are also being encouraged in semi-arid regions, even though this crop has been much neglected by research. Agricultural extension is an active part of this strategy with experience showing that a good timing of sowing and agricultural practices could significantly reduce the loss of productivity due to insufficient rain.

Many technical innovations over the past few years have increased hopes for better management of the environment and a more confident adaptation to climate hazards. More effective *rainwater* management occupies an essential place in these options, although its techniques have not been sufficiently explored. Very often all that is needed is to revitalize traditional techniques, which are widely known for their effectiveness. Such techniques include *magden* (ponds), *tabia* (embankments), *jessours* (weirs) and *matfias* (tanks).

Another technique relates to repeated disk ploughing, which is a major cause of farmland degradation. Unfortunately commonly used in the southern countries, such mechanization leads to soil destabilization and erosion. Direct seeding (cultivation with no tillage, or, its even more innovative form, sowing under existing plant cover) has been subject to encouraging professional experiments in Tunisia since 1999 and could prove to be an alternative to disk ploughing.

Spectacular applications of cactus in several Maghreb countries have shown many advantages, for example field closure, protection of soil against erosion, production of export fruits, and livestock fodder. The expansion of rain-fed olive trees in low-rainfall areas should, however, not be seen as a viable alternative. These trees, planted in rows, in broad 24 × 24 metre patterns, only yield fruit every 6–10 years. Moreover, they increase the soil's sensitivity to wind erosion when it is laid bare by repeated disk ploughing. Excluding some marginal areas where olive trees could be planted, this practice should not be allowed when it encroaches on pastureland. The only 'justification' for these futureless investments is the privatization of a public good (and to benefit from unjustified state subsidies). In south-eastern Tunisia, for example, this has had harmful impacts.

Participatory management of natural resources in arid areas

The importance of natural areas in the southern and eastern countries, traditionally collective-use pastures, puts a particular emphasis on changes that have

occurred in the relationships between communities and land tenure.

In contrast to the intensive production sectors, tribal customs have maintained an important role in pastureland and forested areas. Here, *'belonging to a group'*, which is not necessarily respected by administrative subdivisions, still commands the right of access to pastures or cultivated land, particularly in Maghreb. Forest privatization has not changed user customs; they continue to consider forest grazing land as their own.

However, cultivation and livestock-raising systems in these areas have experienced profound changes over the past few decades. Customary organization used to enable long-term management of resources (with community protection from grazing). Up to the 1950s and 1960s, the areas concerned preserved a relative balance between production and consumption as they did between the population and the environment. Families ensured a sufficient agricultural production while practising what appeared to be sustainable natural resource management. But even then some pastureland was already degraded. Distortions started growing from the 1960s onwards, with the effects of the very large population increase and the regression of customary organization. One significant resulting trend was the *monopolization of pasturelands*, whether for cultivation or 'privatization' (made possible by mechanization or digging of wells). Big farms based on extensive livestock-raising or marginal cultivation have thus been created, opposing their economic and political power to the mass of landholders, who were pushed aside on what remained of collective lands. This development began very early in the Middle East and spread to Maghreb, although with unequal effects.

In an attempt to control this development, several countries have committed themselves to management policies of collective land, mainly through *privatization*. Results have been uneven, particularly because policies have usually been applied without taking the pastoral specificity of most of the collective land into account. In Algeria the law dealing with access to farmland property has led to private investment (largely by urban dwellers) in the steppe-lands of the Upper Plateaux, once enjoying collective land status (*arch*), later privately owned. The results have often been disappointing, the privatized lands not being suitable for agricultural activities. In Morocco, the privatization of collective land has been limited to irrigated land. But other collective land with rain-fed farming has been enhanced by investors who pay a small rent to the local community services that act on behalf of the holders. In Syria, collective pasturelands have been organized into large cooperatives, again with unequal results. In Tunisia, the privatization of collective lands has undeniably boosted farming in the centre of the country and, through secure land tenure and access to credit, enabled major intensification in the form of fruit-tree plantations and cactus reserves. However, the inconsiderate spread of this policy to the arid southern regions has caused growing distortions in pastoral areas (despite legislation prohibiting agricultural activity in these regions).

These observations on the perverse effects of privatizing collective lands in pastoral areas, whether the result of a de facto monopolization or an application of the law, have led decision makers to seek other formulae for managing collective lands of pastoral nature, without necessarily turning to privatization. For example, *managing pasturelands through negotiations with users* has been practised in eastern Morocco in an innovative project based on an organizational formula rooted in the social inheritance of custom rights. The negotiated restoration of the richest but most degraded pasturelands was founded on 'ethno-lineage cooperatives'. In 1996, after three years, 300,000ha of mugwort (*Artemisia vulgaris*) were restored and used for pasture following strict rules accepted by the land users (the area increased to 450,000ha in 2000). In south-eastern Tunisia a new development project has followed a similar approach by promoting an *integrated, territory-specific and participatory approach* (Box 5.16).

Box 5.16 The agro-pastoral development programme and local initiatives in Tunisia

This programme (US$44 million funded by IFAD, OPEC and Tunisia) claims to be a local development process founded on an integrated, territory-specific and participatory approach. It involves 66,000 rural dwellers, many of whom have abandoned their perched villages and moved to new 'water-and-electricity-equipped' urban centres. Livestock raising has remained their main activity despite a long tradition of emigration that began to counter poverty and the development of not very sustainable irrigated agriculture.

The programme includes a series of complementary actions: infrastructure investment (roads, pastoral drilling for water), improvement in natural resource and small infrastructure management (transferred to population groups effectively having rights on pastoral lands, which is an innovation), and the promotion of micro-enterprises and other economic initiatives mainly for the benefit of women and young people. An initial experience highlighted the population's profound knowledge of its natural resources and the solutions for their sustainable management. It also showed their ability to organize themselves and design a diversified development programme.

These new approaches bring hope, but the difficulties should not be underestimated. Their implementation is still being impeded everywhere by a lack of de-concentration and decentralization, by compartmentalization between administrations and the rigidity of administrative

rules (lack of flexibility in implementing public support, and managing land tenure and uses). Nevertheless, such a return to traditional wisdom relying on today's technologies and strong voluntary policies would be the only way to escape a very sombre future. This is one possible way forward (and history shows the incredible resilience of human societies), but it also shows that societies can die as a result of their inefficiency.

Mountains: Degradation or conservation and restoration of the 'Mediterranean garden'?

The importance and fragility of Mediterranean mountain systems

A large percentage of Mediterranean peoples (more than 60 million, of whom 23 million are in Turkey alone) live in mountainous areas. The percentage is especially high in Bosnia-Herzegovina (50 per cent of the population), Albania (39 per cent), Lebanon (37 per cent), Turkey (37 per cent), and in Algeria, Morocco, Serbia and Montenegro and Slovenia. It is not insignificant in Syria and the four EU-Med countries.[25] Many come from communities with strong identities (Berbers, Kabyles, Lebanese Maronites and Druze, Kurds, Kosovars, Montenegrins, Corsicans, Sicilians, etc.). These long-inhabited areas are also 'built' areas, with local communities always having sought to develop slopes and control water. The closeness of the *relationships* between *people* and a *natural environment changed* to maximize resources and reduce risks, constitute the main characteristic and real unifying element of the Mediterranean mountains.

Despite their particularities and an isolation that still remains very real in the north, but even more so in the east and south, the Mediterranean mountains have always been closely attached to the cities, coasts and the sea that surround them. For a long time, the mountains, a place of refuge, were suppliers of manpower for cities, pastureland for herds of the plain (transmigration) and timber for ships. They play an essential role as Mediterranean 'water towers' and main shelters for biodiversity. Apart from their coolness, they offer their authenticity and landscapes to all visitors from near and far, amenities that can only grow with globalization.

Despite these varied and essential roles, mountains have been, and often still are, the 'forgotten ones' of development. Since production has a hard time coping with competition from other more privileged regions and life in the mountains is by nature hard, the Mediterranean mountains have seen *massive* and *abrupt migration* throughout the 20th century, the reasons often being cultural and economic (Box 5.17). Abandonment is the sign of a loss of general confidence in the future of their area, by individuals and local communities and can occur even when tourism development offers new horizons to development. This kind of process is underway in several countries, for example Turkey, even though increasing numbers of urban dwellers are visiting the mountains. One trend intersects with the other without really gauging what both are losing.

Box 5.17 Massive migration from mountain areas, Albania as an example

Migration from the mountains, often massive and sudden, can result in a genuine 'desertion' of entire villages, which, once abandoned, are left to fall into ruin. This was the case several decades ago in France, Italy and Greece, and is now the case in Albania. Since the freedom of movement and the right to reside anywhere in the country was affirmed by law in 1991, some mountain villages have lost between 60 and 80 per cent of their population, which indicates total desertion in future and a concentration of migrants on the plains of the western part of the country and large cities such as Korça, Tirana, Dürres and Shkoder. According to surveys findings, 80 per cent of the migrants claim that they migrated for economic reasons. The same surveys show that more than half do not want their descendants to remain in the village and in farming. All the young women wish to marry in towns, but only a third manage to actually do so, with a third marrying on the plains and a third finally accepting to get married in their villages after having given up all hope of a better solution. Only 16 per cent of the people interviewed, all over 50, stated they would accept the idea of returning to their villages if all the living and working conditions were met.

Source: Sabri Laçi, communication to *Plan Bleu* workshop on 'Montagnes méditerranéennes', Sophia Antipolis, 1–2 April 2003

Once abandoned, the 'built' agricultural systems in the mountains deteriorate and can no longer produce all their amenities. When people leave, the land abandoned and the generational links broken, a whole historical culture disappears, a loss in the sense of collective responsibility related to the land and a land 'escheat' becomes general. Latin law, which does not formally link the property right with a (legal) duty to maintain the land, has promoted this development in Mediterranean Europe.[26] The land changes and returns to its 'wild' state, becoming less hospitable. Not enough men and women remain to maintain diversity and quality landscapes, basic services, and receive possible visitors. Another consequence of abandonment is the disturbance of the mountain ecosystem: loss of biodiversity, deregulation of the water regime, increased erosion risks, and in some cases renewed erosion.

Despite some rural revival, the baseline scenario for the northern countries remains one of *gradual abandonment*, which will probably continue, if not accelerate, with the projected fall in agricultural manpower.

Abandonment, which is increasingly frequent in the northern countries, is not occurring in most of the southern and eastern mountains. Instead, huge rural poverty and the resulting overexploitation of resources are the predominant trends. The degradation is even more serious than in the north: disappearance of plant cover, sometimes disastrous erosion, and loss of biodiversity (middle Atlas and Tell Atlas). The baseline scenario in the south and east thus risks being even less favourable than in the north. Indeed, it is likely that poverty will get worse and *stress and degradation increase*. However, abandonment would also occur, at least locally and mainly after 2015, and might enable some 'biological revival' given the strong resilience (a return to equilibrium after serious disturbances) of Mediterranean ecosystems.

Reconciling development and conservation

Faced with a fairly unfavourable baseline scenario, especially in the south and east, there are many examples showing that shifts towards a more desirable future for mountainous areas are possible and that their generalized application would enable the necessary changes.

In the *north*, new dynamics are emerging (Box 5.18). Active protection of valuable natural and semi-natural environments and diversification of activities, with typical products of the Mediterranean region inserted in quality processes, is no longer a utopian dream but a reality. This reality is highly dependent on the level of commitment by local actors and decision-makers, and many examples show that this commitment is possible and can be very effective. Such an approach enables the 'Mediterranean garden' with its biodiversity to be reconstituted, at least locally, while meeting the growing expectations of people to discover quality products, visit the mosaic of natural, well-kept landscapes and through these landscapes, rediscover elements of culture, nature, history and authenticity. Thus, an original and complex but *specific* '*Mediterranean mountain model*' could develop. This calls for another perception and other responses at the political level different from the 'Alpine agricultural model' (cattle raising) that predominates in Europe, which is today the only well-recognized and supported model, especially by the EU authorities.

One condition is that support be oriented towards more sustainable systems. In the Mediterranean mountains, EU and national aid programmes have had perverse effects such as unjustified reforestation and opening up of forest roads, and aid to livestock-raising based on ill-perceived realities that have aggravated the shift towards practices harmful to the environment (extensive grazing without sustainable management of pastures, an increase in artificial land cover).

Box 5.18 Mountain revival in Cyprus, the Iberian dehesas and France's Cévennes

Until 1992 water and irrigation works absorbed 60 per cent of the rural areas budget in **Cyprus**. With the exception of an integrated project in the Pitsilia area (between 1978 and 1982), rural areas and mountains (16 per cent of the country, 160 villages), where farming revenues are the lowest, barely managed to survive. The rapid economic development of the island went hand in hand with massive rural migration. After 1992, policies became more balanced. The development of communication networks and urban stress favoured a stabilization of the rural population. The rural development plan for 2004–2006 is based on sustainable rural development. In addition to conventional aid to agriculture, it aims to support projects linked to the conservation of local breeds, forest development of abandoned lands, maintaining rural landscapes, local heritage and traditional know-how, support for organic and typical quality products, private forestry and small food processing units. Integrating local activities and actors, multiple activities and spatial planning are seen as indispensable principles for these new approaches.

The *dehesa*, a complex agro-sylvo-pastoral system located mostly in the **south-western quarter of the Iberian peninsula**, is a remarkable example of adaptation to the natural environment. On very large farms it combines activities like cork production, extensive husbandry (exploitation of the herbaceous layer under cork and holm oak forests), pig breeding (enhancing the pastoral value of masts) and feed supplementation if needed. The production of cereals and charcoal, once important, has been practically abandoned. This system requires a constant fight against encroaching shrubs and maintenance of trees. It entered a period of crisis in the 1960s after Spain's and Portugal's economies opened up, which led to a fall in the prices of animal husbandry products (competition with new intensive livestock-raising) and a rise in salaries. Part of the area was degraded by shrub development and part was reforested with eucalyptus trees (for the paper industry). A revival of the *dehesa* started some 15 years ago. This has been possible because society started to recognize and enhance the multifunctional role of these areas: interest in quality production favourable to the environment, value of landscapes and ecosystems rich in biodiversity, enhanced value of products (for example *Jabugo* ham), eco-tourism and safeguarding the Mediterranean forest. EC aid (for extensive animal husbandry in disadvantaged mountain areas, structural funds, etc.) brought support, and the *Estremadura* region even voted for a '*dehesa* law' that sets the rules for its sustainable management.

In France's **Cévennes** mountains, tourism and agriculture have been revitalized by developing the production of sweet onions on terraces, apple juice from old apple varieties, goat cheese with the '*pélardon*' label of origin and new chestnut-based products, and by the national park activities (actions in highlands, protection of valuable natural areas, contributing to

preserve pastoralism through land management and support for herders and local endangered breeds, development of agro-tourism and eco-tourism, architectural regulations and aid to the restoration of the built heritage). All this has made it possible, at least at the local level, to conserve and restore the 'Mediterranean garden'.

A promising approach to managing mountain areas is the one adopted by pastoral land associations (several of which are operating in France). It works on the principle of pooling cultivated or pasture lands into a single fund, which is managed by a livestock-raising company, while land taxes are partly paid with the farm revenues.

Source: Plan Bleu, various national sources

In the *southern and eastern countries*, the 'Mediterranean garden' still exists in the mountainous regions, although in a degraded form because of poverty/overexploitation and deforestation. The main challenge is to continue producing a lot while successfully *decoupling production from degradation*. For the future, the long-term objective would be to strive for rural revival through quality products and services while avoiding the excessive abandonment that has occurred in mountains in the northern countries. A scenario *moving towards modernization* without breaking with tradition would make it possible to avoid all the problems encountered today in the northern countries where authenticity has to be reconstituted from residual fragments.

In halting or reducing degradation, responses such as forest protection, reforestation and creation of protected areas, have only had partial success. Their application has too often led to serious disputes between forest administrations and local communities. In reaction to these approaches *integrated and participatory approaches* for the sustainable management of natural resources have begun to be promoted. They seem to be a promising path as shown by the example of the GEFRIF project in Morocco (Box 5.19). This integrated approach is now being factored-in when implementing *catchment-area-development* programmes (sustainable management of natural vegetated areas, reforestation and land restoration) for which complementary actions between actors and private and public areas are needed. However, these programmes seem to face difficulties in gathering the required funds. The Moroccan national development plan for catchment areas, implemented under the water and forest administration, includes strong participation by local communities. However, in the 1990s implementation was only 13,000ha per year, instead of the 75,000 envisaged, and the downstream positive impacts are still hard to gauge. The allocated and planned budgets (about 30 million Dirham) are still far from the 150 million said to be necessary, and the principle adopted in 1988 of a financing system including downstream beneficiaries is still to be realized.

Box 5.19 The GEFRIF project in Morocco

The Rif has a large rural population (100 people per km^2 in the Chefchaouen Province) exerting much pressure on natural resources (30 per cent loss of forest cover in 30 years, up to 65 per cent in some areas, and soil erosion). The main crops are low-yield cereals (6–8 quintals per ha), forest goat raising, arboriculture and cannabis. The cannabis production has developed significantly but is currently in crisis due to policing efforts and a reduction of profits through market saturation.

Changes in the development model (agricultural diversification and sustainable resource management) are underway thanks to Morocco's strong political will, EU financial support and the mobilization of local communities. Negotiations with local people are leading to targeted investment choices in line with needs actually felt to be priorities (for example schools, road access to enable a tenfold reduction in transport costs), and a review of administrative procedures for land tenure and natural resource management.

Within the framework of the GEFRIF project (participatory management of the Rif forest ecosystems), the forestry administration has organized a new land delimitation after negotiations with the communities. Forest stands of quality or protection stands have remained classified as publicly owned, whereas those that were overexploited have de facto been allocated through individual plots. Offences have been significantly reduced, and a new natural forest regeneration dynamic has been observed. Developing a new generation of locally produced bread ovens (metal) should lead to a 50 per cent saving in fuel-wood consumption while lightening the women's work load (wood gathering) and pressures on forests.

This example highlights the changed role required in administrations for shifting from a 'command and control' culture to one of local and participatory governance. Involvement is facilitated by a de-concentrated cross-sectoral organization (the *Agence du Nord*), which pools national and European financing, and benefits from simplified administrative procedures that facilitate implementation.

The spatial distribution of the population could evolve along one of two scenarios. There could be a concentration in towns and villages located on the plains and along the communication lines, with the mountain villages being abandoned or reduced to a role of temporary residence. Or there could be economic diversification of villages, implying a better insertion in the modern world. The coastal road currently under construction could well lead to an evolution towards the first scenario. However, the form given to tourist development in the region may favour a more balanced development.

Source: Montgolfier, *Plan Bleu*, 2002

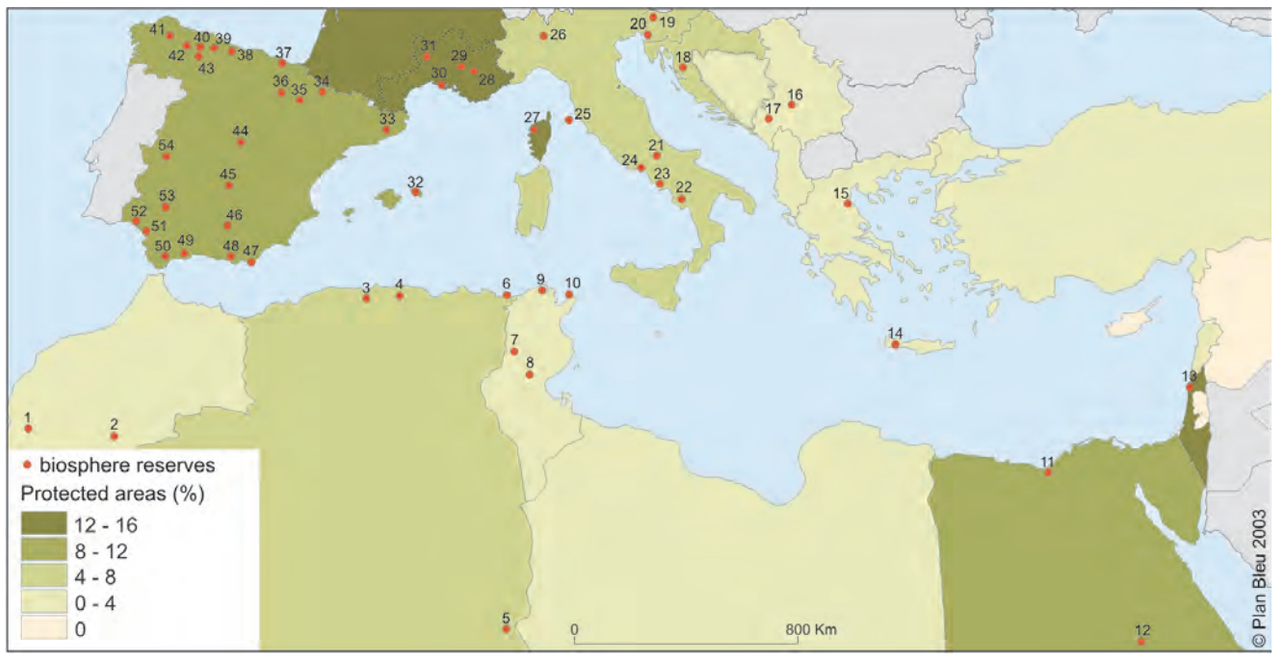
In the north, as in the south and east, the shift to an alternative scenario implies launching processes and dynamics that seek to *reconcile development and protection*. This means recognizing that in this part of the world,

perhaps more than anywhere else, the biodiversity to be protected is both (and often simultaneously) 'natural' and 'cultural', and that it is difficult, if not impossible, to discuss development without discussing the protection of nature and vice versa. This would argue for a specific *Mediterranean approach to the Convention on Biodiversity* combining nature and culture. And local development should be added to the two basic missions of national parks (ecosystems protection and welcoming the public) since, in this region, the third mission is often a condition for success of the other two. This means ensuring strict protection through regulation (possibly by land acquisition) of the last 'relict' natural environments, which are all extremely precious for their biodiversity and their landscapes; favouring the ageing of some forests; protecting and promoting the traditional practices and architectural heritage that have shaped today's heritage with its great value (landscape and biodiversity); and making local people benefit from the protection efforts (to which they are called to actively contribute) through the enhanced value of products and controlled tourism development.

Several national parks are fortunately involved in this pathway, the Italian national parks in particular, as exemplified by the *Monte Sibillini* park, which makes its information huts available to young people for developing new sustainable tourism activities. The French experience of *regional natural parks* is also interesting for combining protection and development. These parks generally operate as associations of municipalities, have technical advisory teams and ten-year territory-specific projects involving various partners (through a charter) for ensuring a development process with environmental protection. The 'charter' is reviewed by the national council for nature protection and approved by the state, owner of the 'regional park' label, which can be withdrawn if need be.

A formula particularly well adapted to the Mediterranean is that of *'biosphere reserves'*, first established in 1976 under the aegis of UNESCO (Figure 5.16). Their aim is to reconcile the imperatives of protecting biodiversity and ecosystems with the legitimate aspirations of local populations with a view to satisfying their economic, social and cultural needs. The different functions of each reserve are facilitated by continuous monitoring (scientific follow-up and indicators), and zoning: strictly protected central zones are surrounded by a buffer zone where activities required for conservation can be promoted (active protection) and others regulated; a transition zone is devoted to cooperation and local development in the broadest sense. However, many countries do not yet have any biosphere reserves (Turkey, Syria, Lebanon, Cyprus, Libya, Albania, Bosnia-Herzegovina) or only a few (Greece, Croatia, Algeria and Morocco).

Figure 5.16 Mediterranean biosphere reserves



Source: UNESCO

Note: A list of the reserves is provided in the Statistical Annex (Table A.36).

Donors have an important role to play in promoting such processes in countries where they are not very developed. Several integrated projects aimed at reconciling conservation with development are underway with their financial support, such as the Karst Ecosystem Conservation Project (KEC), in Croatia, supported by the World Bank. This programme supports cooperation between the local population, national park authorities, entrepreneurs and NGOs (awareness raising, training, sustainable use of resources, rural revitalization). The KEC project has been implemented since 2004 and its completion is expected in 2007, with funds amounting to US$5.07 million.

Will we know how to conserve farmland and suburban rural areas?

Fertile coastal and fluvial plains cover about 5 per cent of the land in the Mediterranean. Through considerable enhancement efforts (draining, mosquito elimination, irrigation and soil reclamation) carried out by successive generations, rural areas in these fertile plains fully contribute to economic development. These regions and their agricultural and natural areas (forests, wetlands) are nevertheless threatened by the development of infrastructures and by very poorly controlled urban expansion in general.

A shift towards an alternative scenario would require an awareness that could lead society to consider valuable (heritage and economic) and threatened farmland as *areas that need protection*, just as much as some forests and coastal areas. In addition, it would be necessary to develop voluntary policies with combined land-planning tools.

Several countries already have specific laws for protecting their agricultural lands (for example Turkey and Tunisia). However, enforcing the law and ensuring the long-term protection of these lands are made harder because of the considerable difference in value between farmland and constructible land and the enormous subsequent pressure from landowners and investors. Organizing a stronger collective, professional and social dynamic to *defend and promote* agriculture and suburban rural areas appears to be indispensable. The different evolution of two regions with very similar natural conditions and development levels such as the Italian Liguria Riviera (which has managed to keep most of its agricultural heritage) and the French Riviera (which has not) reveals that loss of agricultural lands is not inescapable when major long-term issues in terms of identity and the living environment are taken into account.

Apart from urban planning tools (see Chapter 4), the development of *Local Agenda* 21 processes should make progress possible through a higher level of awareness of the heritage dimension of this agriculture.

New practices need to be developed. The objective would be to make *regional development* a tool for helping in decision making with a rationale of decentralization, participation and sustainable development. To this end, *master plans* negotiated with the various decision-makers and actors involved for the benefit of a shared vision of a desired common future, could spatially identify the agricultural and natural areas of rural regions to be conserved in the long term for the common interest. To make such development possible, innovative measures will be necessary in the coastal regions that are subject to very high pressures, even going so far as making lands legally inalienable (not transferable to another) when their long-term conservation as farmland is judged to be a priority. Enforcing such a land easement would require legal backup, and, if need be, compensation, but would cost less than purchasing farmland by public bodies (with leases to farmers). The latter solution is beginning to be suggested in some coastal regions (for example in *Prospective du Languedoc Roussillon à l'horizon* 2015, INSEE, 2003). Funding could come, for example, from taxes assessed on the land's added value.

Some countries (like Egypt) have developed *new town* policies to protect their best land by reducing population pressures (with relative success), others are planning to do so (as in Algeria) (see Chapter 4). The general question raised here is one of redistribution of people and their activities in the Mediterranean region.

Alternatives for rural areas

The current marginalization and dysfunction of many Mediterranean rural areas is generally a direct consequence of the fact that the economic and technological centres are drifting towards northern latitudes where development models have been worked out over several centuries.

However, the preceding analyses show that there are credible options for shifting from the baseline scenario by choosing a more optimistic vision of the future of the ecoregion up to 2025. Nevertheless, the challenges should not be underestimated. Indeed, committing to a path of a more sustainable process implies *in-depth* changes in:

- the 'vision' of the roles of rural areas, of their possible and desirable futures, and the objectives of an alternative scenario for sustainable rural development;
- the overall development and environmental management policies of countries;
- the patterns of regional cooperation and the factoring-in of sustainable rural development by the Euro-Mediterranean Partnership.

Although the nature of these changes is not identical in the north and the south, for the future the prime necessity for solidarity and interactions that bind the two shores should be stressed. The destinies of the two

shores have been closely linked throughout the history and continue to be so despite what separates them.

Towards a Mediterranean 'vision' of sustainable rural development

The first change, and probably the most promising for shaping the future, concerns the way Mediterranean societies see their environment and rural areas. Everything mentioned above shows that Mediterranean rural areas, perhaps even more than elsewhere, are ones where ecological and socio-economic dysfunctions generate risks (that can endanger the development of countries and regional stability), but that they also offer considerable potential. Increased awareness of the costs and risks of poor management and of the multiple roles of rural areas (and their wealth) is a basic condition for changing scenario.

Awareness of the many roles of Mediterranean agriculture and rural areas

The above-mentioned analyses show that in addition to agriculture and its traditional economic food-security functions, rural areas fulfil many other environmental and social functions which are essential for all Mediterranean peoples:

- On the *ecological level*, rural areas have a decisive role not only for the quality of the rural environment but also for suburban and urban areas, and beyond that, downstream, for the coastal and marine ecological balance of the Mediterranean Sea itself. This role is played in particular through water regulation, water conservation, soil and biodiversity, water, soil and biomass production, and sedimentary deposits in the coastal ecosystems. Finally, what must be stressed is the importance of farms in maintaining the quality of the countryside and acting as 'green lungs' between cities in a heavily populated region with strong aptitude for tourism.
- Rural areas are a major element of the *rural–urban* population *equilibrium*. If not controlled, too rapid concentration of people in cities and coastal areas could lead to social instability and the high costs that come with congestion and pollution. Moreover, excessive rural migration as currently occurring in some southern and eastern countries, and under-population in rural areas, as is being seen in the north, will lead to costs that can become prohibitive for states and local authorities: public service maintenance costs for sparsely populated regions, public management costs of abandoned areas, and costs linked to induced risks (forest fires, flooding).
- R*ural employment* (agricultural, semi-agricultural and non-agricultural) becomes a decisive factor in the search for a viable social and spatial balance. It is also of prime importance in containing the social costs related to rural–urban migration and between the northern and southern shores. This issue is even more crucial in the Mediterranean because of the importance of regional contrasts and the dualities that result from them, particularly between highlands and lowlands and between populations with different cultures. Rural employment has a vital regulatory social function, conditioning its viability but also the resilience of societies in times of crisis.
- Rural areas ensure a growing *function of accommodation* (residential and recreational), the economic impact of which goes well beyond the limits of the eco-region and which will only gain in importance with globalization.

The observations that can be made based on existing trends and predominant policies show that these multiple functions of rural areas, the importance of which should be obvious for decision-making, are in fact very *insufficiently recognized*. Such an undervaluation appears all the more harmful since a lasting satisfaction of social demands concerning these multiple functions implies management costs that have a clearer and clearer economic reality, a reality which markets are not yet taking properly into account (Box 5.20).

It is not, however, from lack of trying to demonstrate this fact. Environmental economists, for example, try to quantify the total economic and ecological values of forest areas. Agricultural economists, for their part, try to identify and quantify the multiple (and non-commercial) roles of agriculture so as to facilitate their inclusion in policies. These attempts contribute to the vital recognition of the need for sustainable development of the *rural sector's social and environmental functions*, and, within it, the agricultural sector, as encouraged by the UN Commission for Sustainable Development. Such observations demonstrate beyond a shadow of doubt the importance of these issues.

Box 5.20 The value of the multiple roles of Mediterranean agriculture and forests

Recent assessments of the total economic value of **Italian forests** have shown that the production of timber accounts for only 9 per cent of the total value of forest use, compared with 58 per cent for the water cycle, 11 per cent for 'hobbies, mushrooms and hunting', 10 per cent for firewood, 3 per cent for grazing, 3 per cent for sequestering carbon and 5 per cent for other positive functions. In Morocco this value is broken down as follows: 30 per cent for firewood, 23 per cent for grazing and 18 per cent for protecting the water cycle. On the other hand it is negatively influenced by erosion (–11 per cent) and by deforestation (–7 per cent).[27]

What is true of the total economic value of forests is also true of pastureland and cultivated land. Well-managed

pastures and cultivated terraces are, for example, excellent retainers of water and soils. The obvious importance of extensive livestock-raising in the southern countries, can be added to these poorly perceived effects. Synergies and complementarities between the functions of the different components of rural areas add even more to their overall economic value. For example, it is recognized that the biodiversity and quality of Mediterranean landscapes relies heavily on maintaining a certain mosaic, and thus on a balance between 'natural' areas and forests, and pastoral and cultivated land.

Recent work by FAO on the multiple roles played by **agriculture in Morocco** shows that economic growth of the agricultural sector through pro-agricultural policies should make it possible to significantly reduce the incidence of poverty at the national level. Evaluating the sector's environmental (and social) externalities is seen as essential, so that political decisions take into account the non-commercial services rendered by agriculture to society as a whole. For example, in addition to its contribution to employment and GDP, agriculture generates important social benefits in terms of the rural–urban population balance and furnishes high externalities profitable to other sectors (for example agro-tourism in the High Atlas). Actually, it is also the basis for an important, informal social insurance system by providing functions of social connection and reception for emigrants (the money they send back to their families still in villages could be seen as income from an insurance contract).

Unfortunately, national accounts give a distorted and underestimated picture of the real economic weight of the agriculture sector. Undervaluation of the roles of agriculture concerns not only its non-commercial functions, but also its direct economic and commercial ones. Indeed, the accounts separate strictly agricultural activities from agri-business activities and from agriculture-related upstream and downstream services (transport, trade, insurance and others). Furthermore, they neglect the most important multiplier effects of growth that agricultural growth has for the benefit of other sectors.

These observations emphasize that the value of agriculture, forests and rural areas in the Mediterranean region generally exceeds their contribution to GDP because of their multiple functions and the considerable non-commercial contributions (not reflected in market mechanisms) that these sub-sectors (and rural areas as a whole) make to society. The wealth of heritage of rural areas and the diversity of their functions are therefore important assets and opportunities for the future if politicians had the will to take them into account and if efforts were made to adapt to changes and render explicit the underlying challenges.

Objectives of an alternative scenario

An alternative scenario of sustainable rural development would aim to satisfy this diversity of functions. It would result in *continuous* and *cumulative* progress in three complementary fields: coupling/decoupling agriculture and sustainability, with farmers becoming true agents of sustainable development; improving living conditions, through social, economic and cultural development of fragile rural areas; and enhancing the Mediterranean quality and diversity.

Succeeding in 'coupling/decoupling' agriculture and the environment

The alternative scenario is one of successfully coupling and decoupling agriculture and the environment. Decoupling aims to reduce the negative impacts on the environment and coupling aims to maximize the positive impacts (amenities).

Agricultural development in this scenario takes place on the basis of an agriculture that is *respectful of the environment*, the primary aim of which is better enhancement of *water resources*. The objectives of the alternative scenario mentioned in Chapter 1 would be reached with 34km^3 of water saved in the catchment area by the sector, compared with the baseline scenario. The search for efficiency also affects rainwater, which is better conserved and valued. To achieve these objectives, agricultural policies make sustainable water management one of their primary objectives and implement appropriate tools (aid conditions, pricing, targeted subsidies for developing economical equipment, adapted crops and technical practices, awareness-raising and the organization of producers, etc.).

Developing agriculture that respects the environment also makes it possible to reduce the use of *fertilizers and pesticides* compared with the baseline scenario. Their consumption would thereby drop in the north, and only increase by 25 per cent in the south and 35 per cent in the east, compared with 50 and 70 per cent in the baseline scenario. An even greater reduction would be possible by developing organic farming (which could be facilitated in some southern and eastern countries where farming remains more 'natural'). Organic farming would use 15 per cent of total arable land by 2025; the Italian example would be widely followed in the region and markets in the north would be more open to exports from the south and east.

The alternative decoupling scenario would see a *halt to desertification* resulting from poor management before 2025, by upgrading the living conditions of rural dwellers and improving regulation of agricultural, pastoral and forestry activities in the areas concerned (participatory management, clarification of rights and rules for access to resources).

The alternative scenario also assumes a successful coupling of agriculture and the environment.

The sustainable management of agricultural and naturally vegetated areas (mountains, steppes and

'natural' areas in plains, hills and plateaux) takes their *multifunctionality* into account: biomass production for various types of production (ligneous, plants, pasture, energy), water regulation and erosion control, response to landscape and recreational demand, safeguarding biodiversity, residential demand, etc.). The fundamental role of *grass* (not only of forests) is recognized with the consequent support and supervision of pastoral, agricultural and forestry activities. These are also supported and reoriented with a view to *reducing natural risks* (forest fires and flooding). The major fires projected under the baseline scenario would be avoided.

In this coupling scenario, the positive role played by agriculture in maintaining the great 'green lungs' and rural character around urban areas is at last recognized. The developed countries would thus end the current trend of urban sprawl into suburban rural areas and engage in a scenario of 'sustainable cities and rural agri-business'. The southern and eastern countries that are still in a position to do so would succeed in avoiding the urban sprawl that would result from the expected increase in car use. In all, the region succeeds in reducing the loss of quality agricultural land projected in the baseline scenario (1.7 million ha) by at least a third.

Improving living conditions and developing fragile rural areas

The development of fragile rural areas is another major objective of the alternative scenario. Decisive progress is achieved in three fields:

1. *increase in agricultural productivity*, in particular of rain-fed agriculture;
2. *equipping rural areas with basic public services* (roads, drinking water, electricity, health, education, etc) and *structuring rural centres* (market towns, small towns) so facilitating economic diversification, promoting the attractiveness of the territory and reducing disparities with cities in these poor and under-equipped rural areas;
3. *diversification of economic activities* in mountainous or difficult/marginal areas (particularly the semi-arid regions of the southern countries), that are either underpopulated or, in contrast, likely to maintain a large rural population for a long time: promoting the development of the service sector; diversifying local activities; promoting multi-activity on the basis of labour mobility; linking up with intermediary urbanization; promoting rural and mountain tourism, etc.

There are considerable challenges in the southern and eastern developing countries and in some eastern Adriatic transition countries: putting an end to illiteracy and poverty, re-igniting hope in especially impoverished populations, reducing the risks of instability (urban, emigration), avoiding excessive concentrations of people in crowded coastlines, reducing disparities in domestic agricultural productivity and with the developed northern countries, reducing the vulnerability of societies to worldwide competition, promoting rural revival prior to abandonment in order to restrict the long-term costs induced by excessive desertion of difficult regions (mountains, steppe plateaus), and, finally, developing domestic markets for the benefit of national economies in the region. Success of the alternative scenario could be appraised by measuring the percentage of non-agricultural employment in these areas (which would grow considerably) and the reduction in disparities with cities (basic services, poverty) that would almost be achieved by 2025.

Enhancing the typical character and quality of the Mediterranean (food, products, land)

According to this scenario, the Mediterranean people would value the Mediterranean cultural diversity and identity as well as their knowledge and know-how, in relation to north-western societies.

Regarding *food*, people regain the connection between pleasure and health (avoiding over-regulation of hygiene and enhancing the senses, taste and smell). Well-off consumers quickly return to a more Mediterranean consumption pattern that is more economical in primary energy (in particular with a sharp decline in meat consumption, and thus reduced pressure on land). This scenario of a return to a reasonable and efficient diet implies a strong mobilization of public authorities and consumer associations. Measures could be economic (subsidies, taxation) or information-related (recommendations, pressure on lobby groups, as is already the case in Spain).

This reorientation relies on a desire for 'renaissance' and 'regeneration'. A certain return to authenticity would occur, 'turning the old into new', moving beyond the present trend of demanding standardized and sterilized products. The Mediterranean diet would be revalued through a recognition by the elite of popular ancestral knowledge. As a result, there would be a strong growth in demand for *regional authentic*, '*village land*',[28] *organic products*.

In this scenario, the EU, which has contributed to perverting the Mediterranean model, would become one of its main instigators. The *Mediterranean diet* is widely spread throughout the world. On this assumption, a huge market could open up for the region's products, which could, however, weigh on the environment (increasing pressures on resources and ecosystems following increased production of vegetables, fruits, olive oil and fish). However, there is no evidence that such a development would effectively benefit the Mediterranean regions. The agro-food multinationals might use the Mediterranean image to create markets

and appropriate typical recipes of these regions while relocating production outside the region (olive growing is increasingly spreading in the US, Argentina and Chile). The rest of the world could therefore very quickly become serious competitors unless the producers, industrialists and craftsmen of the agro-food industry in the Mediterranean Basin, together with the countries, manage to organize themselves to protect their specific recipes and products by patents and labels of authenticity.

To stimulate the shift towards the alternative scenario, *policies of 'guaranteed designation of origin'* would play a major role. Such policies make it possible to recognize, defend and promote products and areas in their full heritage dimension. The highly positive image of Mediterranean produce relies more on intangible rather than tangible characteristics (evoking sun, village lands, a past, conviviality). Products are rooted in a place and a society, enveloped by know-how transmitted down the generations. A *village land* is more a human area, characterized by a common history that describes the locality, rather than an area with soil and climate homogeneity. The characterization of an original locality's identity is to be found much more in human practices than in its agronomic unity. Local and regional actors (producers, consumers and institutions) are linked through a relationship of confidence; they perceive their product as an attribute of their cultural and social identity as well as a vector of local development. They can mobilize themselves to upgrade their produce and promote it as a cultural good.

This search for quality is not limited only to food and products. It also concerns *territories* as whole units, as in Tuscany where added value is maximized by the quality of products and services, the *synergy of activities* (in particular between tourism, industry and agriculture), economic enhancement, and the dynamic conservation of Mediterranean landscapes. Under the alternative scenario, the greatest possible number of Mediterranean rural areas apply a 'Tuscan-like approach'.

Mountainous regions would find new economic perspectives. Their 'Mediterranean garden' role would be acknowledged, funded and enhanced.

Such a scenario has already begun to develop on the northern shore, but it is also of interest to the southern and eastern shores, where it seems important to look ahead to encourage healthier diets, protect and promote diversity, and create added value in relation to the development of tourism and domestic and export markets.

From top-down and sectoral development to accountable and integrated development

Agricultural and rural development will be implemented mainly by *professional and local actors*. Only a resolute commitment (individual and collective) on their part, within the framework of territory-specific dynamics, will make it possible to initiate a process of accumulating capital, serving the different rural territories and domestic economies. A basic component of the alternative scenario is the shift from a development that remains very much administered from the top (too often benefiting a minority that is more concerned about raking in money than creating true wealth) to a more accountable development.

Experience shows, however, that if rural development is mainly the responsibility of professionals and local actors, its implementation and sustainability do not come automatically. It implies upgrading facilities, ensuring an enabling institutional framework, and the promotion of *integrated* and *participatory* processes that take the long term into account.

I*ntegration* must take place at several levels, including vertical integration, integration of environmental and social aspects into economic practices and policies, integration of activities in specific territories (facilities, training, promotion) so as to have sufficient scale effects, and integration of activities with the local heritage in order to exploit synergies and add value. The extreme diversity of local situations that characterizes the region requires integrated management solutions and specific options for progress, which are themselves extremely diversified.

P*articipation* is necessary to enable all actors concerned with rural areas to become as many vectors as possible of sustainable development. This implies that they value their know-how, that they share, as far as possible, a common mid- and long-term *vision* for their territory (which does not necessarily mean uniform views on ways and means), that they take part in the formulation and implementation of projects, and adhere to a collective discipline designed to ensure sustainable management of resources and preservation of territorial quality.

Recent examples throughout the region and in other parts of the world show that such a vision is far from unrealistic. The condition for success is mainly to establish a successful link between a '*filière* approach' for sectors (vertical integration) and a 'territory-specific' approach (horizontal integration). These messages are valid for both shores of the Mediterranean even if the contexts for applying them are different.

The integrated 'filière' approach[29]

This first integration approach relates to well-identified activity sectors, strongly characterized by their vertical and horizontal interaction; in particular agriculture and agri-business, forestry, and tourism.

Agriculture and the agri-food industry

The consolidated approach of this first activity sector is characterized by the constraints that weigh on the Mediterranean areas and in particular on the poorest

regions. In most southern and eastern countries, the focus should mainly be on improving the operational conditions of *domestic markets* while production for export is relatively less important. Domestic changes would also extend to a more efficient combination of the market economy and state intervention, and states try to equitably integrate the largest possible number of farmers. To achieve this, priority should be given to *improving land tenure structures* (promoting family farms of a viable size and ensuring secure land tenure), developing small and middle-sized water works, improving water and rain-fed agricultural management, access to credit, training and extension, and improving transport.

Because export possibilities are particularly affected by high tariff barriers imposed on processed products, the added value of which does not usually reach the producing countries, new policies to open-up trade and voluntary actions for 'co-development' need to be designed (particularly in matters such as training, information, certification and joint ventures). Alongside typical and organic fresh seasonal products, the *processed products* sector could also be enhanced as a priority.

Forestry and pastoralism

Such integration should also be applied to forestry, which requires a change in mentality and strategies so that this resource can be managed in a more sustainable way. In the northern countries, where the Mediterranean forest has largely been rehabilitated, people and decision-makers do not yet appear sufficiently aware of the potential of its economic development and wealth. The example of Calabria (Box 5.21) demonstrates this and could be followed elsewhere. Support at the regional level is vital to assist in professional training, identifying and transforming products, economic organization, marketing and enhancing non-commercial products.

Box 5.21 Developing forestry in Calabria

The region of Calabria, in the south of Italy, extends its 15,000km^2 into the heart of the Mediterranean on a very mountainous peninsula with an average altitude of 550m. In 1950 only 3500 of the 7200km^2 of *Selva Brutia* forest originating from before the Roman period remained. Recurrent floods in the 1950s and 1960s led the Italian government to promulgate special laws for Calabria, which were the starting point of a huge reforestation effort (167,000ha). Today, 5770km^2 is covered with forest (38.3 per cent of the region) including 39 per cent plantations (the Calabrian pine in particular). Today the Calabria region considers forestry as an essential component of its economic development. It has adopted a regional forestry plan for the development of new sylviculture for production purposes and the development of human resources through the creation of specialized technical and educational centres. The plan attracts private investors.

In the southern and eastern countries (also to an extent in the north) forest products other than wood can represent a real economic value (Box 5.22).

Box 5.22 Forest products other than wood in North Africa

Egypt exports 11,250 tonnes of medicinal plants worth US$12.35 million per year; Morocco exports 6850 tonnes worth US$12.85 million.

Aromatic plants such as *Thymus* spp, *Rosmarinus officinalis*, *Acacia farniesa* and *Eucalyptus* spp play an important role in **Tunisia** (230 tonnes exported per year with a value of US$3.2 million), **Egypt** and **Morocco**.

A third of cork-oak forests are located in **Maghreb** (21 per cent of which are in **Algeria**). However, this region contributes only 9 per cent (Algeria 2 per cent) of world cork production (350,000 tonnes), which is produced mainly in **Portugal** and **Spain**.

Forests in **Morocco** play an essential role in livestock-raising (Marmora forest). Woody vegetation supply 17 per cent of livestock feed, and it has been observed that animal mortality during droughts is reduced by two-thirds compared with that in unforested areas. In addition, the extraction of edible oil from the argan tree is an important source of income for women.

Source: FAO

At present, limited processing activities make it difficult to enhance these resources. Most of it is exported raw, which limits the benefits in terms of employment and income generation at the local level. Training and investment would be necessary to develop processing technologies and, in particular, marketing in the context of partnerships between the private sector, governments and local communities.

Generally speaking, forestry approaches in the whole region originate from Central Europe, where timber production is the main objective. This vision has dominated Mediterranean forestry and has not been adapted to the main challenges of the region. It would benefit from a redirection that factors-in the diversity of the ecological and economic functions, especially the development of all products, commercial or not, including those often wrongly considered 'secondary' (honey, cork, aromatic and medicinal plants, small fruits, mushrooms, forage resources, recreation, firewood).

These considerations on forests relate in a natural way to pasturelands and extensive livestock raising, which remain of high importance in the south and east. Natural forests and pasturelands together supply a basis for livestock husbandry, mainly sheep and goats, the potential of which could be considerably enhanced. New resource management approaches could be widely introduced, including feed supplements in order to cope in a reasoned way with the consequences of climate

variation. Experiences underway in eastern Morocco and south-eastern Tunisia have laid the foundation for such approaches, and the lessons, which could benefit other southern countries, should be closely followed.

The IAMF and *Silva mediterranea* (Box 5.26 p300) are valuable regional cooperation tools to ensure an understanding of the specificity of Mediterranean forests (and other natural vegetated areas), to develop a new shared vision, and promote adapted resource engineering for the benefit of the sustainable development of Mediterranean societies.

Tourism

Tourism is certainly a part of future solutions in rural regions, provided that it is desired, controlled and developed by and for local people. Its development calls for a highly innovative and integrated approach. The objective would be to make it a real vector of sustainable development (in synergy with agriculture, forestry and handicrafts). There are many successful local examples that demonstrate its potential, as well as harmful examples that highlight the risks of wrong approaches. Success, especially in the mountains, implies the capability of localities to develop projects that equitably stimulate the entire local society and enable communities to resist the tensions that a new activity (always disturbing) inevitably induces. Despite the strong increase in demand for rural and nature tourism (bed and breakfast, rest sites, farm inns, furnished flats, open-air campsites, family tourist resorts, rural hotels) development strategies have remained centred mainly on coasts and the hotel industry, especially in the southern and eastern countries. A reorientation, with adapted policy tools, seems to be necessary (development facilitators and training for local actors, investment aid, organized marketing, enhancement of the local heritage). These approaches have clearly proved their worth in several countries and poor rural regions, where tourism has played an important role in moving away from underdevelopment and opening up to the world. To relieve the coastal zone and contribute to rural development, the alternative scenario assumes moving tourists towards inland areas: at least a third of the projected increase in tourist flows to coastal regions would be redirected towards the hinterland by 2025 (see Chapter 6).

Industry, residential development and new technologies

Agriculture (including fish-farming), forestry and tourism could certainly be improved, and this should be encouraged, but the most successful examples of development show that the existence of an industrial activity, even on a limited scale, is vital to provide sustainable solutions for employment and services (this is also true in the mountains). The most promising approach is often to *enhance the value of local products* (mineral resources and products derived from farming and forests) with the help of small units, often operating initially on the basis of the family economy. In this regard, experience shows that rural development has frequently succeeded in moving from single-activity farming through *agro-food processing* and that adapted policies (training, incentives and promotion) facilitate such positive developments. In Turkey, for example, the GAP project (in south-eastern Anatolia) aims to stimulate new activities through management training (university/companies) and support to project carriers (for example the marble sector, basalt tiles, concentrated pomegranate juice).

Residential development is another opportunity, the development of which calls for some control, as with tourism.

Although setting up service centres with *new communication technologies* (teleworking) may appear premature, they can contribute to an escape from isolation and facilitate the arrival of new inhabitants to the Mediterranean mountains of the EU. *Solar energy* could be a significant development for equipping remote rural villages and provide vital elements of comfort at a much lower cost than connecting to the electricity grid – and at extremely low operating costs (2 euro cents per hour of light). This could open a window to the world (radio, TV and Internet links) and limit the rural exodus by reducing the gap between rural life and the 'modernity' of cities.

The 'territory-specific' approach: Giving priority to local development

The basic paradigms of all strategies for sustainable rural development – *integration*, *'territory-specificity'*, *subsidiarity*, *participation* and *partnership* – form the framework for an approach that corresponds to the political concept of 'local development'. This concept integrates rural areas in specific territories with small towns and rural villages. Many local experiences confirm the relevance, effectiveness, need and convergence of these action principles. The issues at stake are: the recognition and respect of local diversities and the value of local heritage (particularly natural and 'cultural' diversity, including resources, know-how, landscapes and architecture); the transformation of production systems and lifestyles towards a greater awareness of the fragility of resources (establishing or recreating a close and more sustainable relationship between people and the milieu that characterizes these regions); re-establishing the link between protection and development; the creation of 'territory-specific goods' by exploiting what localities have to enhance their added value; and the adoption of planned, targeted and iterative processes that are monitored through indicators.

These processes only make sense if they rely on and are implemented by local communities. But experience

also shows that outside *professional support* and the *promotion of platforms and bridging facilities* are almost always indispensable to formulating territory-specific and community projects, identify heritage assets and facilitate the necessary links between sectoral approaches, territorial organization and conflict mediation. This external support can, for example, take the form of facilitators, coordinators, local development agents, or mediators. The 'facilitating/coordinating' function with local communities is one fundamental key for success.

Such approaches have been greatly stimulated in recent few years in Mediterranean Europe within the framework of *natural parks* (regional natural parks in France) and through the European LEADER *programme* (Box 5.23). Local development initiatives in the style of 'Agenda 21' are also taking shape in the southern countries, particularly with support from NGOs.

Box 5.23 The European LEADER programme

The European LEADER programme, now in its third phase (2001–2006), is an instrument founded on a bottom-up, partnership, cooperative and integrated approach with the objectives of diversifying the economy, making public policies consistent at the local level, and facilitating sustainable development. It is implemented by 'local action groups' (LAGs) that must be formed mainly by local civil society. Under this programme, many Mediterranean mountainous regions have been able to organize partnerships and implement exemplary action programmes. For example, the LAG in Kalampaka-Kili in the Pindus Mountains in Greece have developed alternative forms of tourism in the famous Meteor area that benefit the entire region, particularly the remote mountain villages.

Decentralization, regional development planning and local governance

The issues of decentralization and regional development (spatial planning) are at the heart of the local development concept. Spain has opened up new paths in terms of local autonomy, and Italy has innovated by instituting 'mountain communities' to which municipalities and regions can delegate very extensive responsibilities. However, low population and economic weakness in rural regions (especially in the mountains), lack of initiative, insufficient participation, and the difficulty of effectively involving local actors in projects, sometimes make it hard to fully exploit the opportunities offered by these forms of organization.

Territory-specific approaches are especially necessary to ensure the sustainable management of natural resources. Master plans and management plans make it possible to decide on planning directions and define rules and limits to resource exploitation, for ensuring a long-term ecosystem balance, which can only be achieved if the actors concerned take part in the formulation of plans and fully adhere to the disciplines deriving from this common reference. Adapting ecological (for example deferred grazing) and economic measures to the specific situation in territories is imperative in the southern countries, because it is the foundation of a strategy for moving rural populations out of poverty and preventing environmental degradation. In the north, for example, seeking a compromise between the presence of wolves and pastoralism needs a territory-specific process as well as a change in pastoral practices.

Territory-specific development approaches require a new way of thinking on two essential problems: the scales and the institutions of local governance. Experience shows that several *territorial levels* correspond to the specificity of local problems. In many situations, the locality level that still exist in a large number of regions (especially in the southern and eastern countries) is the scale where responsible actors can be identified, with whom the long-term development and natural resource management plans will be conceived. But community services will be better accounted for on broader scales, as the French experience of grouping municipalities together has shown. And aspects such as the vital master plans that exploit vertical and horizontal synergies, the relationships between cities and the countryside, and primary polarization of rural villages, can only be properly considered on an even wider regional scale. The issue of *'what is the basic region'* is currently at the heart of all thinking about decentralization and de-concentration, and all local development programmes are facing it. The concept of small rural regions is being highlighted: for example *pays* in France; *comarcas* in Spain, 'project areas' attached to local contracts (such as the LEADER territories and natural parks); in Italy, the *comunità montana* constitute to date the most completed example of 'basic region' organized into a community of rural municipalities endowed with extensive competences that are guaranteed by law over the Italian mountain areas. Areas of a certain size that correspond to present or potential tourist destinations, such as natural parks and biosphere reserves, also appear relevant. This is without doubt one of the new frontiers that local development policies will have to explore.

One issue will be that of *'subsidiarity'* for identifying territory-specific levels of responsibility along the lines of bottom-up decision-making. Another is that of the necessary *inter-linkages between levels* to encourage sustainability. A formula to be encouraged is the ambitious and sufficiently long-term 'territory-specific project contracts' (about ten years), which are defined locally, supported by higher levels (regions, states, donors), and monitored through sustainable development indicators

(for example the French regional natural parks). Sound inter-linkage between levels will result from a balanced junction between top-down approaches, demonstrating the determination of the central and regional powers to achieve decentralization while searching for the appropriate level of subsidiarity, and bottom-up approaches from initiatives by local actors, whether they be public or private ones. The role of the regional and local powers is therefore essential in the implementation of such inter-linkage, which is actually one of the key issues for successful local development.

The second problem, that of *local governance*, calls for political structuring of the decision-making process. The present decentralized systems show that territory-specific levels are inadequately represented in the light of their real role in the decision-making chain, while other levels have too large a role in the administrative approval process. In addition, many participatory projects, although showing undeniable successes, only operate with ad hoc structures, often not recognized by the administrative systems (this is, for example, the case for all projects that operate at the village level in Maghreb). Finally, the problem of local governance raises the question of the role played by NGOs and networks of associations in the management structures of local development.

Towards policies for sustainable rural development

Many arguments plead in favour of *rural-focused policies* for rural areas. Today agricultural policies are obliged to integrate environmental and social aspects, and the success of environmental policies in rural areas depends largely on their links with local development. Environment and development are indissolubly linked in the Mediterranean. Equipping rural areas also demands an overall approach centred on priority needs in each given area, rather than sectoral and fragmented approaches.

Although the concept of integrated and coordinated rural development is accepted by all governments around the Mediterranean, its implementation nevertheless requires changes in the skills and relationships between operators, which are sometimes difficult to implement in practical terms.

Box 5.24 Rural development in Morocco, Turkey and Lebanon

Rural development is today considered to be an essential priority, if not **the** development priority, in **Morocco**. It is accepted that progress in other sectors of the economy will inevitably be limited as long as rural poverty continues to block the development of an internal market. Without such a market, no sustainable growth will occur, and there will be no decisive progress in social and political fields as long as such a large section of Moroccan society (14 million people) remains socially and politically marginalized. To meet these challenges, the recently formulated '2020 Strategy for Rural Development in Morocco' sets two basic priorities: (1) to improve agricultural productivity (through growth based on high intensity manpower and responsible management of natural resources by changing land tenure management and water management); (2) to improve the countryside by considerably developing rural towns to stimulate the diversification of economic activities, create new opportunities for multiple activities and develop social and cultural services to better integrate rural dwellers into local political life. The Strategy states that development should be based on actors' initiatives, and assigns new roles to the administration in advisory matters with local institutions and professional organizations (focusing on the importance of support structures close to the populations). The administration must abandon the interventionist approach that has prevailed until now. The greatest obstacle to its implementation comes from the resistance to change by government and administrative institutions. The Strategy is therefore inseparable from decentralization and spatial planning policies.

In **Turkey**, the centralized and sectoral organization of administrative decision-making has often limited the success of integrated rural development projects. The need to remedy this has led to experiments with coordinated operations to structure rural towns. For example the 'Koykent' project launched in July 2000 included nine villages in a pilot phase, covering 212km^2 in Cavdar and its surroundings in the province of Ordu. It upgraded or created basic services (roads and public transport, water and sanitation, land registration, telephones and electricity, the primary school, health facilities, a mobile library, a police station, sports fields, a farming cooperative, the restoration of the mosque, and improvement of village squares), and supported economic activities (farming and forestry). The project made it possible to end rural migration to cities, in fact people began to return to villages, and the population in the region has grown by 30 per cent. The project cost US$8 million; it was carried out under the direction of the Prime Minister and mobilized 32 agencies. Ways of duplicating this experience in other rural regions are under discussion. The authorities are now developing an approach that involves the de-concentrated levels of central administrations, but also local administrations, cooperatives, unions and NGOs. This new approach was tested in the projects of Yosgat at the end of 2001 (irrigation, drinking water connections for 70 villages, rural tracks, reforestation, plantations for firewood and health facilities), and of Ordu-Giresun (training, herd management, forestry, irrigation, drinking water and rural tracks). However, administrative coordination takes time and impedes the expansion of rural development to the desired level. The need to restructure existing organizations remains.

In **Lebanon,** rural development has long been considered a priority. An autonomous public agency, the Green Plan, was set up in 1963 to execute and subsidise infrastructures for collective or individual use. Between 1995 and 1999, the Green

Plan continued actions with 10,000 farmers spread over nearly 2000 villages. It completed 130km of tracks, developed 36,000ha of land and built hillside dams containing 760,000m³ of water. However, as laid down in its statute, the Green Plan can only act on requests by individuals able to pay the non-subsidised part, and local authorities are excluded from intervening. This does not facilitate rural development coordination or integrated and structured operations that are very difficult to develop.

Source: Plan Bleu; Labonne, 2003; national sources

The main difficulty lies in changing institutional frameworks and administrative practices. Indeed, the objectives of sustainable rural development can only be reached if development programmes are part of an *enabling environment* related to *decentralization and de-concentration policies* (setting up multi-purpose and high-level professional field administrations, in the framework of inter-ministerial missions if necessary), as well as legislative frameworks, fiscal policies and cross-subsidy systems between richer areas and poorer, marginalized areas.

In particular this enabling environment must factor-in risks and changes related to the consequences of climate change and water stress (consider structural droughts, measures for promoting water savings, and full implementation of conventions on climate change, desertification and biodiversity).

In this regard, much innovation is required, in particular in the *financial field*. The development and sustainable management of rural areas implies important means of action (to equip villages, manage catchment areas or support and facilitate local projects); resources that are often out of reach of communities weakened by rural migration in the north or poverty in the south. In the Mediterranean, money is concentrated in cities and coastal zones, which are the first to benefit from the products and amenities produced by rural areas (by mountainous regions in particular, which provide their water and pleasant landscapes at prices that bear no relationship to the management costs). But it is also these cities and coastal zones that suffer from ecological and economic malfunctions that develop upstream (increased risks of flooding, fires and the silting-up of reservoirs). This situation of unequal exchange consequently calls for the implementation of new contracts, in particular between cities and mountainous areas and in the well understood interest of both rural and city dwellers.

Sustainable rural development also requires very flexible mechanisms for action, given the diversity in types of activities and the small size of projects. The creation of inter-ministerial or regional funds for rural planning and development, that are de-concentrated and flexible to use, could, for example, be considered.

Finally, an enabling environment would also require a system of *research and development*, training and communications that is better adapted to the challenges of Mediterranean rural areas and therefore would be much more effective.

Regional cooperation that is up to the challenges

Liberalizing trade between the EU and the southern and eastern Mediterranean countries cannot be an end in itself. Indeed, it is hard to see how it would resolve the problems of farmers and rural areas in the south and east, and put an end to the steady degradation of natural resources and the risks of instability that result from it. This is why many experts think that the nature and importance of liberalizing agricultural trade should be defined in a *cooperation agreement* between the EU and the SEMC dealing with the means of action for *sustainable rural development*.

From this point of view several alternatives to the baseline scenario could be considered.

The first would be the gradual dissemination of the European model to the southern and eastern Mediterranean to support the shock of free trade by ambitious regional back-up policies. In fact E*uropean integration* itself is an example of a possible response to the establishment of a widened common agricultural market between countries with different development levels: from its inception to its enlargement to include countries such as Greece and Portugal and today Poland, the EU has provided solutions to its own tensions through an imperfect, yet real strategy of *economic and social cohesion*. Solidarity is embodied in agricultural funds for upgrading farms and ensuring income for farmers, and through structural funds for equipping countries or regions lagging behind in development (in particular their fragile rural areas). However, the EU is going to be directed, at least until 2011, to devoting most of its energy and means to successfully integrating the countries of central and eastern Europe. A situation of uncertainty and dissatisfaction by the Mediterranean world will result from this, which will concern both the 'third' Mediterranean countries and the relevant EU southern regions. With only one or two exceptions, the latter regions will see nearly all of the EU structural funds being transferred after 2006 to the new Member States. The advent of this period will be even more decisive for the future of the Mediterranean world because the cooperation scheme applied to the central and eastern European countries could, in the end, be adopted by the Euro-Mediterranean Partnership, at least in part. Even if this scheme does not formally lead to 'membership', it should go further than the present MEDA programme and result in a formula of the 'more than association and less than integration' type.

In the face of future difficulties, a second possible alternative would be to seek a more *transitional and differentiated partnership equation* in the interest of all partners. This alternative, centred initially on factoring in the differences in situations and challenges of sustainable development, would lead to the development of a shared vision of the multiple roles of rural areas (development and rural employment, conservation of water, soil and biodiversity), to agree on the modalities of a special and differentiated treatment to be applied between the EU and the Mediterranean rural countries in situations of ecological and economic fragility, and to ensure vigorous programmes of sustainable rural development. The EU could, in this spirit, grant a certain E*uro-Mediterranean preference* to agri-food products from the south without total reciprocity. This would make it possible to husband the transitions in the south, avoid needless destabilization, and, in the long term, realize a model of agricultural development, different from and more 'sustainable' than the northern one (it is in the south and east's interests not to follow a European-style developmental model where more and more is produced using fewer and fewer people, while at the same time doing ever greater harm to the environment). In this second alternative, as a priority, the EU would contribute, along with the southern and eastern countries and the different donors, to gradually *upgrading the rural regions* and *decoupling production from resource degradation*; the developing countries, for their part, would commit themselves to conducting the reforms needed to succeed.

In any case, a *political strengthening* of the Euro-Mediterranean Partnership (and European integration to the northern shore), is among the 'turning points' that would make it possible to direct the Mediterranean rural world towards a more sustainable future. The EU and its partners should, in this transition period and as a response to the increasing questions from the Mediterranean world, give strong political signs of their commitment.

One of the first of these signs would be a meaningful *redirection of the Partnership* around the objectives of sustainable rural development, an area that is presently insufficiently taken into consideration by international donors and regional cooperation actions (Box 5.25). This could lead to the affirmation of common values, a shared view of a desirable long-term future for agriculture and the Mediterranean rural areas (notably of their multifunctional nature), and the establishment of real cooperative projects that ensure both a sufficient *pan-Mediterranean dimension* and a *close relationship* with the realities on the ground.

A major challenge will be a concerted development of approaches to succeed jointly in turning production systems towards having greater respect for the environment. Another major challenge will be the successful support of population movements. These are played out in two directions, or 'at both ends': from where emigrants depart, and from where tourists depart. The vital challenge here is to integrate these movements, making them tools in the service of an interconnected and more sustainable development, tools for dialogue, for the sharing of wealth, and for the transfer of know-how.

Box 5.25 The weakness of official development assistance in targeting the Mediterranean rural sector

Official development assistance given to the rural sector in the Mediterranean amounted to only US$3.7 thousand million for 1990–2000, or 5.2 per cent of the total assistance, compared with 6.12 per cent in the preceding decade. This amount includes grants (40 per cent of the total or US$1.5 thousand million) and loans (2.1 thousand million or 60 per cent). The main beneficiaries were Egypt (1.5 thousand million), Morocco (1.3 thousand million) and Tunisia (1.1 thousand million). The eastern Adriatic countries received US$281 million for the same period. These funds were allocated mainly to irrigation (1.1 thousand million). Rural development assistance increased, reaching 462 million (13 per cent of the total) for the 1990–2000 period compared with 250 million (9 per cent) in the preceding decade. Other important items were agricultural policies and administration (US$451 million, or 12 per cent) and agricultural services (US$281 million).

European funding also remained modest and was broken down as follows:

- The MEDA financial tool of the Euro-Mediterranean Partnership has given only 322 million euros to the rural sector between 1995 and 2004, or 4.5 per cent of all expenses, 28 million euros of which are for regional projects. The main beneficiaries have been Morocco (168 million euros) followed by Tunisia and Algeria, two countries where the total contribution went to a single 50 million euro project.
- The CARDS programme has provided 72 million euros of support for the rural sector of the Balkan countries (4.6 per cent of the total).
- The EIB awarded 90 million euros in loans to the rural sector of the SEMC, or just 2.25 per cent of all expenses for 1995–1999. An increase has been recorded since, with 140 million euros at present. These loans cover diverse fields: irrigation, improved accessibility, fertilizer production, etc.

To reinforce the common values and make it a matter not just for governments but also for citizens, the Partnership will need *large decentralized cooperation programmes* adapted to the realities on the ground. Extending to the Mediterranean the community initiative programmes that have proved to be effective (LEADER and INTERREG), or establishing comparable programmes, is one avenue to take. These programmes already foresee the possibility of including partners from third countries, but

they do not back this possibility with a parallel mobilization of MEDA funds. Without major financial input, but with a concerted administrative effort, the EU and its Mediterranean partners should be able to rapidly establish a framework with real possibilities for decentralized cooperation in rural areas. The impact of this kind of cooperation on the ground could be very important.

It will also be in the Partnership's interests to develop '*resource centres*' for rural areas and rely on existing regional cooperation frameworks (Box 5.26). These are already numerous in the rural and environmental fields and should help countries to capitalize even more on this experience and facilitate the redirection of policies to make them more effective, more 'Mediterranean', and thus much more in line with the objectives of sustainable development.

Box 5.26 Networks on the Mediterranean rural areas

The eco-region's specificities have led to a gradual implementation of Mediterranean networks of intergovernmental cooperation in the areas of forest management, nature protection, agriculture and rural development.

Silva Mediterranea was launched back in 1911 as an instrument for intergovernmental forestry cooperation. In 1948 it became the Committee on Mediterranean Forestry, a FAO statutory body. In 2002 an agreement was reached with MAP/Blue Plan to contribute to relaunching this programme along the lines of the objectives and strategies of sustainable development.

For the agricultural sector, ICAMAS (International Centre for Advanced Mediterranean Agronomic Studies) was set up in Paris in 1962; currently it is composed of 13 Member States. It relies on four Mediterranean agronomical institutes, which provide training programmes and run networks according to their specializations (natural resource management, agriculture and food policies, etc.) in close cooperation with the institutions of member countries. Regular meetings of agricultural ministers offer orientations for the region in the agricultural and rural sectors.

OSS (Sahara and Sahel Observatory), with its headquarters in Tunis, and ICARDA (International Centre for Agricultural Research in the Dry Areas), established in Syria in 1977, are two other international resource centres more specifically dedicated to the problems of drylands and arid areas.

IUCN (the World Conservation Union) opened its Centre for Mediterranean Co-operation in 2001 in Malaga (Spain). Among the topics developed by the IUCN Mediterranean Programme are the conservation of biodiversity, the use of natural resources (forests, fisheries, etc.), hydrological resources and desertification.

Many NGOs develop Mediterranean-wide actions and cooperation in these sectors, in particular AIFM (International Association of Mediterranean Forests) and the WWF Mediterranean Programme.

Finally, the Partnership would gain by using 'the Mediterranean character' as a handle for regional association and sustainable development. Identifying values common to the European and Mediterranean worlds would essentially mean jointly rediscovering and recreating the Mediterranean identity. And it is only by redefining its identity that the rural Mediterranean world will regain the cohesion vital to successful cooperation at the internal level and advantageous positioning outside the region in the framework of globalization.

Notes

1 Understood to be all coastal countries excluding the non-Mediterranean part of France.
2 INSEE-INRA, 1998.
3 Excluding non-Mediterranean France. The figures for 2010 are from FAO. Those for 2025 are from the Blue Plan.
4 Excluding non-Mediterranean France.
5 The ratios between 'agricultural population' and 'agricultural labour force' vary significantly from one country to another, thus requiring some caution when comparing relative data on the agricultural labour force.
6 Tunisia shows a clear difference in rural employment profile, where in 1997 agriculture accounted for 43 per cent of rural employment (about 417,000 jobs), followed by the construction and public works sectors (303,000 jobs, 31.5 per cent). The 241,000 remaining jobs were divided between services and other sectors (national sources).
7 National source.
8 MFN applied rate on spices, cereal and other dish preparation, in Israel, Jordan, Morocco, Tunisia and Turkey (WTO, 2004)
9 OECD, 1999.
10 EEAA, 1997.
11 FAO Aquastat information system, 2003 (www.fao.org).
12 FAO Aquastat information system, 2003.
13 IFEN, 1998.
14 Conacher et al, 1998.
15 Montserrat Soliva Torrento, DG Environment, April 2002.
16 Gradus and Lipshitz, 1996.
17 *Plan Bleu*; METAP, 2000.
18 *Plan Bleu* from Mhiri et al, 1998.
19 Sofer, Feitelson and Amiran in Gradus and Lipshitz, 1996.
20 Ramade, 1997.
21 IUCN, 2004.
22 Albanian Ministry of Agriculture, 2002.
23 UNDP, 2005 (http://hdr.undp.org/).
24 Côte and Khiari, in Courtot 2001.
25 FAO, 2002.
26 In contrast to the case of Norway where a farm or forestry estate returns to the public domain if exploitation is stopped; this leads families to find solutions and is remarkably effective in maintaining the rural character at the national level.
27 MEDFOREX project (www.medforex.net/).
28 *Terroir* in French.
29 The *filière* approach consists of the integration of all stakeholders (agriculture, transformation, distribution, industry services and government) within the same production sector or sub-sector in order to enhance performance on domestic and foreign markets. Some attempts to translate the expression into English have been: 'producer-consumer chain', 'production and trade networks', 'commodity chain'.

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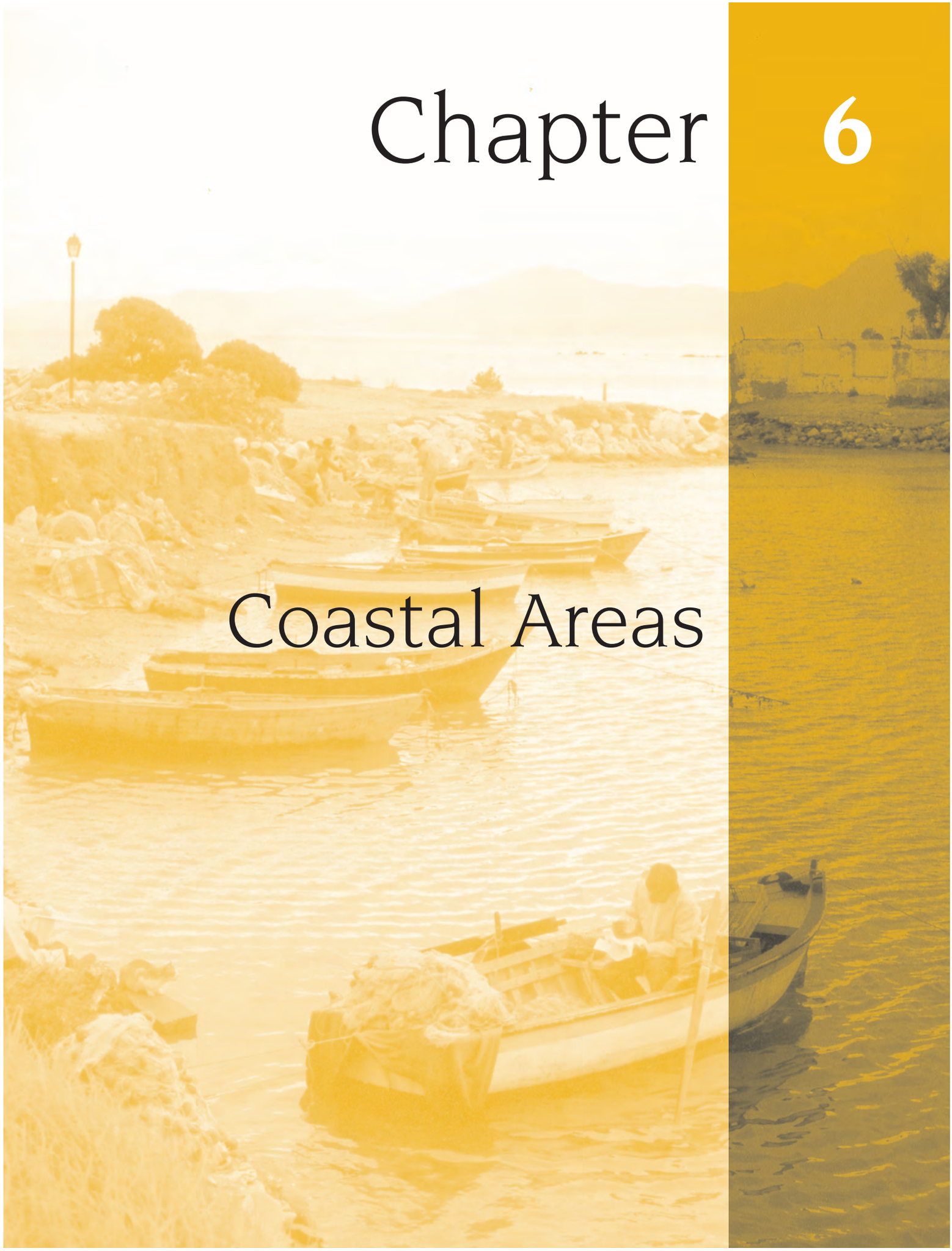
Chapter 6

Coastal Areas



The coastal zone is more than just a narrow strip of land and sea coveted for development. Its ecosystems, with great natural value, and the importance of its social functions and cultural heritage make it a precious resource.

Coastal areas are subjected to a convergence of pressures, resulting in a general trend of increasing urbanization. Under the baseline scenario, some 20 million additional urban dwellers and 130 million additional tourists are expected by 2025, the high concentration of roads, ports, airports, industrial and power facilities will intensify, half of the area will have some form of artificial land cover, and coastal pollution will continue to have serious impacts. With more artificial land and pollution, overfishing, erosion, salt water intrusion, invasive species and global warming, degradation of coastal ecosystems and loss of terrestrial and marine biodiversity will continue and lead to a proliferation of costs and risks. The trend in some coastal zones towards 'tourism-development-only' also carries the risk of loss of identity and economic resilience.

The responses to ensure a planned and stable development of coastal areas have so far been inadequate. Awareness of these trends calls for drastic changes in practices to *stop and urgently reverse the continuous degradation of coastal areas*. An alternative scenario can be envisaged that would lead to a future with a stronger integration of the environment and development, strengthened policies for coastal areas, a redirection of tourism strategies and policies, implementation of new economic instruments, and an overall enabling framework. The Contracting Parties to the Barcelona Convention would send a strong signal of encouragement if they adopted a regional framework protocol for sustainable management of the Mediterranean coastal region. This protocol would focus on legal and operational reinforcement, requiring the creation of coastal laws and agencies, the mobilization of civil society, promotion of 'integrated costal area management' and implementation of territorial planning and region-specific development.

The coastal zone: A description

The coastal zone, a rather narrow strip

Countries are increasingly lead to drawing the boundaries of their coastal zones to ensure sustainable management (Box 6.1). The Blue Plan *defines* the coastal zone as the ensemble of areas and specific territories that are influenced physically, economically and socially by strong interaction between land and sea. Mediterranean ecosystems, societies and economies, which are subjected in a predominant way to the sea, can also be defined as coastal.

The extent of a coastal zone (environmental, cultural, social and economic) depends on the nature of coasts and the history of societies. It varies from a few hundred metres to some kilometres. The coastal zone is thus not limited to the coastline that separates land and sea.

On the seaward side, the coastal zone corresponds with the 'shallow waters' where nutritional input from the land and light favour a high natural production. The limit is set by the 50m depth contour; beyond this depth, photosynthesis is reduced. As a public maritime domain, this marine fringe is administered by the maritime authorities of each country. On the landward side, the coastal zone includes a mosaic of 'natural' (deltas, dunes, forests), agricultural and urban areas that are part of the public and especially private domain. Their management is framed by rules put forward by land-based authorities.

Deltas and lagoons, tourist destinations such as Djerba, the Riviera, Antalya and Benidorm, the large port cities such as Alexandria, Barcelona, Marseilles, Algiers and Tel Aviv all belong to the coastal zone.[1]

Box 6.1 The coastal zone: Official definitions

Official coastal zone boundaries in riparian countries are often lacking or imprecise. On land the boundaries are often physical distances (coastal strips of a few kilometres or just a few hundred metres) that do not necessarily coincide with the territory inhabited by coastal societies. When boundaries exist in the sea, they usually include all the territorial waters, which extend beyond the coastal zone as such (predominantly 12 nautical miles, but 6 miles in Greece and Turkey).

The inadequacies or difficulties in delimiting the coastal zone explain to a large extent the lack of spatial data that would make it possible to assess, compare and monitor socio-economic and environmental developments over time. Comparisons are made difficult by the different delimitation methods applied in riparian countries.

In **Spain** the law on coastal areas uses the term 19 times without ever defining it, except in an indirect way (public domain, neighbouring areas).

In **Tunisia**, the coastal zone is understood to be the shore with a possible inland extension with varying limits depending on the degree of climatic, natural and human interaction with the sea.

In **France** the legal definition includes seaside municipalities (and in some cases estuaries and deltas located outside the salty limit of the water).

In **Algeria**, the new law defines the coastal zone as including the ensemble of all islands and isles, the continental shelf and a strip of land along the coastline with a minimum width of 800 metres.

Other countries have definitions made outside the law:

- **Egypt** defines coastal zones as an interface between the

sea and the land, including the territorial waters and the hinterland that interact with the marine environment; the zones are at least 30km wide in the desert regions, except when geographical obstacles exist.

- In **Israel** the limit on the landward side varies between 1 and 2km from the shoreline and does not include the sea.

Finally, the recent development of the concepts of 'integrated watershed management' and 'integrated coastal area management' has led to delimitation proposals that go well beyond the coastal zone without coinciding with those of administrative coastal regions. This extension can be relevant to activities related to water management but does not mean that the shortcomings of delimiting coastal zones can be ignored.

Lacking sufficient statistical information about coastal zones, the present chapter will, in some cases, refer to data gathered for *administrative coastal regions* (the NUTS 3 level or equivalent: *wilaya*, *province*, *etc.*). Such data may include inland plains and desert or mountain areas that do not really belong to coastal areas. Also, some case studies will be presented that go beyond the coastal zone.

Invaluable coastal ecosystems

The Mediterranean *coastline* is approximately 46,000km long and is more or less equally divided between rocky (54 per cent) and sedimentary coasts (45 per cent). The jagged northern coast, including its many islands, accounts for 73 per cent of this length with a total of 33,480km. The eastern and southern shores account for 6615 and 5735km respectively (14 per cent and 13 per cent), including 3000km of desert coastline. The *islands* alone account for nearly 19,000km of coastline, or 42 per cent. Their insularity results in many specificities (Box 6.2).

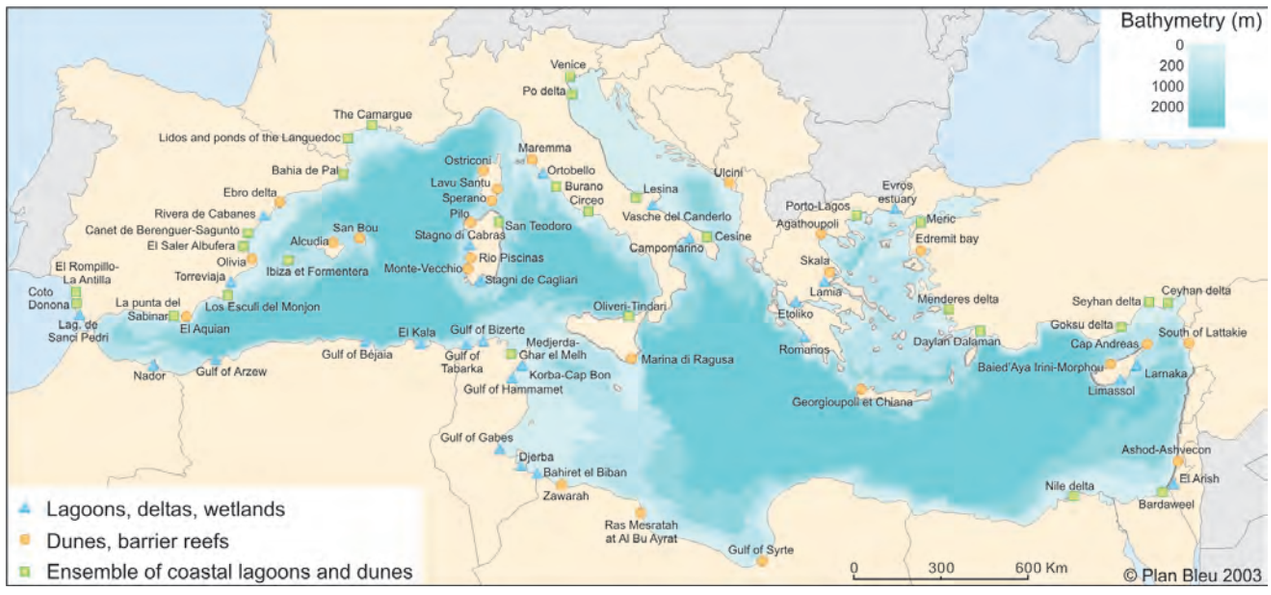
Box 6.2 Islands: Assets and drawbacks of insularity

The Mediterranean has 162 islands larger than 10km², including two that are 'very big' (Sicily and Sardinia), three 'big' ones (Cyprus, Corsica and Crete) and two island states (Cyprus and Malta). Together they house 11 million people.

Insularity is even stronger for smaller islands that are economically distant from the mainland. This insularity results in considerable specificities: exceptional biodiversity and endemic conditions, relative importance of the coastline, scarcity of freshwater resources (low and irregular precipitation, small catchment areas and rivers with low water yields, problems of water transfer, and scarcity of storage sites), scarcity of soil and energy resources, limited domestic markets, dependence on maritime transport, importance of the sense of identity, diversity of know-how and lifestyles adapted to local conditions (for example the Cretan diet, water management and fishing methods).

Insularity is generally a drawback at the social (health and education services) and economic level. The costs of transport (but also loading and stock interruptions), price tensions (shortages, preventive buying, excessive offers, overstocking), ceilings on sales and weak development outlook are all structural obstacles to economic activities and result in an over-cost on goods and services. GDP levels are generally below the national average, and unemployment rates are higher.

Figure 6.1 Sedimentary coasts and their ecosystems



Source: Ramade et al, 1997

Financial dependence on the states to which they belong also exposes islands to ups and downs in public spending.

With the development of tourism, pressures on islands, particularly along their coastlines, have grown considerably. Such development has enabled some of them to compensate for their natural drawbacks, but it has also generated considerable environmental impacts.

Biotopes on cliffs on the *rocky coasts* shelter typical animal and plant communities, many of which are endemic. The steep nature of the land extends into the sea where the coastal fringe is not very extensive.

The *sedimentary coasts* are typified mainly by the importance, fragility and environmental value of their *coastal ecosystems*: sandy and pebbly beaches, barrier reefs and coastal dunes, swamps, lagoons, estuaries and deltas (Figure 6.1).

The four big deltas (the Nile, Rhone, Po and Ebro) as well as other less extensive ones, are unstable areas, sensitive to variations in sea level and rapid switches between erosion and sedimentation, as can be constantly seen by the advancing and receding coastlines. Lagoons are mainly present along the coasts of the Languedoc in France, the Tyrrhenian Sea, some parts of the Aegean Sea around Greece and Turkey, Akrotiki in Cyprus, Tunisia (Lake Ichkeul, lagoons in the Gulf of Gabès) and Algeria (El Kala). Egypt alone contains 25 per cent of the total area of the Mediterranean wetlands (Sebkha el Bardaweel, Manzala Lagoon, etc.).

What is typical of these *paralic ecosystems* (deltas, mud flats, lagoons, ponds and coastal marshes) is the simultaneous presence of freshwater and marine species, and species strictly linked to these environments. They are major components of the Mediterranean coastal system. Their main characteristics are derived from the variable salinity and the relative confinement. Despite serious reductions (half of the Mediterranean wetlands are said to have been lost in the past century), the remaining wetlands still extend over 800,000 to 1 million ha, 650,000 ha of which correspond to paralic environments.

The rather rare Mediterranean *dunes* are precious (endemic plant associations such as the *Artemisia-Armerietum* occur in the inland dunes of south-west Spain). Their location near beaches makes them vulnerable to foot traffic and construction activities.

The *marine fringe* (the sublittoral zone) only covers about 5 per cent of the total water surface, but it has a high ecological and fish-related value. Marine seagrass beds, especially the Posidonia meadows (*Posidonia oceanica*), an endemic species, are of exceptional interest. These beds trap sediment, form barrier reefs that stabilize coasts, guarantee the perpetuity of coastlines, are the location of considerable primary production (assessed at some 21 tonnes of dry matter/ha/yr), and provide shelter for the reproduction of many marine species.

The Mediterranean Sea is a rich store of endemic *flora and fauna*; it contains 7 per cent of the marine species known worldwide, while covering only 0.8 per cent of the ocean surface. A total of 694 species of marine vertebrates have been recorded, including 580 fish, 21 marine mammals, 48 sharks, 36 rays and 5 turtles. As far as marine plant life is concerned, 1289 taxa have been recorded. The marine biodiversity is concentrated in the limited areas with shallow water that contain 38 per cent of the invertebrates, 75 per cent of the fish and nearly all seaweeds. Some species, in particular the sea monk, *Monachus monachus*, and two species of marine turtles, *Chelonia mydas* and *Caretta caretta*, have high symbolic value and are under threat.

The natural heritage with its biodiversity and its vital role in the food chain, in purifying water, and hosting the public, has an *ecological and social value* that requires its preservation for future generations. Some attempts aim at justifying this protection from an economic point of view. A survey carried out in Europe has shown the especially high economic value of the environmental benefits supplied by the paralic environments, which could reach some 2.4 million euros per km^2 per year, far more than rivers and lakes, forests or meadows. This exceptional value of coastal wetlands is explained by the multiplicity of services rendered: natural purifying capacity, an environment that is both receptive to and propitious for dozens of fish and waterfowl species and millions of migratory birds to reproduce, climate and water cycle regulation, erosion prevention, biological control, food and raw material production, fisheries, aquaculture and leisure activities, genetic capital, and knowledge, landscape and cultural heritage.

A coveted place for development

For Mediterranean societies and economies, the coast has long been a place to concentrate development. Several capitals (Algiers, Tunis, Tripoli and Beirut) or major economic centres (Alexandria, Tel-Aviv, Naples, Marseilles, Barcelona and Valencia) are located on the coast. Activities such as fisheries, port industries, salt production and agriculture have been established there for a long time and are developing rapidly. Other sectors, such as intensive fish farming and tourism, are more recent but are also expanding rapidly. *Fisheries*, *aquaculture* and *tourism* depend directly on the environmental quality of the coast.

The nature and development of these varied activities differ with the type of coast. *Rocky coasts* have the advantage of being stable and healthy, offering good port venues; many traditional maritime provinces have developed here historically. These coastal shores, where tourism started to develop more than a century ago (the Rivieras of the Provence, the Côte d'Azur and Liguria), have recently become preferred locations for developing

intensive fish farming in cages. Other activities are more typical of *sedimentary coasts*. The main Mediterranean fisheries are found here; the lagoons alone account for 10–30 per cent of the total fish production in the region. Original forms of aquaculture production (brackish water fish farming in the Italian lagoons, shellfish farming), agricultural production (rice in the Ebro Delta, cotton in the Nile delta, bulls and horses in France's Camargue) and salt production have long been established and developed here. The development of the traditionally insalubrious coastal plains, the advent of mass tourism, and the relative availability of accessible land make sedimentary coasts today a prime place for regional development.

A centre of cultural heritage

The long history of the encounter between the Mediterranean people and their coasts has produced a unique cultural heritage. Being aware of this exceptional importance, the Mediterranean countries initiated a cooperative venture in 1987 between '100 historical coastal sites of Mediterranean-wide interest' (Figure 6.2), of which 48 are UNESCO world heritage sites.

This exceptional heritage ensemble contains archaeological sites and historical centres of coastal cities of all sizes. The shores also offer a great diversity of cultural and natural landscapes (islands and isles, lagoons and steep rocky landscapes).

The know-how of local people, coupled with traditional practices for exploiting natural resources, is part of this remarkable heritage (Box 6.3).

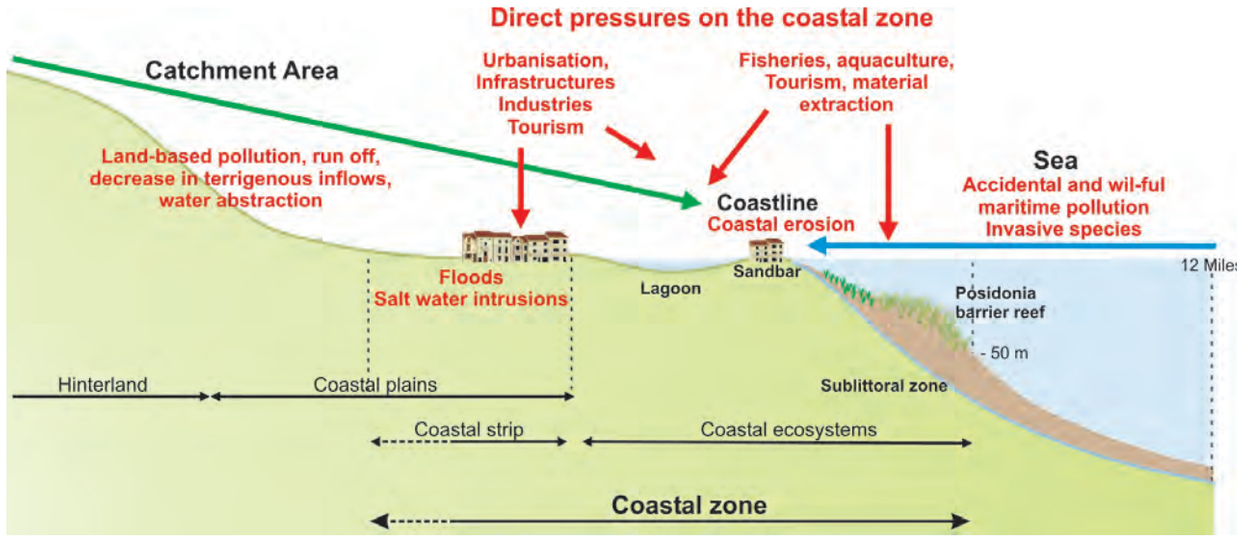
Box 6.3 Traditional techniques for exploitation of the Mediterranean coastal waters

Passed on, adapted and perfected from generation to generation, most traditional techniques of exploitation have proved their sustainability. Several are still being used , for example the '*charfias*', permanent fishery beds built from palm leaves, one of the main fishing techniques used in the shallow waters of the Kerkennah, Chebba and Djerba Islands of Tunisia. Other examples are sea salt extraction in the Slovenian area of Socelje or *felucca* fishing under sail in the Burullus lagoon in Egypt. But these practices are in danger of vanishing because of competition from new, more profitable techniques and the disappearance of this knowledge. In the same way, the tuna nets, permanent fisheries built on the migration routes of the red tuna, were the main technique for catching the red tuna until about 30 years ago. Nowadays only a few tuna nets still exist in Spain, Tunisia and Italy. Faced with competition from the large tuna-boat fleet, maintaining these tuna nets has more to do with concern for loosing traditional practices than with economic profitability.

Figure 6.2 The 100 Mediterranean historical coastal sites

Source: MAP Programme for the protection of coastal historic sites (100 HS), Marseille

Figure 6.3 Pressures on the coastal zone



Source: *Plan Bleu*

A zone subject to convergent pressures

Sometimes chosen because there is no other choice or because it is the preferred area for many economic activities, transport infrastructures and human settlements, and a receptor for land-based and maritime pollution, the Mediterranean coast is subjected to an exceptional *convergence* of direct and indirect pressure (Figure 6.3).

The scale and dynamics of these pressures in the region are illustrated by the Algiers coastal area.

Box 6.4 A convergence of pressures in the coastal zone of Algiers

The Algiers coastal zone, measuring 115km in length and 38km in width from Cap Djinet to Chénoua, was home to 4.3 million people in 1998 (950 per km^2); projections show that there will be 5.7 million people by 2010 (1280 per km^2). Nearly 40 per cent of the entire coastal road network is concentrated in this zone, as well as the largest port and biggest airport of the country, not to mention two-thirds of the industry with 1000 units recorded in 2001 (metalworking, general chemicals, construction, petrochemicals, pharmaceuticals). Agriculture is present on more than 226,000ha of 'usable agricultural area', nearly 28,000ha of which are irrigated. There are eight fishing harbours with a total catch of 26,500 tonnes. Seaside tourism will undergo major development with plans for an 880ha tourist expansion area (TEA). Illegal extraction of sand has been estimated at 5 million m^3 between 1972 and 1995.

These activities exert large pressures on the environment and natural resources: wastewater discharges (225 million m^3 per year, with 174,680 tonnes of suspended matter, 14,700 tonnes of nitrogen and 4100 tonnes of phosphates), production of solid waste (2200 tonnes per day) and gaseous emissions (28,300 tonnes NO_x per year, 209,500 tonnes CO and 663 tonnes SO_2).

Since 1960, 13,700ha of high-quality agricultural land has been lost. Urbanization (which is projected to grow by more than 4000ha between now and 2010) and erosion will only exacerbate this loss. The amount of land covered by vegetation is low (24 per cent). The withdrawal of sandy coastlines is occurring along 80 per cent of the coastal zone. The pelagic species of fish are being overexploited (nearly 5000 tonnes of overfishing). Biodiversity is being reduced in sensitive places.

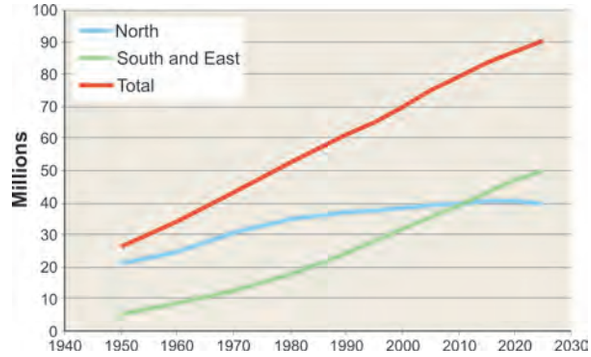
Facing these pressures and multiple impacts, the responses are inadequate (without prejudging the effects of the very recent coastal zone law): weak existing land- and urban-management tools, low rates of urban and industrial water purification (18 per cent), a lack of strategies for sand substitution on beaches and in *wadis*, and a lack of composting units and solid waste treatment plants.

Source: M. Larid, PAC 'Zone côtière algéroise', 2003 (www.planbleu.org)

An increasingly built-up coast: Megapolization?

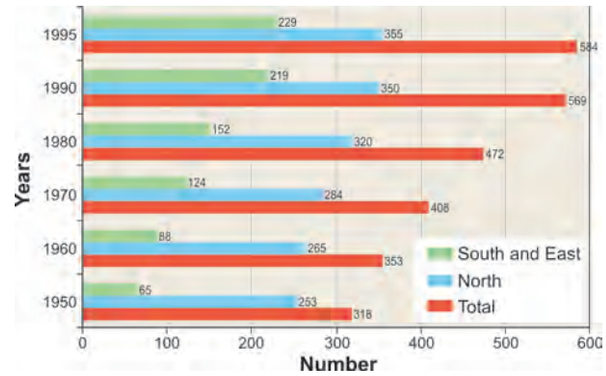
The coastal zone is home to a large population of permanent residents and tourists as well as many transport infrastructures and industrial sites. In all, the Blue Plan recorded nearly 2300 large coastal settlements in 2000,

Figure 6.4 Coastal city population, 1950–2025



Source: Géopolis, 1998, Attané and Courbage, 2001

Figure 6.5 Number of coastal cities with population more than 10,000, 1950–1995



Source: Géopolis, 1998, Attané and Courbage, 2001

an average of one every 20km, including 584 coastal urban areas, 750 '*marinas*' (yacht harbours), 286 commercial ports, 13 gas complexes, 55 refineries, 180 thermal power stations, 112 airports, 238 desalinization plants and a number of big industrial centres (cement factories, steel mills, etc).The amount of coastline which is built on is therefore quite considerable.

Twenty million more urban dwellers and 130 million more tourists by 2025

The permanent population of the Mediterranean *coastal regions* (N3) is projected to continue to grow to 108 million in 2025 in the south and east (1.4 per cent growth per year), stabilizing at about 68 million in the north (see Statistical Annex).

These growth rates may be higher near the coastline itself, because of its highly attractive nature and the rural-to-urban migration that risks being reactivated when agriculture is liberalized. Population statistics are not available at the coastal district level for the whole Basin. However, population data for *cities located on the coastline* give a good idea of the probable development of coastal populations. The population of *coastal cities*[2] could increase 1 per cent per year between now and 2025 and reach 90 million by 2025 compared with 70 million in 2000 (Figure 6.4), in other words 20 million additional urban dwellers on the coasts in 25 years. This growth will occur mainly on the southern and eastern shores, which will add 18.4 million coastal urban dwellers and will reach 50 million by 2025. On the northern shore, coastal cities may start losing people in 2020 and would have only 1.7 million additional city dwellers between 2000 and 2025. This coastal urban population will increasingly be concentrated in the very big cities. In 1995 41 per cent of the coastal urban population lived in cities of more than 1 million, compared with only 30 per cent in 1970. The number of coastal cities has nearly doubled since 1950, from 318 in 1950 to 584 by 1995 (Figure 6.5). The number of small cities has grown steadily in the south and the east (Libya, Egypt and Turkey) while it has stabilized in the north. There are 196 cities on the Italian coastline alone, nearly a third of the total Mediterranean number.

Tourists have to be added to these resident or permanent populations and can double the numbers during peak periods. The tourist consumption patterns and the seasonal aspect result in an overextension of facilities and services that are costly in terms of space, investment and operations.

The international tourist consumes on average more water and energy and produces more waste than the average domestic tourist and resident. For example, on the Balearic Islands, it is estimated that a tourist produces 50 per cent more solid waste than a resident, and water is consumed to the tune of 90,000m^3 per day in winter, but 130,000m^3 per day during the high season. Majorca was so short of water that it had to import it from the continent, and later turned to desalinization of sea water.

The construction of holiday homes, many of which eventually tend to become permanent residences, is one of the important causes of land 'consumption'. In some regions, holiday homes can account for more than 30 per cent of the housing stock (Majorca and Corsica). In France the three Mediterranean regions alone hold 30 per cent of the holiday housing stock in the country. Italy is said to have 4 million holiday homes. In Egypt holiday homes are numerous in Alexandria, Port-Said and on the coast towards Marsa Matruh.

The most important impact, however, comes from the construction of tourist facilities (hotels, yacht harbours, etc.) on the coastline itself. This construction contributes to coastal erosion and the degradation of coastal ecosystems.

The projected growth in national and international *tourist flows* between now and 2025 on a country level (N1) and a coastal region level (N3) is very strong, as seen in Part 1 of this report. In total, the coastal regions are expected to receive 312 million tourists by 2025 compared with 175 million in 2000, or 137 million additional tourists in 25 years, some 74 million in the north and some 62 million in the south and east. The high average annual growth rate (2.3 per cent) will be stronger in the south and east (4.2 per cent) than in the north (1.7 per cent). Despite this difference, the coastal regions in the north will still receive 69 per cent of the total flow in 2025.

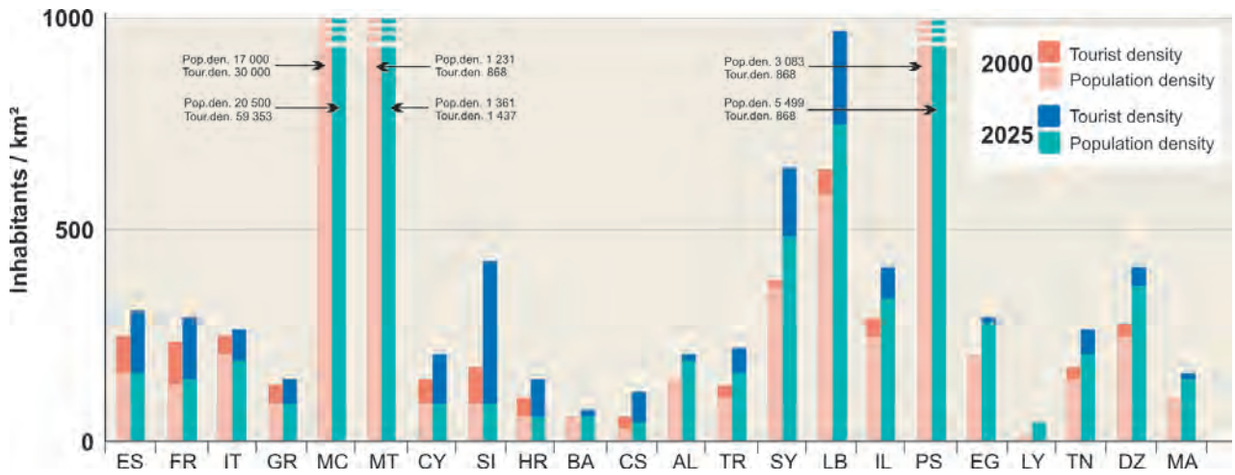
It is difficult to estimate what proportion of these flows will choose the coast. Given the predominance of the seaside resort model (sea and beach), it will probably be very high, in fact so much so that the figures on a regional level (N3) can be taken as representative of the tourist pressure on the coasts. This is especially true in countries like Tunisia where 91 per cent of night-stays are motivated by seaside tourism or Turkey, where the Antalya province (N3 level) contains 23 per cent of the tourist establishments in the country and 35 per cent of the tourist beds, and concentrates 98 per cent of its tourist establishments and 97 per cent of its beds in a narrow coastal fringe. In the baseline scenario, tourism in the coastal regions will continue to develop, principally near the coasts; this despite demand for diversity, but given the current strategies being used (see the section entitled 'Directing tourism towards sustainable development', p341).

In the coastal regions (N3) resident and tourist populations accumulate during the high season. The indicator of *resident and tourist population density during the peak month* shows strong growth; it is projected to rise from 158 inhabitants per km^2 in 2000 to 209 inhabitants per km^2 by 2025 (Figure 6.6 and Statistical Annex).

When calculated for the coastal zone only, this density is much higher since the coastal regions often include inland desert or mountainous areas that are thinly populated. When reporting the figures for the coastline itself, a *linear density* indicator can be obtained that better illustrates the scale of the pressures on coastal zones. The population of coastal cities reported per kilometre of coastline increased from an average of 580 people per km of coast in 1950 to 1530 people per km in 2000 and could reach 1970 people per km by 2025. The average linear density would thus have more than tripled in 75 years. Its growth would be more than 2 per cent per year until 2025 in Syria, Egypt, Albania, Morocco and the Palestinian Territories.

The tourist linear density, also sharply increasing, could triple on the southern and eastern shores in 25 years, while in the north it would probably increase by only 52 per cent (see Statistical Annex). By 2025 the strongest tourist pressure on coastlines would occur in the east (Israel and Lebanon) and the north (Monaco, Slovenia and Spain).

Figure 6.6 Cumulative density of resident and tourist populations in the peak month in coastal regions, 2000–2025 N3 level (inhabitants per km^2)



Source: Plan Bleu, 2003

Note: The cumulative urban and tourist linear densities give an idea of the enormous pressure on the Mediterranean coast in peak periods. The total could reach 3330 people per km of coast by 2025 compared with 2300 in 2000. Pressure would be especially high in the Levant (from Syria to Egypt), Spain, Slovenia and Algeria.

A concentration of roads, ports, airports and industrial areas

Population and socio-economic developments will result in strong growth in coastal infrastructures and facilities, especially for transport and tourism facilities. Population growth in the south and east will also lead to increasing needs in the energy and industry sectors, not to mention desalinization plants.

Coastal areas have substantial sea, air and land - transport infrastructures (see Statistical Annex). Intensively-used *roads* now run along a large part of the Mediterranean coast at no more than a kilometre from the shoreline (Figure 6.7), particularly in Algeria, Lebanon and Israel, but also in Croatia, Italy, Spain and France. The islands are better preserved. Roads, generally built too close to the shores, disturb the physical interactions between land and sea, and generate a ribbon urbanization along the coast. Roads also consume a great deal of space. According to available data, the highest road densities (the relationship between road length and the dimensions of the area under consideration) are found in Algeria (4.1 km/km^2 in the *wilaya* of Algiers, 1.4 in the *wilaya* of Tizi Ouzou), Syria (1.6 in Tartus Mohafazat) and Cyprus (1.4 in the Limassol district).

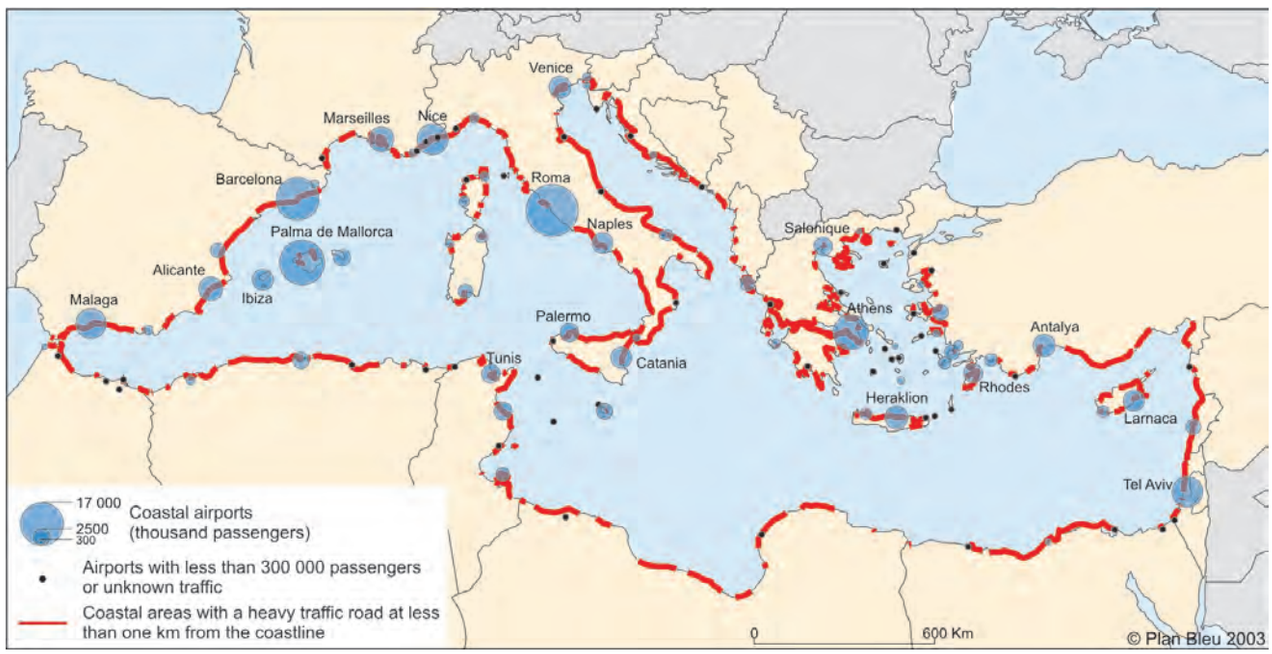
Many *airports*, among the largest in the region in terms of traffic, serve coastal cities or cities near the coast. There are a total of 112 airports on the Mediterranean coast (Figure 6.7), some of which have been built on coastal wetlands (Corfu, Larnaka, Marseilles, Rome, Thessalonika and Tunis). Tourism development explains the amount of traffic recorded to some destinations and the observed traffic increase. Opening up small islands increases the need for airport infrastructures.

In 2003, the Mediterranean had 286 *commercial ports* (Figure 6.8), of which only 46 were fitted with receiving equipment for ship wastes. They are often surrounded by industrial areas, sometimes with free zones.

Projections for transport to 2025 show *considerable growth in traffic* (see Chapter 3). The coastal zone will be affected by several major infrastructure projects. In the framework of the trans-European transport network in the enlarged Europe, for example, priority projects include a rail–road bridge at the Straits of Messina (2015), a high-speed railway linking Barcelona, Figueras and Perpignan (2008), Perpignan and Montpellier (2015) and Montpellier and Nîmes (2010), and the Venice–Trieste–Koper–Divaca railway (2015). Plans for new road construction also exist in the south and east, for example the coastal road in Morocco.

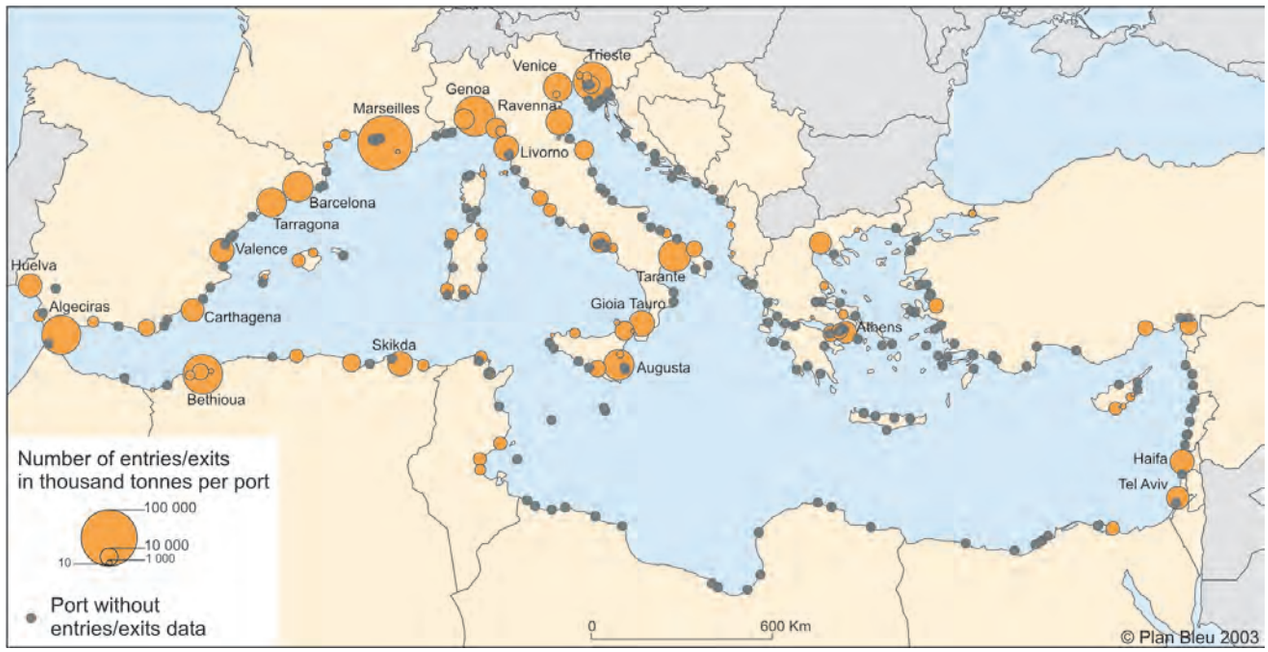
Air-passenger traffic is projected to grow between 2000 and 2025 by some 2.6 per year throughout the Mediterranean. This growth would be stronger in the south and east (3.2 per cent per year) because of increased flows of international tourists. It is expected that the expansion of existing capacity and the construction of facilities along the coast will be carried out in coastal areas experiencing a tourist boom (Croatia, Turkey, Egypt, Libya and Tunisia). In Tunisia, for example, according to various growth

Figure 6.7 Road and airport infrastructure along coasts



Source: diverse national statistical *sources*

Figure 6.8 Mediterranean commercial ports



Source: Lloyd's List: Ports of the World 2003; national statistical yearbooks

assumptions,[3] airports with a capacity of 10.5 million passengers per year in 2002 will be receiving between 15 million and 24 million passengers per year by 2020. In Egypt the government[4] has approved a plan for expanding the airports of Alexandria, Port-Said and Marsa Matruh, and building a new airport in El Alamein.

Port infrastructures will probably develop more by expanding existing capacities and/or by changing their specialization than by new construction, with occasional exceptions such as the new Tangiers-Mediterranean port in Morocco. Some examples of planned expansions are the 'seaside highways' in south-eastern and south-western Europe by the European Union (2010) and the development of the port of Dubrovnik in Croatia for passenger traffic.

In addition to the commercial ports, there are 750 *yacht harbours*. New yacht harbours have serious negative impacts on the environment (consumption of land and degradation of surrounding shallow waters, disturbance of the dynamics of coastal currents, and chemical pollution). In countries already well-equipped (Spain, France, Italy, Monaco, Slovenia and Israel, see Figure 6.9 and Statistical Annex), the construction of new marinas will face many difficulties, given the saturation level of coastal land and the degree of coastal protection. To meet an ever-growing demand (projected at 1.5–2.6 per cent per year for France over the coming years[5]), an emphasis will be put mainly on developing, expanding and rehabilitating existing capacity and on developing dry ports, which will create new sorts of pressure on the landward side of coastal zones. For the other countries, the baseline scenario assumes that by 2025 the projected ports (43 in all) will be built in Greece and Turkey. In Croatia, port capacity could be developed mainly by optimizing and converting existing locations and by lighter facilities (anchorage sites). Countries will be put under severe pressure by investors wishing to build marina complexes.

Figure 6.9 Marinas in Italy

Source: Pagine Azzurre. Il portolano dei mari d'Italia, 1999 edition

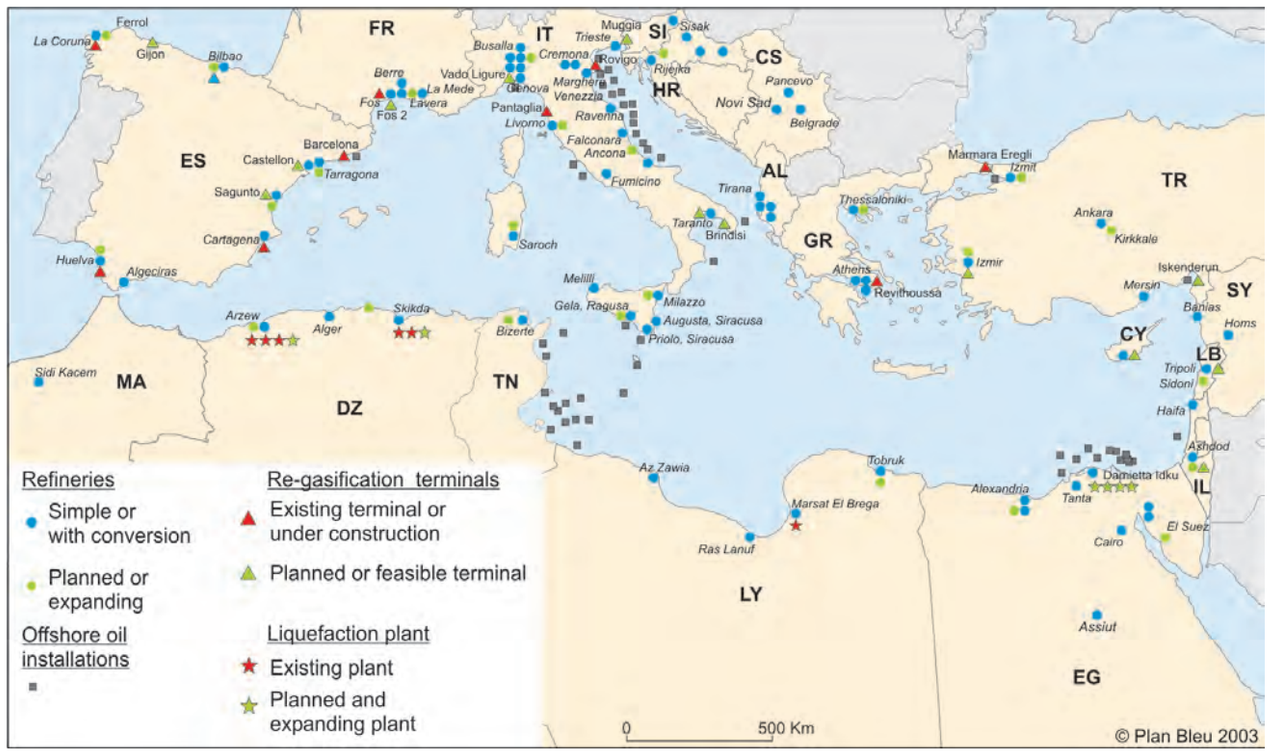
Cruises have experienced strong growth over the past 15 years. 20 per cent of the world supply is met in the Mediterranean with 104 ships and 72,000 beds. The number of passengers is projected to grow considerably by 2025. In Marseilles, the number of passengers increased from 11,600 in 1993 to 260,000 in 2002 and might reach 600,000 by 2025. Tunisia is projecting 380,000 cruise passengers by 2010 compared with 185,000 in 2000. In Cyprus the number increased from 58,000 in 1985 to 135,000 in 2000. This growth involves more specific developments in existing ports rather than the construction of new ones. However, it should be noted that the new Tangiers-Mediterranean commercial port was planned so that the old port of Tangiers could be given over to the cruise business; and an off-shore platform has recently been created in Monaco.

The number of operational *energy plants* (refineries and thermal power plants) located on the coast numbered 112 in 1987 with 43 planned. In 2004 there were 288 in operation (gas plants, refineries and thermal power plants) with 226 planned, excluding the off-shore plants (Figure 6.10). Apart from the pollution generated, energy installations also occupy appreciable areas of land. A refinery can occupy from 1.5 to 35 hectares per million tonnes of processed crude, and a 1000Mw thermal power plant occupies from 6ha (natural gas) to 18ha (coal). Given the growing energy demands and the fact that on average 40 per cent of the power plants are located near the coastline (maritime access and cooling water), it is projected that by 2025 there will be 360 power plants in the Mediterranean coastal zone, including 160 new ones.

The projected doubling of the intra-Mediterranean gas trade will require new infrastructure to meet demand. At present there are 12 operational gas refineries, one under construction and 17 planned, excluding the new refineries (18 being expanded or planned) that would bring the total to 73.

Industry in coastal areas (chemicals, petrochemicals, metallurgy, food processing, waste treatment plants), at present mostly in Spain, France and Italy, will also increase in other countries. In 1989 the Blue Plan had already estimated the number of major industrial plants on the coast from Morocco to Turkey at 157, plus 67 planned. Strong industrial growth is projected for the south and east to meet increasing demands due to population growth and rising living standards. Stable in the north, *steel* production in the south and east increased from 8.5 million tonnes in 1985 to 21 million by 2002 and could reach more than 50 million by 2025.[6] *Cement* production will probably decline in the north and increase by more than 150 per cent in the south and east. This growth will particularly affect the coastal zone.

Figure 6.10 Mediterranean coastal energy infrastructure



Source: Data from Oil & Gas Journal; OME, UKHO, SHOM Questionnaires

To meet freshwater shortages and the growing tourism and urban demand, some countries have turned to desalinization. In all there were 238 *desalinization plants* in 2000 (with an average production capacity of more than 500m^3 per day) scattered along the coast.[7] According to national projections for water supply by desalinization in the medium-term,[8] it is estimated that the additional production needed will be more than 1 million m^3 per day, which implies 175 new plants with a 6000m^3 per day capacity (or 35 with a production capacity of 30,000 m^3 per day).

Half the coastal zone under artificial cover by 2025?

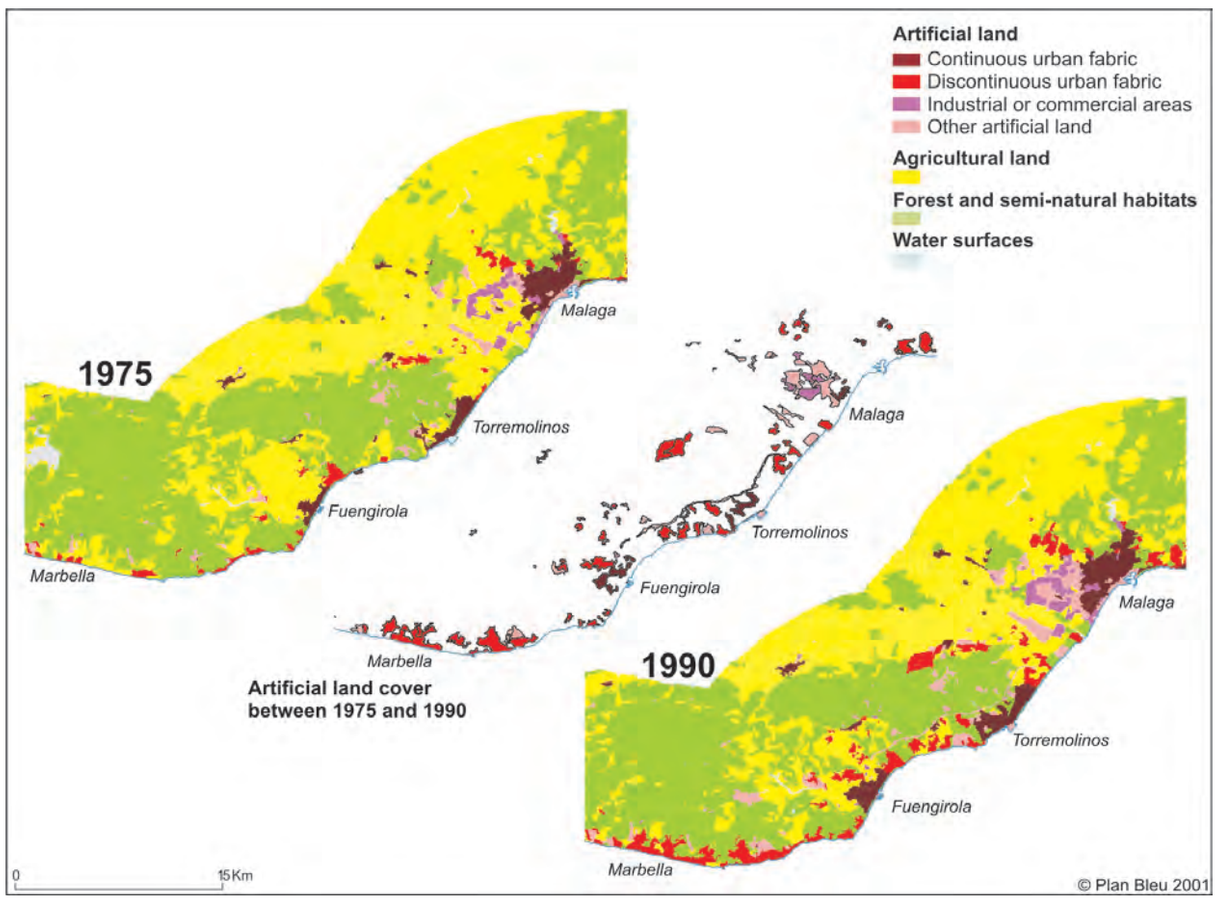
The first consequence of continued growth in population, infrastructure and facilities is an increase in built-up and other artificial land cover in the coastal zone.

The *linear nature of coastal urbanization* and the *speed* of the phenomenon is significant (Figure 6.11). The balance between the urban fabric, agricultural land and forests that existed in 1975 on the 66km of coastline in the Malaga region (Spanish Andalusia) was upset in 1990. On this 66km long strip that goes 10km inland, artificial land cover increased by 76km^2 (3.5 per cent per year) at the expense of agricultural land (which lost 55km^2) and forests and semi-natural environments (20km^2). This increase in artificial land cover was especially high (50km^2) on the coastal strip from 0 to 2km; the coast is now almost completely built-up along its entire length.

On the basis of the European LACOAST programme, which supplies satellite images, changes in the Mediterranean coastal zones of Spain, France and Italy can be assessed (Figure 6.12). The spectacular growth of construction along the Andalusian coast (55 per cent in 15 years on the 0–2km strip) brings it close to the average rate of artificial land cover in Mediterranean France and on the rest of the Spanish Mediterranean coast. The percentage of artificial land cover on the Italian coasts remains slightly lower but is increasing strongly (by 22 per cent in 17 years in the 0–2km strip).

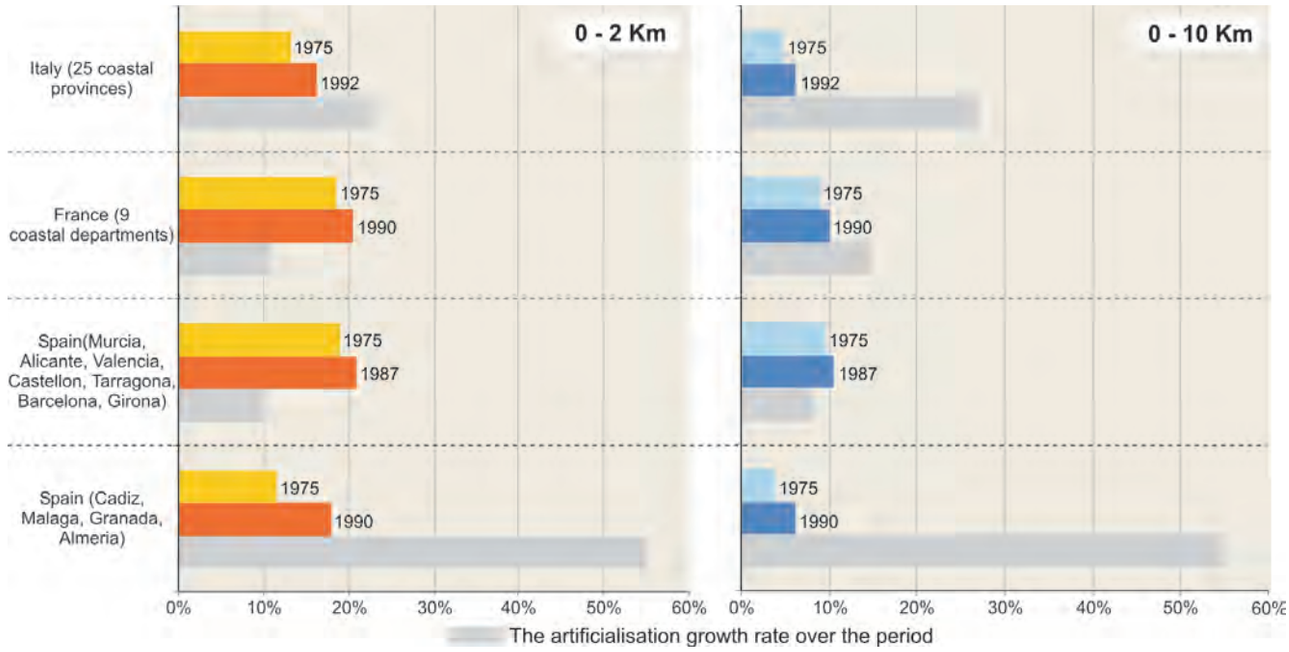
Such comparisons are not available for the Balkans and the southern and eastern shores. Many studies and

Figure 6.11 Coastal construction from 1975 to 1990 in Malaga province (Spain)



Source: EU-Joint Research Centre, Ispra (LACOAST)

Figure 6.12 The increase in artificial land covering a few Mediterranean coastal regions (%)



Source: *Plan Bleu* from JRC data

diverse information, however, show the same trend in linear coastal urbanization.[9] Natural conditions sometimes impose this linearity, as in Alexandria, Egypt. When the land surface makes it possible and urbanization is not mainly the result of tourism, urbanization can develop in the form of a half moon, as in Sfax, Tunisia, where artificial land cover more than doubled between 1972 and 1994 at the expense of agricultural land (see Chapter 4).

Other sources and methods could be used to assess the percentage of artificial land cover of the Mediterranean coastline.

The *Géopolis* database gives the surface area of coastal cities, which can be compared with the surface of the 10km wide coastal strip. These data should be analysed with care, since non built-up areas can be included in the city surface figures[10] and leave margins for densification. The data show that the urbanized proportion of the 10km coastal strip was very high in 1995 in Spain and Lebanon (>50 per cent, Table 6.1). According to *Blue Plan* projections, which assume that city-dwellers will in 2025 consume 1.2 per cent more space than in 1995 (smaller households, increased incomes, increased infrastructures), the process would increase in Spain and Egypt (>70 per cent by 2025) and even more in Lebanon (to saturation point).

Data from night-time light radiation surveys (see Figure 17, p27) show the part of luminous coasts, that is coasts with high density transport infrastructure or built-up areas: about 40 per cent of the total coastal zone seems under some form of artificial land cover. There are large differences between countries, ranging from 7 per cent in Albania to practically 100 per cent in several other countries (Lebanon, Israel, the Palestinian Territories, Malta, Monaco and Slovenia). Except for Albania, Greece and Cyprus, the percentages are in general much higher on the northern and eastern shores (more than 60 or 70 per cent) than on the southern shore (between 20 and 45 per cent). These data must be handled with care, however, because the level of artificial land cover along roads and in villages is underestimated.

Based on these different methods, it is estimated that 40 per cent of the coasts, or 18,000km, were already built up by 2000. This proportion is projected to increase between now and 2025 with population and tourism growth, and with the creation of approximately 500 new major facilities (including 43 yacht harbours, 200 energy plants and a large number of desalinization plants and industrial sites). The development will vary between regions. In coastal zones that are already urbanized and countries where the coastal land is now protected, urban overflow will take place mainly on a secondary line.

Table 6.1 Urbanization of the coastal strip in 1995 and 2025 in a number of selected countries

Country	Mediterranean coastline (km)	Coastal fringe surface – 0–10km (km²)	Total surface of coastal cities (km²)		Ratio of total surface of coastal cities and coastal strip surface (%)	
			1995	2025	1995	2025
Spain	2580	25,800	14,182	18,886	55	73
France	1703	17,030	4042	5738	24	34
Italy	7375	73,750	28,320	33,366	38	45
Greece	15,021	150,210	3041	4072	2	3
Lebanon	225	2250	1287	2286	57	102
Egypt	955	9550	3116	7468	33	78

Source: Géopolis 1998; Attané and Courbage, 2001; *Plan Bleu*, 2001 and 2002.

Elsewhere, urbanization may increase the proportion of built-up coasts, especially in regions with a strongly developing tourism industry.

Under the baseline scenario assumptions, an additional 200km of the coastline will, on average, eventually be under some form of artificial land cover each year, or about 5000 additional kilometres in 25 years. By 2025, 50 *per cent of the coast could thus be irreversibly built-on*. In some countries, vast coastal conurbations or urban cordons may extend over tens if not hundreds of kilometres.

Box 6.5 Increase in risks and costs of flooding due to coastal urbanization in France's Languedoc-Roussillon region

Building on coastal zones increases vulnerability to flooding. In the Languedoc-Roussillon region in France, where the population in the coastal districts has doubled in 40 years, 300,000 people live in flood-prone coastal areas. The area dedicated to dwellings, activities and infrastructures (18 per cent more in 2000 than in 1990) has grown faster than the population. The average built-up area in the region increased from 260m² per capita to 420m² per capita in 22 years and could reach 500m² by 2015. The same is true for the flood-prone part of the plains (which will increase by15 per cent over the same period). Urbanization in flood prone areas reduces the area of natural floodplains, thus increasing vulnerability to flooding. Eighty per cent of the buildings in flood-prone areas have been constructed during the past 40 years and bear witness to the failure to enforce regulations.

The costs of these floods in human and material terms are becoming less and less bearable. In 1988 Nîmes suffered damage valued at 610 million euros. The floods of September 2002 killed 35 people in the French *département* of the Gard and caused damage estimated at one thousand million euros.

Source: IFEN, 2003

This linear urban sprawl results in many impacts along the coasts, including pollution, traffic congestion, degraded landscapes and coastal ecosystems, and increased coastal erosion.

One of the consequences of coastal urbanization is an increased vulnerability to *flooding*, which can be extremely serious along some coastlines (Box 6.5).

Impacts on *ecosystems and landscapes* are virtually irreversible. Although they will probably increase considerably between now and 2025, the degree of seriousness will depend on the capacity to implement appropriate responses. Possible responses to this challenge, such as the ability of countries to develop sustainable management policies for their coastal areas, are analysed in the following sections. Box 6.6 gives an example of a high-quality coastal zone that is expected to undergo strong tourism-related urbanization, while responses are developed to try to control this process.

Box 6.6 Strong tourism-related urbanization on the Croatian coast and measures developed to reconcile environment and development

Croatia has a high tourism potential due to its high-value natural, cultural and historical heritage. These elements are at the core of the national tourism strategy, which aims to increase the competitiveness of the sector and create a clearly identifiable image in international markets.

The coastline of Croatia and its many islands constitute its main tourist attraction. Since 1999 the Adriatic coast has enjoyed the status of a Priority Tourism Zone. This coast, which contains 95 per cent of the national accommodation capacity, has been urbanized along some 850km (15 per cent of the coast). Taking into account existing pressures and local projects, the authorities estimate that an additional 800km will be urbanized in the near future, a length 1650km of coastline (65,500ha of coastal zone), of which 15,300ha will be occupied by tourism along 600km.

Since 1997, the Croatian government has published various documents aimed at reconciling tourism, national planning and environmental protection: the 'land use strategy' (1997)

and the 'land use programme' (1999) recommend the privatization of tourism and the implementation of impact assessments. The areas with high ecological value are considered as strategic tourism resources. The Environment strategy and the National environmental action plan for 2002 assess the actual situation and the obstacles, and define the objectives to be achieved. The Report on the state of the environment in Croatia (2003) recommends the creation of a new generation of land-use plans that take the objectives defined in the earlier documents and frameworks into account. The protected environment on the islands is considered a good opportunity for the development of sustainable tourism. Finally, the *2010 Strategy for the development of tourism* that is about to be adopted formulates ten objectives, two of which specifically integrate the environmental dimension (land-use plans that require natural resource preservation, environmental awareness and preservation of ecological wealth).

The challenges are considerable, since the very aspects that attract tourists (preserved natural resources, attractive landscapes and cultural wealth) could very easily be jeopardized by tourism and urban development, which would not sufficiently integrate the demands of territorial quality.

Source: *Plan Bleu*, based on personal communication from M. Mastrovic, Ministry of Environmental Protection and Physical Planning, Croatia, 2004

Pursuing the fight against coastal pollution

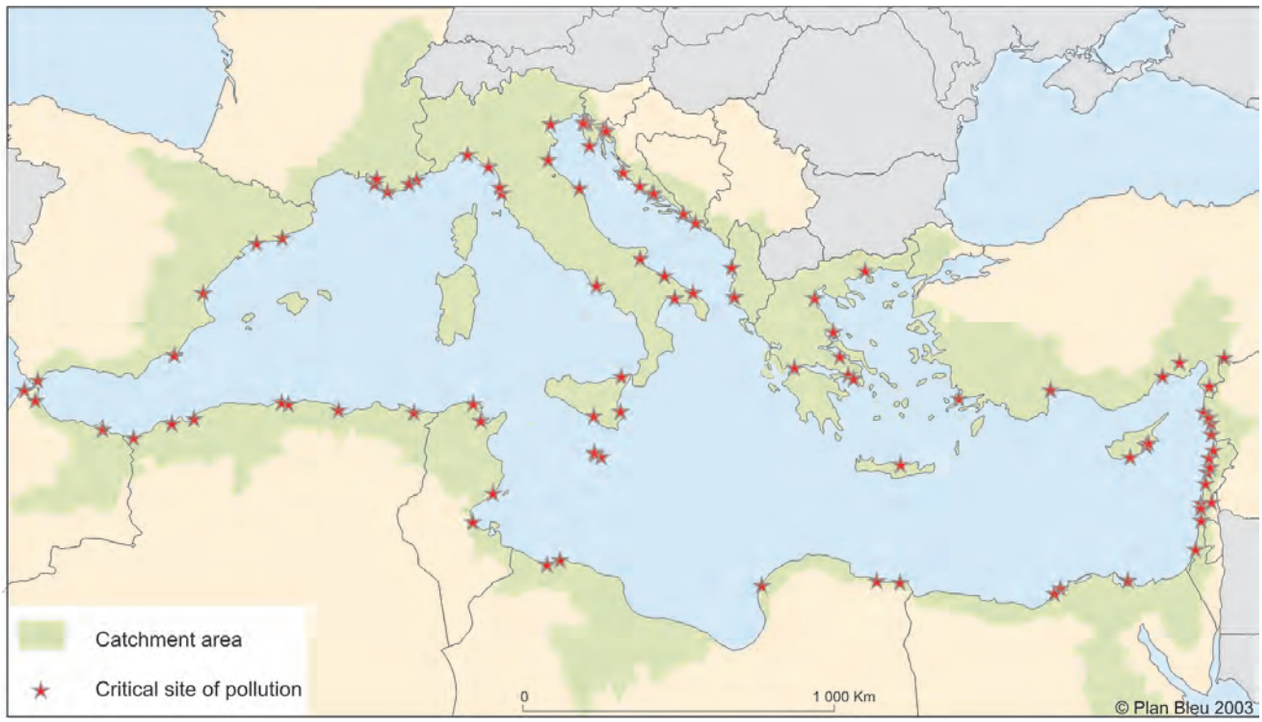
Mediterranean coastal waters are affected by wilful or accidental maritime pollution and land-based pollution.[11] The land-based sources are responsible for 80 per cent of the total pollution affecting the Mediterranean, and responses have been developed over the past few decades to reduce and prevent this. Pollution originating from activities at sea account for only 20 per cent. Hydrocarbon pollution has decreased in recent years, but an increase in pollution risks is retained in the baseline scenario, given the rise in maritime traffic (see Chapter 3).

High-impact land-based pollution, improvements remain insufficient

It is difficult to estimate the quality of coastal waters, and even more its trends, on such a vast scale. The MAP/MEDPOL inventories concentrate on the 101 *priority coastal hot spots* (Figure 6.13) for which a new 2001 assessment showed uneven changes (improvements as well as degradation, depending on the location).

Coastal water pollution affects ecosystems, human health and the economy in many ways (increases in

Figure 6.13 One hundred and one priority pollution hotspots



Source: MAP/MEDPOL; Margat, 2004

Note: In 1999 the 101 hot spots contained a population of 35 million, half of whom lived in 11 coastal cities with a population of more than 1 million.

public health costs, reduction in seafood consumption and the related loss of jobs in fisheries and aquaculture, negative effects on tourism). All economic activities in an area can be affected. Izmir Bay in Turkey in the 1950s, for example, enjoyed a high recreational value. Since then, heavy pollution (domestic, industrial and agricultural) resulted in a drop in tourist arrivals of between 1.55 and 3 million people (a loss of 9–18 million overnight stays between 1950 and 1990), a drop in fishing activities (loss of shellfish and fish), a loss of salt production and a surcharge for dredging navigation channels. Bathing is no longer possible.

The most important forms of pollution in the Mediterranean are eutrophication, chemical contamination, including persistent toxic substances (PTS), pollution from organic and pathogenic micro-organisms and hazardous solid waste.

Eutrophication

Eutrophication is a process by which waters enriched with nutrients (nitrogen and phosphorus) stimulate primary aquatic production. It induces an increase in phytoplankton biomass, including seaweed, 'red tides', seaweed scum, the growth of benthic algae and sometimes a massive growth of immersed and floating macrophytes. It has become a chronic problem in shallow waters near deltas (Rhone, Ebro, Po, Nile) and major urban areas, for example near Sfax with its phosphates. However, the Mediterranean is far from reaching the serious situation in the Black Sea or in the Marmara Sea. Between 1965 and 1995 nitrate concentrations in the western Mediterranean increased by 0.5 per cent per year while phosphate concentrations were reduced by 1 per cent, so changing the N/P ratio and thus promoting eutrophication. The northern shore appears to be more affected, with repercussions for biodiversity and tourism (Box 6.7), but it is also the most closely monitored shore.

Box 6.7 Eutrophication and its impacts on the northern Adriatic coastline

Eutrophication has been affecting the northern Adriatic for 20 years and is attributable to discharges (particularly via the Po river) of nutrient-rich substances in quantities that surpass the natural capacity of assimilation. Italy alone contributes nearly 270,000 tonnes of nitrogen per year and 24,000 tonnes of phosphorus. 12,600 tonnes of nitrogen and 600 tonnes of phosphorus are added annually from the Istria region. The first examples were recorded in 1969. In 1975 a massive increase of flagellates led to a general anoxia (lack of oxygen) in deep water accompanied by the disappearance of bathyal fauna and the death of large quantities of fish (7000 tonnes for the district of Cesenatico alone). Similar events continued to occur in the following summers.

The phenomenon has repercussions on tourist visits and biodiversity. The appearance of gelatinous organisms (*mucillagine*), linked to a 'cloudy sea' in many parts of the Adriatic in the summers of 1988 and 1989, led to a 20–30 per cent drop in the number of tourists. The total number of overnight stays in Rimini province fell from 17.8 million (1988) to 11.7 million in 1989. Moreover, recurrent anoxia of deep waters leads to important changes of the benthic ecosystem. The repetition of these dystrophies[12] has led to the disappearance of 15 species of molluscs and three species of crustaceans.

Source: UNEP-MAP, 1996a

Three-quarters of this problem, which many experts consider to be of great importance for the Mediterranean coastal waters, is caused by various *diffuse agricultural discharges*. Farming discards more than 1.6 million tonnes of nitrogen (N) per year and nearly 1 million tonnes of phosphorus. Eutrophication could spread to the southern and eastern shores with agricultural intensification and urban growth. Agricultural projections (see Chapter 5) indicate that the use of fertilizers could increase between 2000 and 2025 by as much as 70 per cent in the east (mainly in Turkey), 50 per cent in the south and 5 per cent in the north. Rational agriculture, making more efficient use of fertilizers, could limit the risks of excessive soil additives, and thus the diffuse discharges of agricultural origin.

Rivers that drain major catchment areas with intensive agriculture (the Arno, Po, Ebro, Pinios and Nile) are the main vectors for transmitting these pollutants to the sea. The input of nitrates by the 80 main rivers flowing into the Mediterranean doubled between 1975 and 1995. Phosphorus has stabilized after its use in washing detergents was restricted (Table 6.2).

Table 6.2 The flow of nutrients carried by river water into the Mediterranean Sea

	$N\text{-}NO_3$ flow (Kt N/year)	$P\text{-}PO_4$ flow (Kt P/year)	TP flow (Kt P/yr)	$N\text{-}NO_3/P\text{-}PO_4$ ratio
<1975	333	14	36	23.4
1985–1990	469	38	94	12.5
>1995	605	14	36	42.2

Source: Blue Plan from MAP/MEDPOL data

The discharge of non-treated wastewater from *industry* and *cities* contributes 10 per cent of the total input of phosphorus and 20 per cent of nitrogen. This can aggravate eutrophication locally. Organic discharge lowers the amount of oxygen in water even more, as in the Ebro delta, where it is close to zero.

Intensive aquaculture is responsible for only a small part of the nitrogen input, although is it increasing rapidly

(25 times higher in 2000 than 1990) and can have serious local impacts.

Chemical contamination of coastal waters, impacts on human health and the environment

Of the chemical substances discarded into coastal waters, *persistent toxic substances* (PTSs) are especially worrying because of their persistence and their toxic effect on animal and plant life if concentrations exceed certain thresholds. The flows of industrial *heavy metals*, although low compared with those generated by natural processes, such as mercury, increased by 300 per cent between 1950 and 1990, and this trend has only recently been reversed.[13] Most of the input comes from run-off and the atmosphere, the major contributors being Spain, France, Italy and Greece, with 70 per cent of the lead input and 60 per cent of cadmium. O*rgano-chlorides* are the largest group of *persistent organic pollutants* (POPs). They have a high resistance to degradation and accumulate in the fatty tissues of marine organisms. Available information does not make it possible to highlight overall trends, but local levels of PTS can reach toxic thresholds for plants and animals near industrial areas and estuaries (see Statistical Annex). H*ydro-carbons*, particularly polycyclic aromatic hydrocarbons (PAHs) are persistent and originate from land-based sources (incomplete combustion processes and industrial effluents). They can be much larger in volume than the operational and accidental discharges of maritime origin.[14]

Studies measuring the *impact of* PTS *on human health* in the Mediterranean are rare, especially for the southern and eastern shores. Food, especially contaminated sea food, is the source of 70–95 per cent of infections. PTS are difficult to detect in food, but their effects can be very serious in the long run. One-off studies report levels of PTS ingestion that can go well beyond the standards set by the WHO.[15] In Italy, for example, daily intake of PAHs through food has been estimated locally at 3 micrograms per day per capita (1.4 micrograms of carcinogenic PAH per day), or 100 times more than the tolerated daily intake.[16]

The effects of accumulating persistent substances in the food chain and fish oils are particularly important for human health, but also have serious and long-term *economic consequences*. An example: an EU regulation that set limits on the concentration of dioxin and PCBs in fish meant for human consumption, hit exports of herring fished in the Baltic Sea, threatening to ruin an entire economic sector in the riparian countries. These countries will have to pay the price of industrial developments in the past that were not respectful of the environment (paper mills using chloride, waste incineration) since they contributed to high concentrations of dioxin and PCBs in herring (average age between 12 and 18 years). Considering the lifespan of these substances, the countries will have to pay for a long time without any hope of improvement. If the Mediterranean region does not take timely action, it will not be protected against such an 'ecological and economical time-bomb'.

I*ndustrial* discharges are the largest source of chemical pollutants, entering coastal waters either directly or via rivers. Pollution risks are expected to increase, given industrial development in the SEMC, with major discharges into the sea and rivers and a low level of pollution clean-up. In the northern countries, there is already clear evidence of contamination by PCBs, PAH and solvents reaching the Mediterranean via the Po, Ebro, Rhone and other rivers (see Statistical Annex).

Armed conflicts are also polluting factors with long-lasting effects. With the destruction of industrial and military sites during the Balkan war, several thousand electric transformers containing PCB oil were damaged and tonnes of persistent hazardous substances were discharged, which accumulated in groundwaters and ended up in coastal waters and finally in the food chain, in particular of fishing families.

Organic and microbiological pollution will increase in the south and east

Particulate *organic pollutants* discharged into coastal waters around outlets of insufficiently treated wastewater lead to an excess of dissolved oxygen consumption, resulting in high environmental degradation of coastal waters.

M*icrobiological pollution* of coastal waters and substances produced by pathogenic micro-organisms in the sea can cause diseases in humans and marine animals. Although considered an important problem in the Mediterranean, this type of contamination remains little known. Monitoring the pathogenic agents is limited to measuring faecal, coliform and streptococcal contaminants, usually by measuring the Biochemical Oxygen Demand (BOD).[17] The main *impact on human health* concerns gastric-intestinal infections from seafood, including salmonella, gastro-enteritis and hepatitis. Some marine animal diseases have been reported, related to infection by a mobilivirus (fish and sponge diseases, the deaths of dolphins in the 1990s). Using biomarkers should make it possible to improve the very incomplete monitoring and assessment systems.

The primary cause of contamination is the *discharge of untreated domestic and industrial wastewater*. The resulting BOD load in the Mediterranean 101 coastal hot spots was estimated at 805,000 tonnes per year in 1999. Discharges from coastal cities participate in the trophic imbalances of coastal waters. Five cities (Alexandria, Naples, Izmir, Barcelona and Beirut) produce a quarter of the total BOD load in the Mediterranean. Total industrial discharge for the 101 coastal hot spots was estimated in 2000 at 410,400 tonnes of BOD load per year. With growing urban and tourist populations, estimated at 2.2 per cent per year in the south and 2.8 per cent in the east, domestic

and industrial discharges may see a large increase. In the north they may fall by 0.4 per cent per year because of the decreasing population (see Chapter 1). With tourism developing, especially yachting, discharges may increase considerably if regulations are not kept up to date.

This form of pollution directly affects the quality of bathing water, creating a public health problem. Following Directive 76/160/EEC, the quality of coastal bathing waters in the EU has improved steadily. In the Mediterranean countries of the EU, compliance with standards reached nearly 100 per cent in 2002 in Greece, more than 98 per cent in Spain, 96 per cent in Italy, and just 88 per cent in France where 9 per cent of the bathing areas are insufficiently tested. In the other countries there has been an increase in the number of sampling stations (82 in Tunisia[18]).

Solid waste and hazardous waste: Alarming tonnage by 2025

Coastal districts produce some 30–40 million tonnes of solid waste per year. Plastics alone account for 75 per cent of the waste found either on the sea surface or floor. This waste originates from households (17 per cent), tourism (15 per cent) and dump sites (14 per cent).

Accumulated waste is a source of environmental pollution: marine animal deaths, chemical contaminants, an aesthetic impact and repercussions on fisheries. In the Gulf of Lion plastics make up 70 per cent of large waste and fishing equipment 3 per cent. Waste density is highest in the north-western sector near the large urban agglomerations of the French coast.

In the baseline scenario, the production of solid waste is assumed to increase in all countries between 2000 and 2025, by 2.4 per cent per year in the north and 3 per cent in the south and ast (see Chapter 4). Given the present gaps in information-gathering and analysis this does not promise much improvement. Coastal urban areas are projected to produce about 71 million tonnes of domestic waste by 2025, 40 million tonnes more than in 2000.

H*azardous waste* generated in addition to domestic waste has been estimated at about 20 million tonnes per year; 76 per cent originates from five sectors: metallurgy, mining, refineries, the organic chemical industry, and the processing and storage of hazardous waste.

Unlike coastal artificial land cover, these environmental impacts are not irreversible (except for PTS). Solutions exist that can minimize and process the high volumes of pollutants and solid waste dumped into coastal waters.

Mobilizing actors and funds for the Strategic action plan to combat land-based pollution

Over the past few decades we have seen a wealth of *legally binding international agreements*, which are increasingly shaping national regulations. The most important are listed at the end of this chapter.

As early as 1975 the *Mediterranean Action Plan* (MAP) set up a cooperation mechanism for the Mediterranean. The coastal countries and the European Community[19] adopted a framework Convention for the Protection of the Marine Environment of the Mediterranean (the Barcelona Convention) that came into effect in 1978, with Protocols containing technical appendices. In 1995 the 'Barcelona system' – the Convention and its Protocols – was modified to take the developments of international law into account and broaden its scope both in space (adding coastal zones and water catchments, the source of most of the land-based pollution) and content (expanding it to the broader concept of sustainable development).

To combat land-based pollution, MAP has an extremely important protocol, the Land-Based Sources (LBS) Protocol. According to article 5:

The Parties undertake to eliminate pollution deriving from land-based sources and activities, in particular to phase out inputs of the substances that are toxic, persistent and liable to bio-accumulate. To this end, they shall elaborate and implement, individually or jointly, as appropriate, national and regional action plans and programmes, containing measures and timetables for their implementation.

Simultaneously with developments at MAP, the European Union (also a Contracting Party to the Barcelona Convention) added ambitious objectives to its legal apparatus with directives for water protection, including directives on wastewater, IPPC, nitrate and maritime security, and the EU Strategy on waste (see the legal references at the end of this chapter), and the Framework Directive on Water that aims to reach a good state of continental and coastal waters by 2015. These documents, compatible with multilateral agreements on the environment, are gradually framing the environmental regulation of EU Mediterranean member countries and 'accession' countries. The EU budget finances part of the costs of upgrading infrastructures and contributes to the exchange of experiences and strengthening the capacity of its member countries. For the 2000–2006 period, about 3 thousand million euros are to be devoted to the environment each year from structural funds for its member countries (a major portion is for wastewater collection and treatment) and about 300 million euros for wastewater treatment in the ten new EU countries (an average subsidy of 64 per cent of the total costs).

MAP plays a basic role to avoid the gap that would result between the 'European' shore, endowed with regulations and resources to limit pollution, and a 'non-European' shore, less equipped with instruments for implementing environmental policies, but experiencing a considerable increase in pollution over the next 25

years. Such a division would compromise efforts of the more advanced countries to control their pollution. MAP can help to avoid this division by contributing to the process of defining common priority objectives, harmonizing monitoring methods and regulations, and helping the least-endowed countries to implement them.

After a legal consolidation phase in conformity with European and international provisions, MAP is now moving towards a more operational phase, intended to reinforce the countries' resources for implementation. This is illustrated by the Strategic Action Plan (SAP) formulated to enforce the LBS protocol. Adopted in 1997, SAP sets objectives to reduce land-based pollution by 2025 (for example treating the wastewater of all cities in conformity with the LBS protocol,[20] suppressing the discharge of many persistent toxic substances, zinc, copper and chromium, pesticides and hazardous waste). It also aims to halve cumulative industrial discharges of BOD in *all* countries by 2010. These objectives are defined in *National Action Plans*, which MAP is helping to formulate, and subsequently to implement by lending support in mobilizing the required funds.

With this impetus, regulations are being set up at a national level, foreseeing discharge-permission regimes. Some countries, however, do not yet have legislation for classified installations (Morocco, Turkey and Lebanon).

Major difficulties persist in *implementation*. According to existing inventories,[21] less than half of the liquid industrial waste is purified and less than a third is treated before discharge into the sea or a river. Of domestic wastewater, about 60 per cent of urban waters are discharged into the Mediterranean without previous treatment.[22] It is estimated that 48 per cent of the large coastal cities (with populations of more than 100,000) do not have treatment plants, 10 per cent have primary treatment,[23] 38 per cent have secondary and only 4 per cent have tertiary treatment prior to discharge into the marine environment.[24] Even among the EU member countries, the Directives are only gradually being implemented. While cities with populations of more than 150,000 were supposed to install at least secondary wastewater treatment before 31 December 2000, the EC reported many delays in 2001 in large Mediterranean cities (Figure 6.14).

In 2000 (Figure 6.15), some countries had no wastewater treatment system (Albania and Syria) or only a small proportion of the population was linked up (Italy, Turkey, Egypt and Tunisia). The average yield of treatment plants is low – less than 70 per cent – which corresponds with the spread of secondary and primary

Figure 6.14 Urban areas with more than 150,000 population equivalent in compliance with the EU Waste Water Directive (in the 4 EU-Med countries, 2001)

Source: EC Second Forum on Implementation and Enforcement of Community Environmental Law. Intensifying our efforts to clean urban waste water. Brussels, 19 March 2001 http://europa.eu.int/comm/ environment/nsf/city_sevage.htm

treatment plants. Yields are lowest in Slovenia, Lebanon, Turkey and Croatia where plant only provide primary treatment. Average yield in Greece is lower than in other EU countries because of the high proportion of primary treatment plants; but progress has been made since these statistics were gathered, with a secondary treatment plant in Patras completed in 2001 (another one for the sewage of Athens was under construction in 2003). Several countries retain at best some 10 per cent of the BOD_5 (Croatia, Lebanon, Morocco, Slovenia, Turkey and Egypt).[25]

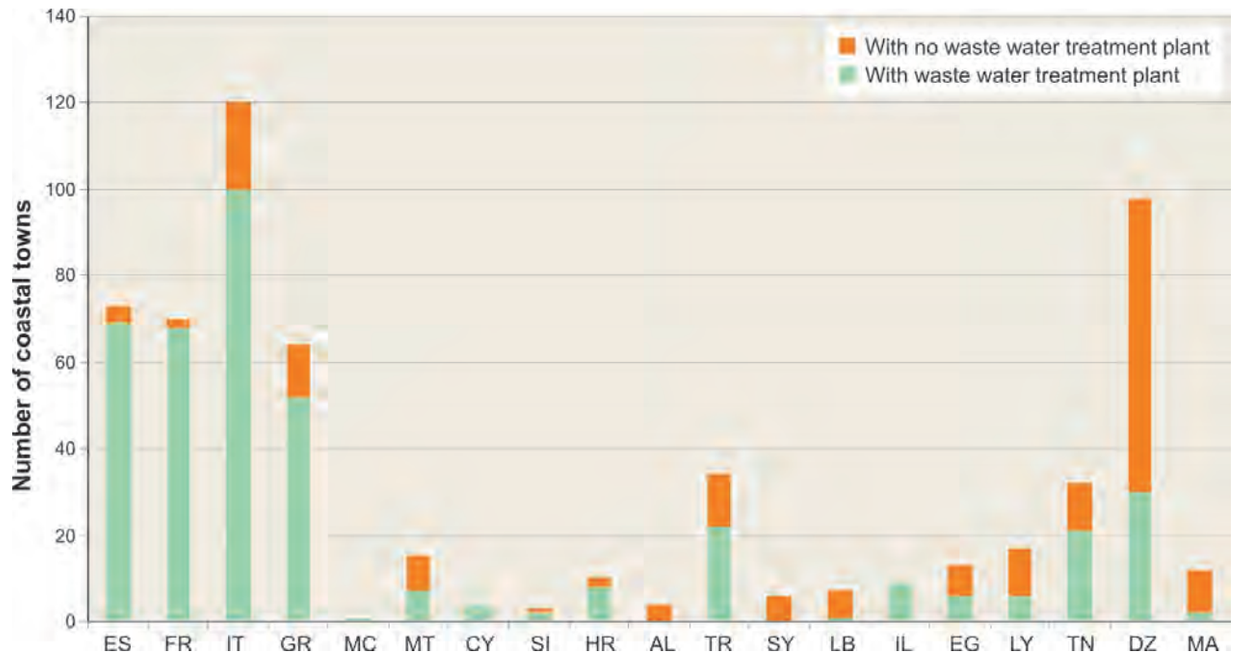
Considerable effort will be required to install treatment plants where they do not exist, to complement primary treatment by at least secondary treatment, and to equip coastal cities that will have to absorb 18 million additional people between now and 2025. This effort mainly concerns the southern and eastern countries.

Likewise, half of *industrial* process discharges and less than 10 per cent of domestic industrial discharges are treated before they enter the Mediterranean countryside (and less than a third before being discharged into the sea or rivers, see Statistical Annex). Thus there is much room for improvement in this field. The use of filters or primary sedimentation of industrial effluents could reduce discharges by 70 per cent and secondary treatment of effluents (activated sludge, for example) would give a reduction factor of 10–20. Better management of techniques presently available for treating industrial effluents, sludge and residues and emissions into the air could reduce pollutant inputs to a tenth of their present levels, thus reducing discharges to coasts. However, given the quantities of pollutant input from rivers, the atmosphere and the Black Sea, efforts to reduce inputs must also occur via comparable measures taken upstream.

The main obstacle lies in the lack of institutional, financial and human *resources* dedicated to pollution monitoring, control and treatment. Funding requirements to remedy the situation in the south and east and to meet future demands are very high. Funds are needed for *investment*, *management* and *maintenance* of infrastructures. For example, the costs required to meet the SAP objective of halving *industrial* BOD discharges before 2010 for all 101 hot spots have been estimated at more than US$600 million for investment and about US$40 million for annual operational cost.

For domestic wastewater alone, the Blue Plan has roughly estimated the cost of upgrading treatment systems[26] for the 32 million people in coastal cities with more than 10,000 inhabitants in the SEMC, and the new infrastructures needed for treatment of wastewater of 18 million additional coastal dwellers expected by 2025 (in cities with a population of more than 10,000) at about 10 thousand million euros[27] between 2000 and 2025.[28] This

Figure 6.15 Wastewater treatment by coastal cities with more than 10,000 inhabitants, 2002



Source: MEDPOL, 2003

equals 2–3 per cent of the GDP of these countries. Operating costs could reach 300–600 million euros per year. Of course these costs should be seen against the cumulative medium-term benefits (impacts on the environment and human health, possibility of re-using wastewater, methane production, see Box 6.8), but this does not make short-term financing any easier.

Box 6.8 Factoring in environmental benefits in calculating the treatment tax in Morocco

The *Régie Autonome Multi-Services d'Agadir* (Agadir autonomous multi-services authority) has launched a sewage treatment programme for greater Agadir requiring an investment of 1570 million DH (150 million euros) spread over the period 2003–2015. As part of a preliminary pricing study applying various cost-recovery assumptions about users, simulations have shown that factoring environmental benefits into the calculation would make it possible to limit the tax increases on users. Examples of environmental benefits of wastewater treatment are: reduced pollutant loads (reduction in human health risks, improvement of bathing waters), wastewater re-use, biogas recovery, mitigation of greenhouse gas emissions (methane) and energy savings. If the Authority were to take into account such benefits, which can be recovered in future, the tax to be paid by users could be reduced by 20–33 per cent. However, the tax was finally set without factoring in these benefits.

Source: Jorio, 2003

Faced with such orders of magnitude, it is reasonable to question the objectives of SAP up to 2025 for the SEMC, which will need a massive input to finance and maintain these infrastructures. Of course, autonomous funding mechanisms are preferable, but they need to be put in place gradually and be acceptable in relation to the income of the users. Faced with these financial constraints, the search for *simple and cheap technology* to treat urban wastewater in the SEMC is a challenge. It is also essential to target those actions that are the most advantageous from the cost–benefit point of view. Rather than having very sophisticated facilities in a few isolated locations, more basic standards or technology could be envisaged. The MAP/MEDPOL approach of first addressing priority hot-spots and attacking a few persistent substances is derived from this concern to optimize the available financial resources.

Such step-by-step prioritization would be facilitated by improved *knowledge* of the scale of pollution and its long-term impacts on the coastal environment and human health. Information about the quality of the milieu remains scarce and not easily comparable, even though progress may be expected in the future following current efforts to harmonize methods at the regional level. The use of biomarkers is a promising approach. More research is also required to enable a better assessment of the health risks of PTS (impacts on mortality, reproduction, the cognitive abilities of small children, etc.).[29]

Another way of reducing the costs of *curative* treatment would be to promote *preventive solutions* such as *water demand management* (see Chapter 1) or *cleaner production techniques* in the industrial sector that make it possible to minimize in advance discharge volumes (and thus volumes to be treated). This may prove to be especially relevant for developing countries. Savings made by such waste reduction at the source enable a quick return on investments (Box 6.9).

Box 6.9 Examples of savings made by cleaner production techniques in the industrial sector

Many examples in the Mediterranean show initiatives that introduce clean processes into industrial production, reducing the volume of polluting waste or emissions or the consumption of water and energy. These projects sometimes require no investment, and with the savings they realize they have a very quick return on investment.

In **Malta**, a company producing health care articles reduced the quantity of cardboard used for packaging by 24 per cent just by improving the shape of the cardboard boxes. The savings for the company amounted to US$30,000 per year. And the flow of packaging waste to public dumps was reduced by 36 tonnes per year.

In a potato chips factory in **Lebanon**, a new production process resulted in water savings of 18m^3 per day (consumption and discharges), while the investment was written off within two years.

In **Tunisia** a manufacturer of car batteries discovered 19 ways of preventing identified contamination and pollution (acids, lead scoria and wastewater) and saving lead and energy. The costs of the new measures were US$522,500, but the savings were US$1.5 million per year.

In Alexandria in **Egypt** a textile factory saved 30 per cent on water consumption, 27 per cent on steam and 19 per cent on electricity.

In **Spain** a surface treatment plant saved about 30 per cent on water, 4 per cent on salts for the baths, 60 per cent on chemical products for water treatment, and 22 per cent on treatment tax. Annual savings amounted to US$20,500 while the investment was written off in four months.

Source: MAP/Regional Activity Centre for Cleaner Production, Barcelona

Reinforcing ways to control pollutant discharges on the coast and into the sea also need to be considered. Mechanisms for monitoring and control are largely inadequate (the administrations in charge of control have only weak and dispersed financial and institutional resources), especially in many SEMC where the number of inspectors is pathetic compared with the number of

installations to be checked. Monitoring and sanctions for offences are rarely strong enough to be dissuasive.

Under the baseline scenario, the objectives advocated in the SAP for the southern and eastern countries would only be partly achieved, unless the mobilization and capacity of all actors involved in combating and preventing pollution (states, cities and industries) are strengthened, regional cooperation based on north–south financial solidarity improves, knowledge is transferred, and adapted technologies are introduced (cleaner production processes). Without such measures, the region could see a growing gap between north and south, with progress on the northern shore while improvements in coastal water quality on the southern and eastern shores are too slow. Development of coastal tourism with its related environmental requirements could, however, play a fundamental role in mobilizing for an alternative scenario.

Protecting coastal ecosystems and their biodiversity

The Mediterranean coasts have been drastically altered over the past few decades, both biologically and physically. Changing water regimes, land- and maritime-based pollution, artificial land cover in coastal areas (infrastructures, construction and development of activities such as aquaculture and tourism) have all resulted in impacts on coastal ecosystems. Coastal erosion has increased as a result of human activities, saline intrusion has increased as a result of excessive extraction from coastal aquifers, and invasive species have become new sources of coastal degradation.

Conventional policies to protect nature, promoted at both international and Mediterranean levels, are being implemented in coastal areas by all bordering countries. However, they are insufficient to ensure the required re-direction of current trends.

Altered coastal ecosystems, increasing costs and risks

Coastal erosion and salt water intrusion

Coastal erosion is affecting a significant proportion of the coastline. Sandy coasts are most affected, including beaches and deltas. In Mediterranean France 35 per cent of the beach front has been affected by receding coast. In Italy, Spain and Greece 40 per cent, 35 per cent and 25 per cent of recorded beaches, respectively, are affected. Between 1959 and 1997 the average annual coastal recession in Algeria varied between 0.3m and 10.4m. Similar situations are seen in other countries.

Coastal erosion has increased over the past few decades as a result of extraction and developments in the coastal zones and neighbouring catchment areas. Regulating nearly all the rivers beds in the entire Basin has, over the past 50 years, led to a 90 per cent *decrease in sediment* reaching the sea.

Input from the Ebro in Spain has been reduced from 4Mt per year to 0.4Mt following the construction of dams. Before building the Aswan Dam in Egypt, the Nile deposited 57 million tonnes of sediment per year in Cairo. Today it is only 2 million tonnes per year, resulting in serious erosion of the coasts in the delta, all the way to the Sinai, the Gaza Strip and Israel. Sediment captured over the past 30 years (1962–1991) by the main dams in Algeria[30] amounts to about 264 million m^3, and the dams in the wadis in Morocco that drain into the Mediterranean trap 93–96 per cent of the sediment.

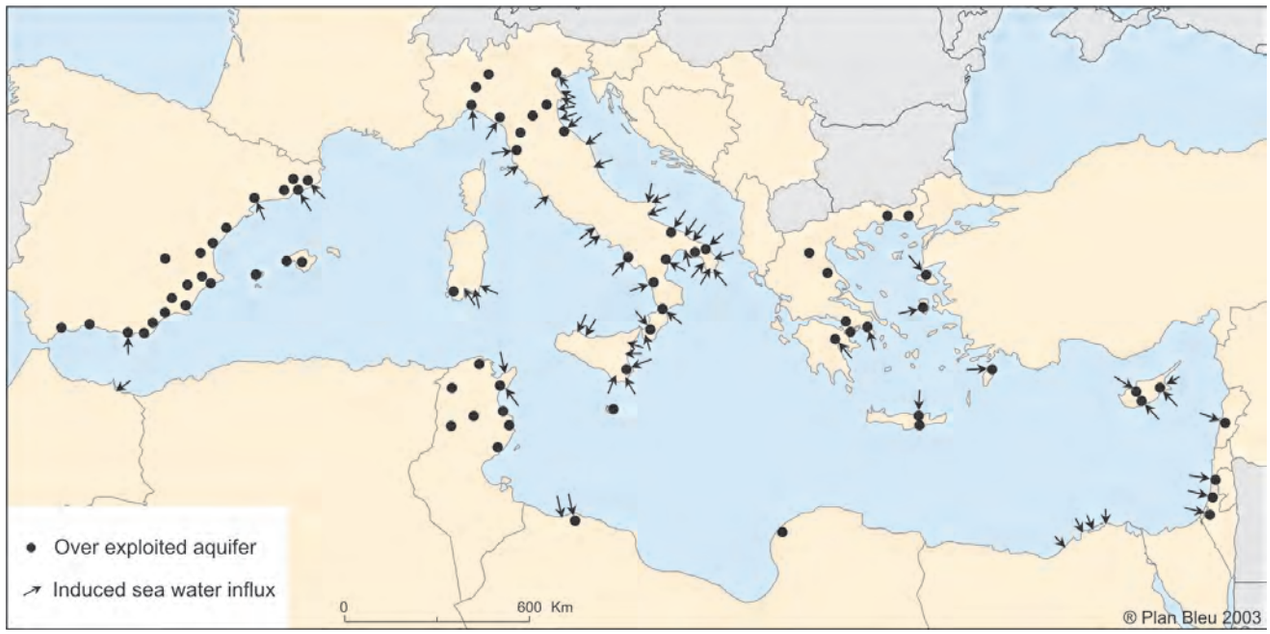
Moreover, *extracting sand* from beaches reduces the sediment load and increases the energy of rising water, which in turn accelerates erosion. In Israel it is estimated that more than 10 million m^3 of sand has disappeared because of sand extractions on beaches.[31] And sediment deposited by coastal currents is far too little to fill this gap. *Construction on the coastline* itself (dikes, groins and water breakers) disturbs currents, leading to erosion or accumulation, locally amplified by degradation of seagrass. A loss of 25–35m of beach has been observed in El Kantaoui in Tunisia since the end of the 1980s following the construction of the yacht harbour. Sometimes these coastal works accelerate accumulation and even trap sediment.

Erosion can have considerable *economic consequences*. The near disappearance of the beach in Tangiers in Morocco in the 1990s after the construction of the fishing harbour and commercial port, resulted in a reduction in tourism. The destination lost 53 per cent of its international tourist night-stays, causing a substantial loss of income from tourism (US$20 million per year), tourist transport (40 per cent) and loss of income for craftsmen (25 per cent).[32] In Italy, 1.9 million m^3 of sand was artificially deposited between 1983 and 1993 on 13.8km of beaches in Emilia-Romana.[33]

According to the baseline scenario, an increase in coastal erosion can be expected, providing a good reason to think about the *shape* of the coastline in 100 years. The main contributors will be the projected growth in infrastructures, construction and extraction of materials along the coast, the construction of new dams on rivers, and the degradation of marine seagrass beds. To counter the impacts of this erosion, protection works will be needed, making the coastline even more artificial.

Extracting freshwater from coastal aquifers and islands, linked mainly to irrigation and growing coastal cities, is on the rise and increases the risk of over-exploitation and *saline intrusion*. This is already happening in many coastal plains (Figure 6.16) and is expected to increase over the next two decades.

Figure 6.16 Sites with groundwater overexploitation and saline intrusion



Source: RIVM RIZA, 1991; national sources compiled by J. Margat for the *Blue Plan*

The growing risks of high-impact biological invasions

On a global scale, *invading species* are the second most important cause of biodiversity loss, after physical destruction of habitats. Introducing species from afar is a particular risk because of the absence of natural predators and competitors. The Mediterranean is particularly affected with its nearly 500 non-indigenous marine species.[34] The introduction of foreign species has increased since the opening of the Suez Canal in 1869, more trade, transport and commerce, the development of aquaculture (Figure 6.17), and a rise in water temperature.

Non-native species arrive with dirt on ship hulls and in ballast water and sediment. In the Mediterranean the species introduced via ships are mostly macrophytes, molluscs and crustaceans.[35] As maritime traffic is projected to increase fourfold by 2025, the introduction of these species via ships will continue to increase. Of land-based animals, rodents (rats, brown rats and mice) are the most invasive in the basin. Of land-based plants, 'ice plant' (*Carpobrotus edulis*), a strong soil-covering species that chokes indigenous plants, is very difficult to eradicate and has spread over many coastal fringes.

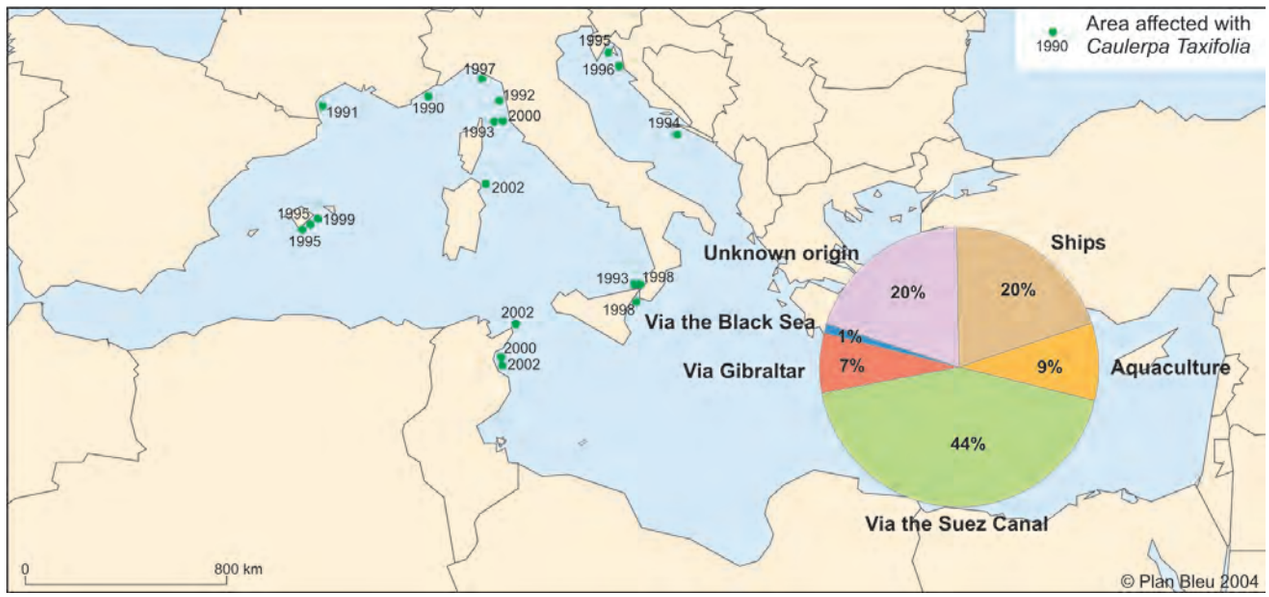
The biological invasion receiving most press coverage in the Mediterranean is the alga *Caulerpa taxifolia*, which is threatening the invaded ecosystems. Introduced accidentally and first sighted in 1984, it now affects six western Mediterranean and Adriatic countries, and concerns 13,000ha of sea floor along more than 180km of coastline (Figure 6.17). It lives at a depth of 0–50m and invades seagrass meadows. The IUCN classifies it as one of the 100 most dangerous invading species. Another alga, *Caulerpa racemosa*, first sighted in 1990, seems even more dangerous because it spreads extremely rapidly and already concerns 50,000ha. This alga, containing toxins and contributing to the depletion of fish stocks, is very difficult to eradicate. Manually removing it is only possible over very small areas. In an optimistic scenario, the Mediterranean would generate its own reaction and limit the expansion. With a more pessimistic view, strong expansion is not excluded, and might affect the biodiversity and economy of the coastal zone.

With increasing transport and the rise in temperature that favours species of tropical origin at the expense of native species, biological invasions can only increase. Major degradation of the ecosystem, comparable to what has been observed in other seas (for example, the Black Sea) cannot be completely excluded.

Degradation of coastal habitats and species

The Mediterranean is considered to be one of the world's most threatened seas. MAP has recorded 104 *endangered*

Figure 6.17 Main ways non-indigenous marine species are introduced and spread of Caulerpa



Source: EEA, 2003; Université Nice-Sophia Antipolis, Laboratoire Environnement Marin Littoral, 2002

species, from plants to cetaceans, in particular the monk seal, sea turtles and posidonia.

The reduction in turtle populations has reached the point where two of the three resident species are now considered vulnerable to, if not in danger of, extinction. These are the green (*Chelonia mydas*) and the loggerhead turtle (*Caretta caretta*) that only reproduce in the Mediterranean. The main causes of this reduction are the disappearance of spawning sites (due to sand extraction from beaches) and capture (10,000 turtles are killed every year).

The number of monk seals has decreased steadily over the last half century. Classified by the IUCN as one of the ten most endangered species in the world, the monk seal has, since the 1970s, vanished from the coasts between Syria and Egypt and has practically disappeared from the north-western Mediterranean and the coastal waters of Maghreb. Most of the population can now be found along the coasts of Greece, Turkey and the islands of the Aegean Sea. Causes for its disappearance are pollution, the destruction of its habitat and reproduction sites, and hunting. Given the competition with fishing, overfishing of some areas may also be a cause for the fall in numbers.

The most degraded and endangered *coastal habitats* are the dune ecosystems (as a result of construction and pedestrian pressure), shallow waters (subject to physical changes, pollution and overfishing), wetlands (see below), and some beaches that are used as spawning sites by turtles.

The reduction of *wetlands* has resulted mainly from infrastructures and urbanization (building of airports, roads and marinas), upstream water works mainly for irrigation (reduction of water input), and changes in agricultural practices (drying up of marshes). Levees for flood control also reduce flood plains and can upset ecosystems (subject to periods of drying and salinization or, in contrast, to sudden desalinization after a break in a levee). This happened when the Camargue region in France was flooded in September 1996: the entire *Zoostera noltii* grass beds of the Vacarès vanished following a sudden drop in salinity.

Tourism in particular contributes to the degradation of natural habitats and other biodiversity. Approximately 10–20 per cent of the *Posidonia* meadows of the Côte d'Azur are said to have vanished with the constructions on the seaside and three-quarters of the sand dunes from Spain to Sicily have been destroyed by urbanization for tourism. Open anchorages have also been a source of degradation. In August 2002, along the coast of the Porquerolles Island of France, 1350 anchored boats (outside harbours) were counted at one time, which can mean a floating population of 4000–5000 people without a sanitation system. In addition, the anchoring causes degradation of the sea floor and the dissemination of undesirable species.

Chemical pollution, as well as physical aggression, contribute to the irreversible disappearance of coastal habitats. In 50 years the area of *Posidonia oceanica* meadows has been seriously reduced all around the Mediterranean,

in particular near large cities and industrial ports such as Athens, Naples, Genoa, Marseilles, Barcelona, Algiers and the Gulf of Gabes.[36] The example of the Gulf of Marseilles (Box 6.10) shows that the observed degradation is a result of *converging pressures*.

Box 6.10 Factors in the degradation of Posidonia meadows

The main causes identified for the regression of Posidonia meadows in the **Gulf of Marseilles** are:

- Coastal developments that irreversibly destroy the shallow waters. They affect 15 per cent of the sea floor between 0–10m and 10 per cent of the floor between 0–20m in the Provence-Côte d'Azur region.
- Pollution. The grass beds that grew between 4 and 35 metres in 1947 now only grow between 10 and 25m. The rise of the lower limit is due to a reduction in light, resulting from increased suspended matter and algal blooms. The lowering of the upper limit is due to poisoning by highly concentrated pollutants at that level.
- Dragging, sand and gravel extraction, anchoring and the repetitive action of boat-based fishing.
- The presence, since 1984, of an invasive algae of tropical origin, *Caulerpa taxifolia*.

In the **Gulf of Genoa** there is an additional factor, namely the warming of surface water by 2°C in ten years; here some forms of seagrass meadows have quasi disappeared.

Source: GIS Posidonie (www.com.univ-mrs.fr/gisposi/)

Although insufficiently assessed, the *present cost of coastal degradation* has been estimated for some southern countries. In 1999 these were estimated at 0.33 per cent of GDP in Egypt, 1 per cent in Tunisia (0.9 per cent as a result of loss of tourism income related to degradation of the environment and 0.1 per cent as a result of loss of fishing), and 0.6 per cent in Algeria (0.59 per cent tourism-related and 0.01 per cent as a result of impacts on health).[37] These estimates do not take account of environmental and social costs or increasing vulnerability to risks such as maritime pollution, flooding and biological invasions.

Over the past few decades, major disasters have been avoided in the Mediterranean, but this does not mean that the sea is protected against pollution such as that caused by the *Prestige* in the Atlantic in 2002 and 2003, the cost of which has been estimated at more than 8 thousand million euros.

Finally, *global warming* could be a long-term aggravating factor, in particular for lagoons and deltas where major human and heritage issues are at stake. If in the far future the *sea level* were to *rise* 1 metre, 12–15 per cent of the Nile Delta would be affected. In addition to rising sea levels, climate change could also increase the frequency of exceptional events such as torrential rains leading to increased risks of *flooding*, and could modify the competitive balance between species that are very vulnerable to higher temperatures. This would also increase the impact of invading species.

Mobilization to protect coastal biodiversity

The degradation observed in coastal biodiversity has led to a growing mobilization of civil society, states and the international community. Legal instruments have been adopted over the past 30 years (international treaties, protocols, regional agreements, national laws), some of them specific to the Mediterranean.

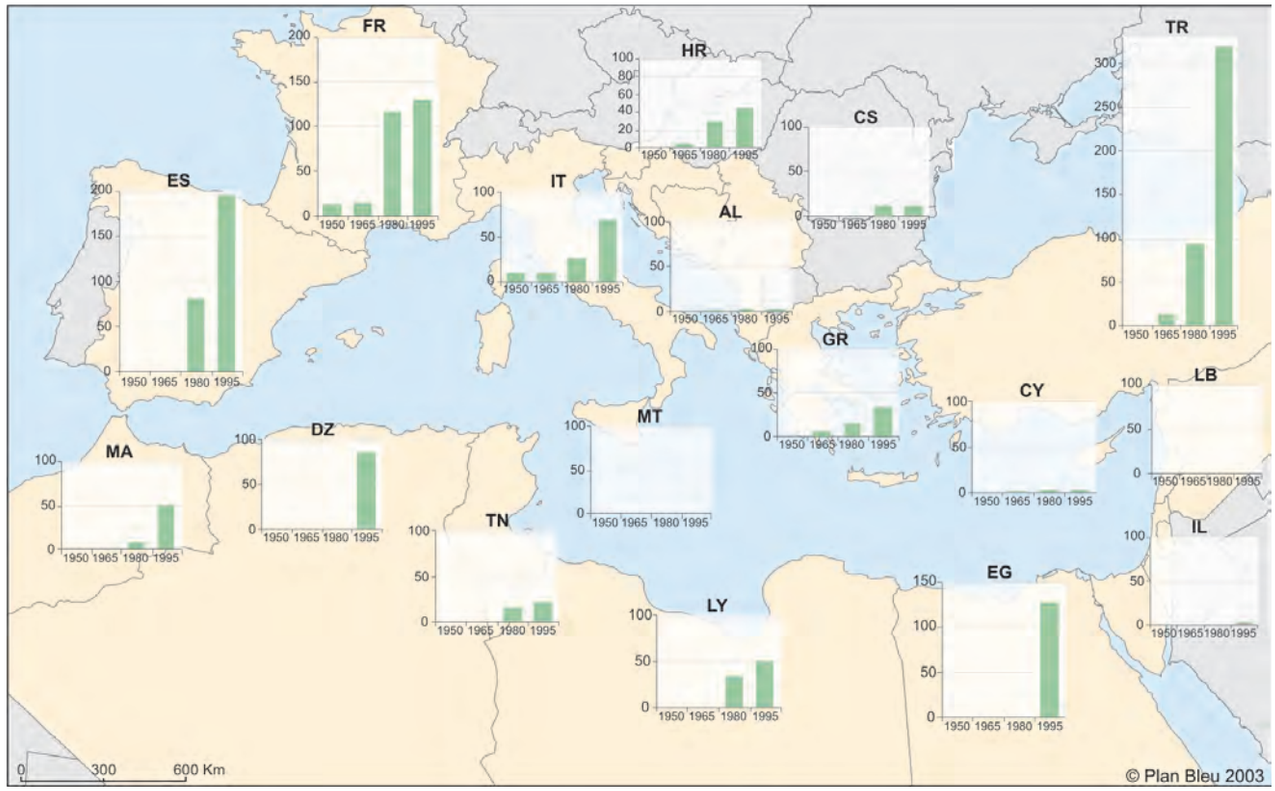
Several relevant *international treaties*, not specific to the Mediterranean (see Legal references at the end of the chapter) are important for the region. Under the RAMSAR Convention on wetlands (Ramsar, 1971) it has been possible to classify 81 RAMSAR sites in the Mediterranean Basin (Figure 6.19), to structure the MEDWET network, and encourage specific regional action programmes. The United Nations Convention on the Law of the Sea (UNCLOS), which entered into force in 1994, is an important framework that commits signatory States to protect and preserve their marine environment and cooperate at the international and regional level.

MAP (1975) and its Barcelona Convention (1976, amended in 1995) are an example of regional cooperation and a framework for regulating and acting on the protection of marine and coastal biodiversity. The Protocol Concerning Specially Protected Areas (SPA) came into force in 1986. It was replaced by a new protocol (Barcelona, 1995) relating to both protected areas and biological diversity. It is now applicable to all marine waters of the Mediterranean whatever their legal status, as well as to the sea floor, its underground areas and terrestrial coastal zones. This extension beyond territorial waters was necessary to protect migratory species such as marine mammals. The Protocol stipulates in particular the establishment of a list of 'specially protected areas of Mediterranean importance' (SPAMI). Once an area is included in the list, the Parties shall not permit or undertake activities that could go against the objectives that motivated their creation. It is remarkable and very innovative that the SPAMI could be applied to the high sea.

The Mediterranean is also covered by *sub-regional agreements* such as the RAMOGE Agreement (Monaco, 1976) between France, Monaco and Italy on the protection of coastal waters, and agreements dealing with some endangered species such as the ACCOBAMS Agreement (Monaco, 1996) on the conservation of cetaceans in the Black Sea, the Mediterranean Sea and the contiguous Atlantic area.

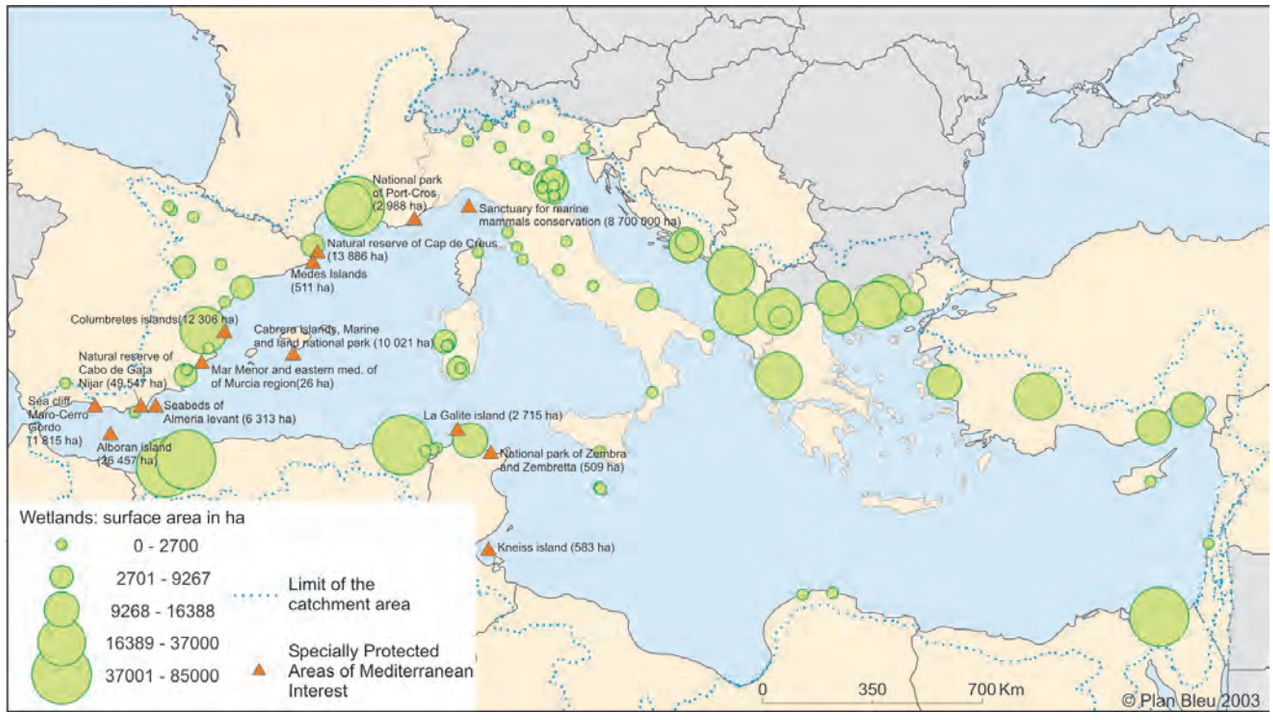
The adoption of laws in all coastal countries to protect nature, mobilizing public opinion and NGOs, as well as

Figure 6.18 Protected coastal areas in the Mediterranean, 1950–1995 (thousand hectares)



Source: Ramade, 1997; World Conservation Monitoring Centre (www.unep-wcmc.org)

Figure 6.19 Specially Protected Areas of Mediterranean Interest (SPAMI) and wetlands classified through the RAMSAR Convention



Source: *Blue Plan* from Medwet, 2003 and MAP Regional Activity Centre for Specially Protected Areas (RAC-SPA), Tunis (www.rac-spa.org)

the arsenal of international documents have contributed to an increasing number of *protected marine and terrestrial areas*. The total of coastal protected areas in the Mediterranean, including all IUCN categories, reached 1.15 million ha in 1995 (Figure 6.18)[38]. It increased sixfold in 25 years. In 2003 there were 152 SPAs, including 47 marine areas. Fourteen of the 152 SPAs are already included in the list of SPAMI (Figure 6.19), including the 'Franco-Italian-Monegasque Sanctuary' for cetaceans, covering high-sea areas.

However, this progress is relative. In fact, there is a *gap* between the legal status of protected areas and the effective application of measures required for their conservation. If data were available on *budgets for protected areas*, they would show large differences between countries and the meagre resources allocated in most countries. Actually, considerable resources are necessary to develop and comply with regulations, ensure the protection of natural and cultural heritage, organize public recreational access under conditions that are compatible with conservation objectives, and ensure that people living in or around protected areas adhere to the objectives from which they may derive benefits. Many parks may envy the budget of the Port Cros National Park in France (3.9 million euros in 2002 for 3741ha, 1800 of which are marine areas). Still, it is modest compared with the budgets of small cities.

Furthermore, the *relative portion of protected coastal areas* (*terrestrial and marine*) remains lower than observed in continental regions. This illustrates the difficulty of classifying areas that suffer strong anthropic pressures as protected without directly controlling land property. Most protected coastal areas are protected because of their specific ownership status (state property, local authorities property, or state donations). Many NGOs believe that the proportion of protected land in coastal areas remains much too low, given the projected increases in pressures and impacts. In 2003 the WWF drew up a list of coastal areas that deserve to be classified over the coming years.

Implementing the SPA and biodiversity-related Protocol should not be limited to classifying protected areas. At the same time *action plans* need to be developed to contribute to the Protocol implementation. This is, among others, why a Strategic Action Programme for biodiversity was adopted by MAP in 2003 (Box 6.11).

Box 6.11 The Strategic Action Programme on Biodiversity (SAP-BIO)

In November 2003, in Catania, the Contracting Parties to the Barcelona Convention adopted the Strategic Action Programme for the Conservation of Marine and Coastal Biological Diversity in the Mediterranean (SAP-BIO). The programme was prepared by the Tunis Regional Activity Centre on Specially Protected Areas with financial support of GEF and driven in 2001 and 2002 by bordering countries. It is one result of an assessment and cooperation process involving most international and regional organizations concerned (nearly 120 national and international experts).

SAP-BIO calls for 30 priority actions to reconcile the socio-economic development of the coastal areas with biodiversity conservation in the region. Within the framework for implementing the Convention on Biological Diversity and the expanded SPA Protocol of the Barcelona Convention, it aims to improve governance systems for the sustainable use and conservation of biodiversity.

The funds required for implementing the SAP-BIO (planned to start in 2005) are estimated at US$137 million, 97 million for national level and 40 million for more regional level activities. These funds would be divided as follows:

- 52 per cent for conservation activities;
- 37 per cent for data gathering and research on biodiversity;
- 11 per cent for information programmes and public awareness-raising.

Source: MAP/SPA-RAC

All these protection efforts are, however, not enough to turn around the general trend towards degradation of the Mediterranean coastal biodiversity. A shift to an alternative scenario would require *major changes* in the modalities of development and planning, in particular:

- A more general use and reinforcement of *impact assessments* for projects and programmes, and a development of *sectoral strategies and policies* (tourism, fisheries, aquaculture, transport, energy, water, agriculture) to *integrate* the objective of sustainability upfront.
- The implementation of *specific coastal zone policies* to expand protection instruments beyond conventional nature-conservation approaches and develop an *integrated approach* to coastal zone management and development. In the alternative scenario, new generations of protected areas would emerge. These areas, designed as genuine instruments for sustainable development, would be managed within the framework of various types of partnerships, including management by states, local authorities or communities, NGOs and economic actors.

Ensuring sustainable management of fisheries and aquaculture

The maritime part of the coastal zone produces living resources that people have exploited for thousands of years. Current trends offer new outlooks but could also have serious impacts. The exponential development of intensive fish farming (aquaculture) will not be without

problems, while degradation of the environment and stocks endangers the fisheries sector.

Avoiding a decline in fishery

The specifics of Mediterranean fishery

Fishing is an important issue for the Mediterranean. Although it puts only a relatively small quantity of produce on the market compared with the demand, it is an important component of the Mediterranean identity and employment. It accounts for 420,000 jobs, 280,000 of which are fishermen, and the average prices of landed produce are much higher than world prices.

The sustainability of fish resources (and consequently fishing) is favoured by the wide diversity in depth and by the presence of many refuge zones for spawning, two important factors for resilience. The exceptionally high proportion of *small scale operators in professional fishing* is also favourable in terms of sustainable development. Small inshore fishing indeed produces high-commercial-value fish, a source of many jobs compared with the quantities landed, and is much more selective in its catch than industrial fishing (trawl nets in particular).

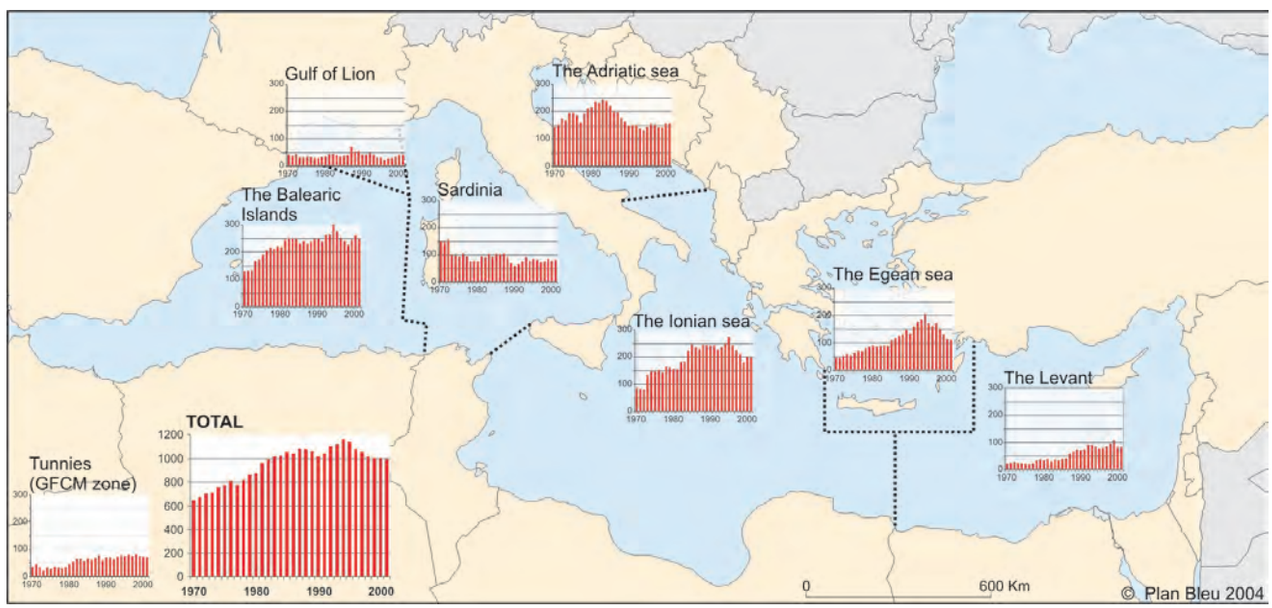
Small-scale fishing concerns more than 85 per cent of the boats (71,800 out of a total of 84,100). Boats are sometimes not motorized (4000 of the 13,700 boats in Tunisia), and many fishermen have several jobs (80 per cent in Malta, 92 per cent in Syria). The percentage of inshore fishing of the total catch varies between countries (Syria 87 per cent, Cyprus 58 per cent, Greece 56 per cent, Tunisia 44 per cent, Italy 41 per cent, Israel 39 per cent and Slovenia 10 per cent). The industrial fleet is concentrated mainly in the EU-Med countries (57 per cent of the total). Sport fishing accounts for 10 per cent of the total catch, which is a lot.

Unsustainable development

Despite these favourable characteristics, several indicators show that the fishery sector is presently undergoing worrying changes. In addition to the degradation of coastal ecosystems, fishing is suffering from domestic competition. *Fishing activity* has increased in general, for example engines with more power, about 20 per cent more boats between 1980 and 1992, and an increase in the number of trawl nets (137 and 170 per cent respectively in Algeria and Morocco between 1980 and 1992). Industrial fishing practices have also changed. They now exploit all fish resources, fishing up to 800 metres in depth.

Increased catches[39] (about 1 million tonnes in 2001, Figure 6.20 and Statistical Annex) are accompanied with a *drop in yield*, a sign of the start of degradation of stocks. This is clearly the case in the most productive areas where industrial fishing occurs, such as in the Adriatic and around Sardinia. For some species, the overall catch per fishing unit is 60 per cent less today compared with about 20 years ago. The total catch has fallen in several countries, particularly in Italy, the leading producer in the Mediterranean. Catches have effectively dropped from 358,000 tonnes in 1980 to 294,000 tonnes in 2001 (0.9 per cent per year).

Figure 6.20 Fishing: Catches (thousand tonnes)



Source: FAO, Fishtat, GFCM capture production 1970–2001

The state of several fish stocks and spawning of commercially valuable species confirms the *degradation in fish resources*. This is the case, for example, with the sea bream in the Alboran Sea, hake in the Gulf of Lion and Atlantic red tuna for which catches in the Mediterranean (all flags included) amounted to 10,000 tonnes in 1980, peaked at 39,000 tonnes in 1994 (a 10 per cent increase per year), and then fall to 23,700 tonnes in 2001. Shrimp catches increased from 10,000 to 25,000 tonnes between 1980 and 1990 (a 9.1 per cent increase per year) to fall back to 14,000 tonnes by 2001 (a 5 per cent annual drop).

Without extensive changes in fisheries management and strengthening of coastal protection, current trends imply a risk of increasing loss of fish resources and corresponding *employment* (several tens of thousands). In 2000, 8000 Italian fishermen lost their jobs, 16 per cent of the total number of jobs in the sector.

More sustainable fishing calls for effective changes

To face up to the risks of unsustainable fishing, changes in operating modes are essential.

In 1995 FAO formulated a 'code of conduct for responsible fisheries', which is, however, non-binding. FAO provides the secretariat of the General Fisheries Council for the Mediterranean (GFCM), which brings together the rim countries, the EU and Japan, organizes scientific fish monitoring, develops regional cooperation and formulates recommendations. The International Commission for the Conservation of Atlantic Tunas (ICCAT) does the same, especially for Mediterranean fishing of Atlantic red tuna.

In 2003 the European Commission proposed its own action plan. A community regulation draft was drawn up in order to ensure the sustainable exploitation of resources in the Mediterranean area. The measures proposed include increasing the mesh-size of trawler nets, banning trawl and drag nets less than 1.5 nautical miles from coastlines and above sea meadows, creating EU and national level 'protected zones' where certain fishing activities would be banned, the implementation of minimum sizes to be landed for more than 20 species, improvement in compliance control, and sharing of management responsibilities between the EU and Member States. Given the multi-specific nature of Mediterranean fisheries and interaction between fishing practices, it also suggested the formulation of management plans before the end of 2004. The second objective of the EU action plan consists of launching a debate on the possible extension of Member State jurisdiction in fishing matters, and where applicable within the framework of a multilateral initiative involving the other rim countries.

As early as 1990 the Blue Plan[40] was warning about the risk of exacerbated competition between small- and large-scale fishing if the observed trends were to continue. It stressed the importance of *strengthened concerted action* between scientists, professionals and decision-makers, an improved knowledge base (for example maps of nursery areas), the reinforcement of regulations (banning trawl nets within the 3-mile limit) and regional cooperation. Promoting *participatory* and national approaches to the *management* of living marine resources as part of local development was also emphasized, keeping the possibility of sub-regional fishing zones in mind, as well as entrusting responsibility to local fishing communities. This kind of approach may make it possible to better adapt modes of exploitation to the environment. One of the most interesting early experiences occurred in Cyprus where trawler fishing slowly declined, leading to a critical situation as early as 1981. The administration imposed a general additional fishing ban in the reproduction period despite opposition from trawler owners but with the support of small-scale fishermen. This reduction made it possible in the subsequent years to increase catches by 40 per cent.

Local development approaches can lead to the development of *artificial reefs* (provided impact assessments are made). Reefs provide shelter and nursing zones for high commercial value species and have proved a deterrent to trawler-net fishing. They promote local fishing as well as sport fishing and eco-tourism. Their recent development in several rim countries owes much to the involvement of local governments and the mobilization of associations and professionals. Spain, with more than 60 locations listed in 2000,[41] Italy and France (each with 25) are the most advanced countries in artificial reef development. Significant projects are underway in Greece, Cyprus, Turkey (Izmir bay) and France (40,000m^3 in the bay of Marseilles in 2006). In addition, spreading reefs around marine windfarm sites is being considered (a project being studied in the Languedoc-Roussillon region). In 2000 the volume of immersed artificial reefs was about 170,000m^3 (92,000 in Spain, 45,000 in Italy and 33,000 in France), which remains quite modest compared with countries like Japan.

At the *sub-regional* level, inter-governmental and professional initiatives can promote the sustainable management of shared stocks. In 2002, for example, the fisheries associations of the Adriatic agreed to establish a regional committee for responsible fishing that promotes a cooperative approach with scientists, the authorities in charge of fisheries and local associations.

These regional, sub-regional and local initiatives with increased awareness illustrate that alternatives are possible. The challenge is to shift from fishing based on ferocious competition between fishermen to *responsible fishing focused on managing ecosystems*. Strengthening regional cooperation and mobilizing actors to develop this kind of process on different geographic scales will be

decisive. For non-shared stocks the local level should be preferred, for taking the social context and knowledge to organize fishing into account. At the local level, collective discipline can most easily be implemented to ensure resource conservation.

These approaches imply a continuous adaptation in management and practices. This means reaching agreement on areas reserved for small-scale fishing, banning periods, and the number, place, nature and desired extent of *protected zones*. Close ties are necessary between fisheries and aquaculture, whose development should not add to the problems of fisheries and, on the contrary, contribute to collective progress.

Seeking sustainability in the Mediterranean fishing industry means going beyond the single objective of the long-term conservation of fish resources. In this region, the objective is less related to quantities caught and more to production of the best possible values. What is required is a better recognition and enhancement of the merits of a *'Mediterranean' fishing model*, made up of small-scale fishing units with a strong socio-cultural dimension.

Regulating the rapid development of fish farming

Tripling the production of bass and sea bream between now and 2025?

With the wealth and jobs it creates, aquaculture plays a significant role in the economic development of many coastal areas, especially in some economically hard-hit islands. Such development also contributes to avoiding 'tourism-only' specialization and redeployment of fishermen who have lost their jobs. Most extensive and semi-intense production methods are also beneficial for the environment. In the long term, aquaculture contributes to maintaining and enhancing wetlands, and it strengthens moves to safeguard water quality, the essential condition for its survival.

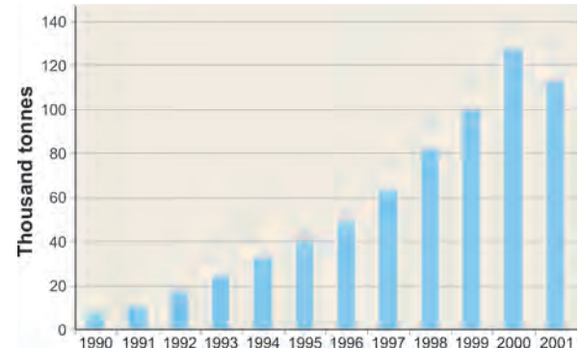
The strong growth in Mediterranean coastal aquaculture *production* (marine and brackish waters) has been one of the most remarkable facts of the past few decades. Total production (molluscs, fish and crustacean) amounted to 359,000 tonnes in 2001 compared with 149,000 tonnes in 1990 (see Statistical Annex), a 140 per cent increase in 12 years. However, this growth rate of 8.3 per cent per year remains lower than global growth (12.4 per cent per year).

Production and its growth are unevenly distributed. The leading producer is Italy (with about 170,000 tonnes in 2001, 150,000 of which was shellfish) followed by Greece, Egypt, Turkey and France. Growth is very strong (between 25 and 35 per cent per year) in Egypt, Turkey and Greece. A second group of countries with annual production of about 2000–5000 tonnes and very strong annual growth, includes Croatia (26.5 per cent per year), Israel and Cyprus (38 per cent) and especially Malta (72.9 per cent). The fairly low production in Morocco and Tunisia, on the other hand, seems to have levelled off.

Extensive and semi-intensive production, based wholly or in part on the natural productivity of the environment, is considerable (220,000 tonnes of shellfish) and is still increasing. Mollusc production in Greece, 354 farms in 2000 compared with only 5 in 1990, increased from 6000 tonnes in 1990 to 28,000 tonnes in 2000. In addition to Italy's ancient brackish-water fish farming (100 farms along the Adriatic coast produce 5000 tonnes per year of grey mullet, bass, sea bream and eels from 63,000ha), there is a strong growth in mullet breeding in the coastal lagoons and ponds on the Egyptian coastline (raising fish from juveniles fished at sea).

The intensive production of sea perch, sea bass and sea bream has seen even higher growth and today represents by far the largest part of production (in value) (Figure 6.21).

Figure 6.21 Bass and sea bream, aquaculture production in the Mediterranean and the Black Sea, 1990–2000



Source: Fishstat, FAO (www.fao.org/fi/statist/FISOFT/FISHPLUS.asp)

Note: Intensive marine aquaculture of bass and sea bream has experienced spectacular growth since 1990. These two species account for a value of 24 per cent and 33 per cent, respectively, of a total aquaculture production, valued at US$883 million in 2001 (compared with US$311 million in 1990). This development was made possible by strong market demands, highly developed artificial insemination, technology transfer, favourable temperatures in the Mediterranean Sea and the availability of appropriate sites. Greece has now become the leading producer with 66,000 tonnes in 2001 compared with 3500 in 1990. Turkey is next, its production started in the early 1990s and reached 28,000 tonnes by 2001. Intensive aquaculture production of red tuna began in 1997 with 670 tonnes, and had grown to 7750 tonnes by 2001. Underway in several countries (Croatia, Italy, Malta, Morocco, Spain and Turkey), this production is exported to the Japanese market. Juveniles are captured in their natural environment and bred for a period ranging from a few months to two years. Fish-raising could develop towards a full cycle (reproduction in hatcheries).

In terms of *prospects*, several elements suggest that growth in production would continue at a sustained pace. Regional demand for sea produce in the Mediterranean countries far outstrips supply and is projected to continue to grow with population growth in the south and east, increase in tourist flows and a fall in the price of aquaculture products. Increases are expected in the SEMC where consumption of aquatic products is low compared with the developed countries of the northern rim (5.8kg/cap/year in Morocco, 7.5kg in Turkey and 10kg in Egypt compared with 52kg in Spain, 29kg in France, 26kg in Italy and 24kg in Greece). In Egypt, the national development strategy is to increase consumption and reach 14kg per capita per year by 2017. Strategies of major producers appear to favour policies of growing markets through lower prices. The demand for fish fillets with guaranteed quality and traceability observed in most European markets is expected to lead to the emergence of farming of new fast growing marine fish species such as the croaker and the wreckfish. New offshore production techniques (already under development in Cyprus and Malta) will probably be broadly mobilized to compensate for the limited availability of coastal sites and increasing conflicts between activities.

The growth in marine-fish production is projected to continue, and to more than double by 2025. Should the bass/sea bream thrust succeed on the European and Mediterranean markets, greater growth in demand and production are very likely, as has been the case over the past few decades with salmon in northern Europe.

Risks and regulatory measures

This growth, however, may well run up against difficulties. The production growth in a competitive context risks occurring in a sawtooth manner with crises of overproduction and marketing (falling prices, degradation of the image of products, market saturation, making commonplace). This could raise questions about strategies, especially of the quantitative kind. Local pollution is expected to increase as well as conflicts with other coastal activities. Further difficulties lie in the risks of degrading stocks of species whose juveniles are caught in natural surroundings (red tuna and mullet) if this additional pressure is not accompanied by a greater effort in stock management. Furthermore, loss from cages and contagious diseases should be feared. In the long run, genetic modifications are also possible after interaction between escaped fish-farm species and natural species. Introducing non-indigenous species can also threaten biodiversity.

Several recent *initiatives* aim to reduce and anticipate these risks. The GFCM and ICCAT are formulating directives for sustainable tuna-raising practices in the Mediterranean, and the aquaculture committee of GFCM is planning to launch a regional project on 'sustainable development of Mediterranean aquaculture'. In 2002 the European Commission formulated a strategy for the sustainable development of European aquaculture, which points out four main challenges: promoting economic viability; guaranteeing food security, human health and the well-being of animals; tackling environmental problems; and stimulating research.

The challenge for the Mediterranean is to support and orient aquaculture development through an integrated approach that aims to enhance the diversity of its potential, create employment, put quality products on the market, and reduce environmental impacts. The following would contribute to these objectives:

- P*romoting extensive and semi-intensive aquaculture* that retains the possibilities of development in several countries in both marine and brackish waters.
- Assessing the impacts of aquaculture on ecosystems and *strengthening regulations* (concession or authorization systems) for reducing such impacts and foreseeing risks. Drawing up documents on 'best available techniques' could also contribute. There is also the question of the density of fish-raising in relation to the absorption capacities of sites. Malta has drawn up guidelines, and Cyprus imposes a minimum distance of 3km between two farms. One suggested solution would be to *rotate sites* by granting two sites for a single production unit.
- P*lanned development* as part of integrated coastal area development in all rim countries through technology transfer benefiting the developing countries and regions in economic hardship.
- Implementing *eco-labels* and certificates for stimulating the emergence of quality products with less environmental impact and thus enhancing market niches.
- Searching for a *positive synergy with the fisheries sector* and local economies, including support of the aquaculture sector through appropriate instruments (taxes on products) to conserving commercially viable natural species (in particular those caught for raising on farms), reclassifying fishmen, and developing aquaculture methods for the benefit of fisheries (artificial reefs and sea ranching).

To contribute to this necessary development towards an alternative Mediterranean aquaculture and fisheries sector, the strengthening of *regional cooperation* needs to be organized. Regional scientific instruments (GFCM and ICCAT) need to be consolidated along with their synergies with other regional cooperation mechanisms (especially MAP) and the European Commission. The EU also has a fundamental role to play in reducing Mediterranean north/south imbalances through programmes for strengthening capacity and co-development.

Mobilizing for an integrated coastal area management

To tackle the unsustainable heavy trends occurring in the coastal areas, the Blue Plan, in 1989, stressed the imperative of adding *broader responses* to the sectoral responses that have been discussed, integrating development with the environment, promoting inland-area development to relieve pressure on the coastal zones and developing *national policies for coasts*.

Also stressed was the need to strengthen regulatory and legal instruments and accompany them by structural progress:

- establishing administrative entities that are original and specific to the coastal areas;
- prospective studies and integrated planning;
- protecting significant parts of the coastal land and waters;
- resolute interventions in economic mechanisms (pricing) and landownership issues.

These orientations were taken up by the MCSD and the proposals relating to sustainable management of coastal areas were approved by the MAP ministerial meeting in Tunis, in 1997.

Although implementation of the recommendations adopted in 1997 still need to be assesed in detail, available information indicates a growing awareness and mobilization of civil society and the emergence or strengthening of national and local policies for the protection and integrated management of the coastal areas.

Box 6.12 EU mobilization for integrated management of coastal areas

Following a demonstration programme implemented in 1996 by the European Commission, the European Parliament and Council, in May 2002, approved a recommendation on the implementation of a *strategy on integrated coastal zone management*. This EU strategy would deal in particular with the affirmation of principles, setting up national inventories, formulating national strategies, and cooperation with non-EU member countries bordering the same regional sea. The Environment Programme of the Euro-Mediterranean Partnership also included sustainable management of coastal areas as one of its five action priorities. The EU Water Framework Directive (October, 2000, modified in November, 2001) also covers coastal areas since it refers to integrated management at the river basin level and sets out several environmental measures up to 2012 (reducing risks, monitoring and controlling discharges, preserving protected areas, public participation, pricing policies).

At the regional level, MAP and the EU are promoting the national implementation of such integrated management policies and programmes (Box 6.12). The extension of the Barcelona Convention to coastal areas,[42] as agreed in 1995, could lead to strengthened legal and operational frameworks. However, no protocol or regional strategy has yet been formulated that would enable a sharing of efforts to protect the common good, and give the rim countries the necessary impetus for strengthened, coordinated political action in the region.

Creating laws and coastal institutions

In all countries there is administrative separation, even rivalry, between land and sea. The juxtaposition of maritime laws and general environmental and development policies has become insufficient to protect and manage coastal areas in a sustainable way. Specific instruments and institutions are increasingly considered necessary for attaining this objective.

To date, only five Mediterranean countries have a *framework law for coastal zones* (Algeria, 2002; Spain, 1988; France, 1986; Lebanon, 1966; Greece, 1940), three of which apply a broad vision of coastal areas (Spain, France and Algeria). Morocco and Israel are preparing a framework law for the protection of the coastal environment. Three countries have also been innovative in creating *coastal agencies* (France, Tunisia and Algeria). Other specific management mechanisms are either emerging or are planned in several countries (Box 6.13).

Box 6.13 Coastal agencies and action plans in selected countries

France was the first Mediterranean country to pass a specific management instrument (1975), the 'Conservatoire du littoral', to acquire natural coastal land. By 2003 this conservation centre was protecting about 36,000ha and 180km of Mediterranean coastline (11 per cent of its total Mediterranean coastline, 21 per cent in Corsica). Without its activities (together with other measures to gain control over land for protection purposes, including national parks, forests, religious and military properties) virtually no natural space would remain on the Provence seafront.

However, the conservation centre was unable to prevent urban abuse of the coast during the 1980s (housing developments, marinas and other golf/building complexes), facilitated by a lack of spatial planning and the predominance of short-term speculative, political and landownership approaches (property-based electioneering and seeking maximum tax returns on property). These abuses led to an increase in the number of associations, the mobilization of landowners worried about protection, and the coastal area law of 1986 that banned construction on valuable natural areas in coastal districts. State departments and judicial authorities have recently applied a strict reading of this law and its implementation, thus rendering

most of the major construction projects inoperable and requiring a revision of district land-use plans. Urbanization pressure has been pushed towards coastal plains and inland areas. This casts doubt on the 'quantitative' model of urban and tourism development in coastal zones, and favours a more 'qualitative' model that aims to optimize the existing built-up fabric.

A recent report[43] warns against an image of the coastal zone that is exclusively tourism-oriented. It describes the loss of identity of a coast that is unstructured, hardly productive and transformed into a linear metropolis, where traditional activities are disappearing to benefit leisure time activities. Agricultural land tends to vanish, with the consequent costs of flooding and fires. New responses are being planned with three objectives: (1) broadening the delimitation of the coastal zone to include the functional interdependence of sea and land; (2) broadening the definition of coastal zones to a more overall heritage context (human, social, cultural and economic); (3) promotion of 'local territory projects'. Management of landownership, spatial planning and the promotion of productive management of landscapes and nature (agriculture, fisheries and aquaculture) are advocated, as well as a Conseil National du Littoral (National Coastal Zone Council) to encourage and disseminate good practices, evaluate policies and move away from an overly administrative view of costal zones.

Tunisia is the only other Mediterranean country with an institution dedicated to coastal zones (since 1995): the 'Agence de protection et d'aménagement du littoral', APAL (Protection and Planning Agency for the Coastal Zones). APAL is in charge of implementing the action plan formulated in 1992 by the Ministry of the Environment and Spatial Planning for the protection and enhancement of the natural and cultural heritage of the coastal zone and its integration into the rest of the country. The action plan requires: identification, protection and management of sensitive natural areas; creation of protected areas; delimitation and definition of a management mode for the maritime public domain; protection and management of beaches; monitoring the coastal zone, and combating coastal erosion. Regulations have been strengthened to control urbanization, develop the coastal zone, protect the marine environment from accidental pollution, and combat attacks on the environment. APAL manages over 700 temporary jobs along the coastal zone that focus on prevention and dialogue. It has set up a 'coastal zone observatory'. In 2000, 17 natural areas had the status of 'sensitive zone', and benefited from a management scheme that makes it possible to protect and enhance about 9500ha along 190km of coastline. Master plans for developing sensitive zones have been drawn up for the whole coastal region, relying on a detailed and dynamic assessment.

Other specific management mechanisms have been set up in other Mediterranean countries:

In **Algeria**, the Commissariat national du littoral, established by law in 2002, is in charge of inventorying coastal zones (human settlements, natural areas, islands regions) and implementing the national coastal zone policy. In **Malta**, a Coastal Resources Advisory Board (CRAB) was proposed in 2001 as part of the Coastal Planning Programme to ensure a sustainable use of the coastal zone in cooperation with local actors, and to create a research centre. In **Slovenia**, the Environmental Agency (Ministry of the Environment, Planning and Energy) established in 2001, ensures the management of coastal zones (ten districts) and catchment areas. It deals with nature conservation, protection of soil and air quality, environmental impact assessments and granting concessions for water use. In **Lebanon**, a draft coastal law, being formulated with assistance from UNDP and the World Bank, provides for the creation of a Coastal Management Council.

In highly decentralized countries, coastal regions are developing often innovative coastal policies. In **Spain**, the Valencia Autonomous Community launched a Strategy for Integrated Coastal Zone Management in 2002, aimed at rehabilitating degraded coastal areas, improving infrastructures and reinforcing conservation and protection measures. In addition, a Permanent Coastal Observatory is planned. In **Italy**, the Tuscany region is working on an Integrated Coastal Zone Management Plan and an investment programme for emergency operations to preserve and return equilibrium along the coast.

Source: Blue Plan from diverse national sources

A recent comparative analysis of national laws[44] makes it possible to present an initial overview.

One of the main problems remains the inadequacy of *institutional coordination* in this area where various rules and administrations in charge of maritime and land-based issues confront each other. According to diagnosis by legal experts there is an institutional disorder in the breakdown of responsibilities, a lack of legal coastal unity and insufficient delimitation and coordination. Specialized consultative committees on coastal zones are still rare (national committees in Egypt, Turkey, Greece, Slovenia, and more informally in France). Coordination is organized mainly around sectoral fields (water, waste, transport or tourism).

In Bosnia-Herzegovina, Croatia, Slovenia, Malta, Tunisia and Israel, coastal areas are in general covered by *land-use plans* along with *impact assessments*. These plans seldom integrate land and sea, and even less so all related activities. Egypt and Spain (and partly Croatia, Lebanon and Turkey) are trying to articulate an *overall scheme* or master plan.

Despite the lack of specific laws, half of the Mediterranean states have at least made provisions to *regulate construction in coastal zones* (Box 6.14).

The principle of *free access to shores* and beaches is accepted everywhere, but has no legal basis yet in Malta, Monaco, Libya and Israel. In Lebanon access is often made impossible by a continuous line of private properties, which in fact leads to the privatization of coastlines. Private beaches also prevent access in Egypt, Lebanon and Malta.

Box 6.14 Regulation to limit construction and roads in coastal zones

Five countries (France, Italy, Lebanon, Tunisia and Turkey) have laws specifically dealing with coastal zone planning and urbanization. Turkey has a 1990 law delimiting the coastal zone, land use and construction on a 100m coastal fringe. In Spain, a 'zone-of-influence' exists where special urban restrictions can be enforced. In France, the width of the coastal fringe is not defined by law, but legal rulings have sometimes allowed it to reach up to 2km from the shore. The width of the zone with a building ban varies considerably between countries, from 6m from the shore in Morocco to 200m in Egypt, 30m in Greece, 50m in Turkey, and a preference for 100m in Bosnia-Herzegovina, France, Tunisia, Libya and Israel. Absolute construction bans exist only in Croatia, Greece, Malta and Slovenia. Easement is applied to all construction except roads in Israel, tourism in Libya and camping sites in Spain and Italy.

Construction of new coastal roads is banned only in Algeria, France, Slovenia and Spain although it is the main cause of the artificial land cover of coasts.

All countries have some form of *permit system* or preliminary declaration for setting up industrial or commercial activities in coastal zones, and impact assessments are widespread (except in Lebanon, Monaco and Morocco). The reach of these instruments can, however, be reduced by the existence of thresholds or the non-implementation of laws.

In general, information about coastal zones remains incomplete. Monitoring the quality of the coastal environment is still centralized, which makes permanent monitoring an illusion. De-concentration efforts (for example in Tunisia with the coastal observatory attached to APAL) or decentralization appear essential to achieve better effectiveness. Existing or planned permanent observatories are rare (Algeria, the EU, Slovenia and Tunisia). The European LACOAST project ensured monitoring of coastal land-use changes between 1975 and 1990, but remains insufficient in detail and coverage (Greece, the islands, etc.) and has no equivalent in the non-EU countries. The coastal dimension is seldom or never taken into account by statistical agencies. In national environmental reports, only six countries (Algeria, Croatia, France, Malta, Morocco and Tunisia) deal specifically with coastal areas, while other countries mention coastal areas only through related themes, including tourism (Greece and Italy), pollution (Egypt), planning (Israel and Greece) or the marine environment (Italy and Turkey).

The fields least covered by law (or its application) are coastal urban planning (importance of *illegal constructions* with frequent laws for regularization[45] in many countries), damaging extraction of sand, coastal industrial activities, waste and sanitation, marinas, monitoring and access to beaches. Obstacles to the law being implemented are the lack of surveillance staff, a sanctions regime that is either non-existent or not enforced for local political reasons, and insufficient financial resources, information and public awareness.

In general, current legal tools seldom contribute to integrated coastal area management. They provide hardly any ways to reduce overlaps or lack of political and administrative responsibilities on the coasts, nor has the issue of using part of the tax and property revenues to finance the protection and sustainable management of coastal zones been considered in law making.

Mobilizing civil society

Without the commitment of often visionary local, national and international personalities, land-owners and associations concerned about the future of coastal areas, many precious coastal sites would have been irreversibly degraded by private or public investment, a number of governance reforms would not have come about, and pollution and risks would have been much more serious. Many protected cultural and natural sites and areas owe their existence to such commitments. The appeals by Commander Cousteau and Mrs Mann Borghese did not go unnoticed when MAP was created. Box 6.15 gives some examples of increasing initiatives.

Box 6.15 Examples of civil society initiatives for the Mediterranean

Mediterranean civil society is increasingly motivated by coastal protection and management. Many local conservationist associations have contributed to protecting some coastal sites from generalized uniformity. Others, such as ENDA, Greenpeace, WWF, Friends of the Earth, MIO-ECSDE or MedForum have acquired international support, and communicate increasingly with local communities and global authorities (Johannesburg Summit). Partnerships are beginning to be formed with local authorities (regions, municipalities) and the business community to achieve sustainable coastal area management.

The **Medcoast** network, which includes 15 institutes from various Mediterranean countries, works to improve understanding and concerted development of Mediterranean research. Since its founding in 1993, its secretariat (Middle East Technical University of Ankara) has organized eight major specialist conferences and ten training programmes (on integrated management of coastal areas and beaches).

Motivated and committed individuals with **local projects** are a decisive factor in mobilizing actors. The **Tyr Coast natural reserve** (MedWetCoast project in Lebanon), the last sandy beach in Lebanon and a Ramsar site, has benefited since 2002 from remarkable initiatives, including assessment studies of the site by NGOs and scientists, protecting sensitive areas,

careful development of eco-tourism (organized visits to marine turtle sites, with an increased number of egg-laying sites in 2003), the reduction of tourism pressures on beaches (shops have been pushed back 50m from the shoreline and their numbers reduced), the promotion of organic agriculture with the implementation of new packaging and marketing procedures, grazing control, a ban on hunting, micro-credits and training for developing guest rooms, plans for sustainable fisheries and studies for rehabilitating archaeological heritage. The recruitment in early 2003 of a site manager, the formation of a management committee, many meetings with farmers, awareness-raising of children and citizens, many organized visits and the commitment of local professionals have all contributed to this success.

Helmepa (the Hellenic Marine Environment Protection Association) is an example of a **private business** initiative. Founded in 1982 by Greek ship owners and sailors, it aims to increase environmental awareness in the industrial maritime sector and apply pressure for strengthened protective legislation. Helmepa's 2002 budget was 862,000 euros, of which 80 per cent went into environmental training of professionals and 20 per cent was used for educating young people. Other comparable initiatives have since started in Turkey and Cyprus. **Cymepa**, founded in 1992 in Cyprus with the same objectives in mind, brings together not only professionals of the maritime sector but also many companies with land-based activities (in particular hotel keepers). Cymepa stresses the importance of ethics as a basic value in the move towards more sustainable development. Turkey's **Turmepa** was founded in 1995, has 6600 members, and aims to prevent maritime and coastal pollution by raising awareness (schoolchildren and professionals) through waste-recovery operations and telephone reception intended to register all warnings of pollution.

Towards 'integrated coastal area management'

Integrated coastal area management (ICAM)[46] is a dynamic *process* that brings together various public and private actors in a coastal area to optimize the long-term choices by highlighting the need for a careful use of coastal resources.

ICAM activities are underway in many countries and are encouraged through regional cooperation. MAP has contributed to the implementation of coastal area management programmes (CAMP) around the Mediterranean, through the activities of its Priority Actions Programme (PAP) Centre. About ten CAMPs have been undertaken since 1989 with support from various MAP centres (Box 6.16).

In addition, a dozen projects (out of 21) of the EU Integrated Coastal Zone Management (ICZM) demonstration programme launched in 1996 were located in member countries bordering the Mediterranean.

Several lessons can be drawn from the various experiments. First, implementation of the ICAM approach makes it possible to *bring partners closer together*, contribute to awareness, increase the common vision of priority objectives, and improve decision-making. At the beginning of the process, a prospective study using sustainable development indicators,[47] facilitates this convergence and helps to clarify the challenges to be met depending on the dynamics observed and the economic, social and environmental issues at stake. Analysing the results of CAMPs (Box 6.16) shows improvements in several fields, including *strengthening of institutional capacities* (training specialists and decision-makers in new instruments and techniques), implementation of national information systems, and a better integration of environmental issues into coastal area planning.

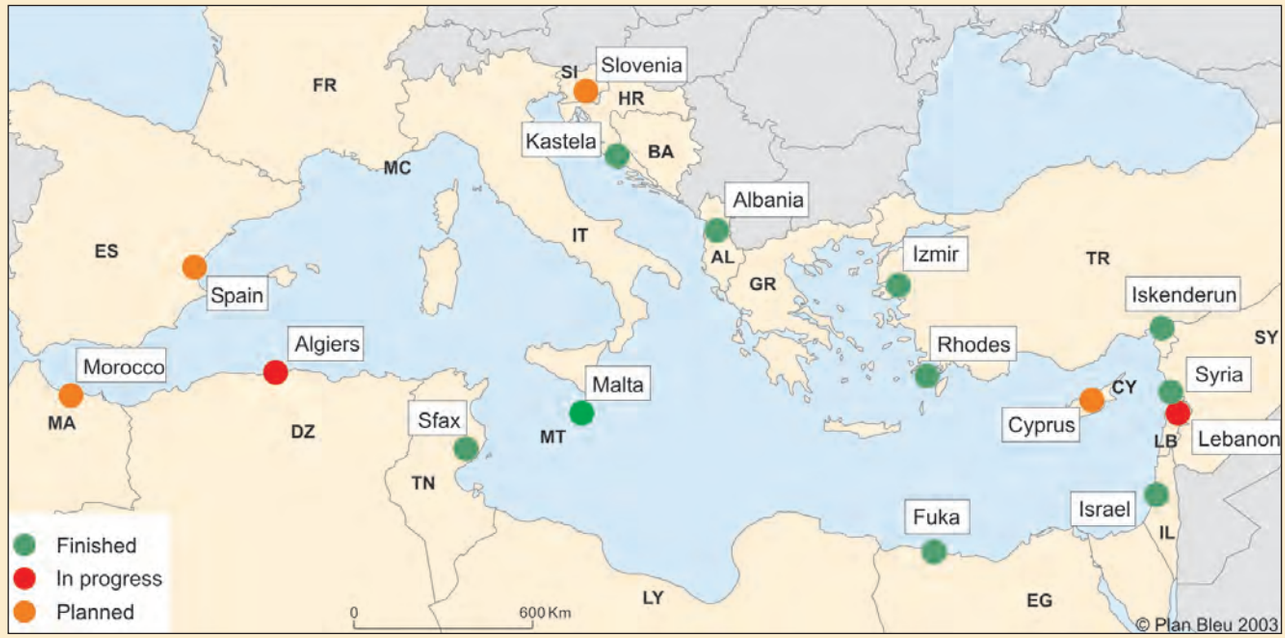
Experience shows, however, that real results remain limited to a few, well-defined fields such as the fight against marine pollution, and landscape improvement. Wanting to tackle everything through an ICAM process seems to be a pipe dream. Although 'integrated' in the assessment stage and involving different actors, the process would gain if priority objectives were formulated, for concrete progress along a few limited and well-defined directions that could evolve over time in line with local realities.

Several 'ingredients' are required to give the approach the best possible chance of success. First of all, *political will* makes it possible to legitimize the collective process. This is a basic necessity and may be expressed through inter-ministerial decrees, and may contribute to mobilizing national and local private and public actors. *Local initiatives* are a vital complement to political will. The *time frame* is the third component of success. It sometimes takes five years, even more, to finalize a territorial contract for integrated management. And finally, mobilizing *financial resources* appropriate to the issues at stake is essential. The Bay of Toulon (France) contract, for example, which led to a five-year commitment by many partners in 2002, required ten years of effort to find internal and external financial support to fund the post of the lead person and the total mobilization of nearly 103 million euros for the 2002–2007 period.

The real effect of ICAM approaches is therefore relative. Many serious obstacles explain the implementation problems, in particular:

- the swiftness of changes as well as the power of short-term interests and speculative behaviour that are in contradiction with the long-term objectives of integrated management;
- the multitude of actors and strategies that have objectives that are generally contradictory and can engender conflicts and political barriers;

Box 6.16 MAP Coastal Area Management Programmes: Location and some results



- **Kastela Bay (Croatia):** technical solutions that served as a starting point for the 1999 construction of a wastewater processing system, funded by the World Bank and METAP.
- **Izmir Bay (Turkey):** training of local and national specialists in ICAM, setting up a geographic information system laboratory and a socio-economic and environmental database.
- **The island of Rhodes (Greece):** a database and information system for local development, identification of priority activities (water and waste management), reorganization of administrative facilities and technical services, and improvement of local decision-making.
- **Coastal regions in Syria:** strengthening of institutional capacities and training a multi-technical team of specialists in all sectors.
- **Fuka-Matruh (Egypt)**: raising awareness of civil servants and decision-makers about environmental problems in the region, which has led to the adoption of a decree banning all construction in the north-western region until an integrated plan has been approved by all ministries concerned; departure point for a new project ('economic and social planning for spatial development').
- **Albania**: strengthening of institutional capacities and training of local and national experts in ICAM.
- **Sfax (Tunisia)**: a database, a geographic information system and a series of multidisciplinary studies on the state of the city's environment and its possible future, and training of local managers and specialists.
- **Israel**: input for changing policies relating to the management of sand and retreating cliffs, reducing pollution in the Nahal Kishon hot spot, a new base for information management, the formulation of land-use plans using remote sensing, and the participation of NGOs and local experts and actors.
- **Malta**: the introduction and dissemination of participatory methods and sustainability indicators; strengthening the cohesion between teams and actors; proposals to set up a 'coastal resources consultation committee', and adopting a 'Coastal area statement for the Maltese islands'.

Outside the CAMP framework, the Blue Plan was requested by the Turkish Environment Ministry and Ankara University to contribute to a forward-looking study on the environmental management of **Iskenderun** bay. This study made it possible to draw the attention of local authorities to the serious pressures threatening coastal areas with high ecological value, since then listed as nature reserves.

Source: MAP Priority Actions Programme, Split (PAP/RAC www.pap-thecoastcentre.org)

- the diversity and complexity of the questions to be considered;
- the fragmentation and overlap of political and administrative responsibilities in the coastal areas as well as the lack of a common culture, communication and coordination between marine specialists and maritime authorities, and spatial planners and land-based authorities;
- the complexity of legal aspects and a certain bureaucratic inertia.

Given these obstacles and the resulting imbalance to the benefit of speculative or sectoral interests, integrated coastal area management appears to be an illusion if not accompanied by *strengthened* legal, regulatory, economic, property and technical *instruments for protecting* and sustainably managing coastal areas not yet occupied artificially.

An *enabling environment* is required to allow the development of ICAM processes. Mobilizing actors and integrating policies at local and regional levels are in fact only conceivable if the higher echelons of government and administration create an integrated legal and institutional framework and promote action at the most appropriate local level.

With *decentralization* and the recent development of *inter-municipal cooperation* in several northern Mediterranean countries, one can see a certain appropriation of the question of sustainable management of coastal areas by local decision-makers, and an increase in processes linking elected officials, scientists, state departments and civil society. Indeed, according to the Spanish experience,[48] it appears that in highly decentralized countries, the *regional scale* (NUTS 2 equivalent) could become an adequate level for promoting integrated management, provided there are mechanisms in place to ensure the factoring-in of long-term issues.

Regional development policies to reduce predictable pressures

The scale of pressures observed on coastal zones is often driven by the marginalization of mountain-region economies in the north as well as in the south. The vulnerability of rural societies and inland cities still cause a movement towards the coast, and free agricultural trade could strongly increase this trend in the developing countries (see Chapter 5).

To relieve the projected additional pressures on coastal areas, some countries are implementing voluntary policies to revitalize inland areas. For example, an approach to create infrastructures and new towns has recently been developed in Algeria (Box 6.17).

However, these voluntary approaches, structured around major projects, do not always have the desired results (for example as seen in the partially disappointing results of the new cities policy in Egypt). Less spectacular and more de-concentrated approaches for planning regional and local development need to be promoted in societies that are turning to a market economy and adopting principles of democratic governance where the population can choose where to settle down. To strengthen or highlight the attractiveness of inland rural areas on the market, policies to *enhance inland cities* and *revitalize rural regions* have the potential to be explored. The EU also supported such efforts in southern Europe, relying on a project approach, local governments and active professional groups. An alternative development would be characterized in particular by the implementation of much more ambitious sustainable rural development strategies and policies (major programmes with small projects), an approach currently being tried in some countries, although not one without problems (see Chapter 5).

Box 6.17 Countering the intolerable increase in urbanization along the coast of Algeria

What characterizes the Algerian coastal zone is the high population density (1300 people per km^2 in the Algiers metropolitan area), which is only going to intensify with population growth. By 2020, 16.8 million of the total of 42 million Algerians are expected to be living on the coast. This will lead to an overall urbanization of the coastal plains, high-quality agricultural land will disappear (an additional 50,000ha of land will be lost in the *Mitidja*) and environmental degradation will increase. At the same time, inland areas of Algeria (the High Plateaux and the south) are in danger of remaining marginal and continuing to suffer from poverty and desertification.

To counter these trends – which are considered unacceptable – the report *Aménager l'Algérie de 2020* (Managing Algeria in 2020) offers a strategy that led to the adoption of two laws in 2001–2002 relating to planning and development of the country's territory, and to the conditions for creating new cities. A national spatial scheme has been drawn up, aiming to reverse migration by voluntarily redeploying 3 million people from the coastal fringes towards the interior. Apart from measures to protect the coastal zone itself, the following measures are planned to protect high quality farmland in the coastal zones: strengthening inland infrastructures (roads, public services), voluntary relocation with financial support from the 'national fund for the development of Algeria's territory', and the creation of new cities with a strong economic performance at the foothills of the Algerian Sahel. The new city of Sidi Abdallah (1998) is oriented towards cutting-edge technologies (cyber-park, medical research). Other possibilities are being considered such as the El Affroun project (agricultural sector) or the Bouînan project (sports and leisure activities).

The objectives are threefold: (1) to rebalance the population distribution in the country and enhance the inland territories, (2) to protect and enhance natural resources by restoring economic vitality and the attractiveness of the inland regions, and (3) to manage urbanization in the coastal zone.

Without prejudging the results of such an ambitious strategy, its orientation in itself signifies a will to reverse a particularly worrying process.

Source: Association nationale de développement de l'économie de marché (ADEM). Algérie : perspectives 2010. Alger, 2003

In these regional and local development strategies, reorienting policies and the tourism sector to benefit the hinterland may represent a prime direction for revival.

Directing tourism towards sustainable development

The Mediterranean is the world's leading tourism region. Given the multiple impacts of tourism at economic, socio-cultural, environmental and territorial levels, the development in this sector will be decisive for the future of coastal zones and the whole eco-region in general. The relationship between tourism and sustainable development therefore deserves much attention.

A strategic sector dominated by competition

Tourism has without exception become an *essential economic sector* for all Mediterranean countries because of the size of tourist flows, the amount of money spent, the contribution of the sector to GDP, the number of jobs created (Part 1 and Box 6.18) and the expected growth of domestic and international markets.

Box 6.18 Socio-economic imperatives of tourism, some figures

The tourism sector is of particular socio-economic importance in the Mediterranean since it strongly contributes to the creation of jobs and added value.

In terms of direct and indirect *employment*, the sector represents 10 per cent of the total number of jobs in Greece and 30 per cent Malta. In Italy more than 2 million jobs were generated in 1999. In Tunisia tourism provided work for 355,500 people in 2000, nearly 10 per cent of the total workforce. In Croatia tourism generated 283,000 jobs in 2001, would have risen in 2003 to 294,000 (28 per cent of the total workforce) and is projected to reach 427,000 (40 per cent of the total workforce) by 2013. In Turkey, there were 1.4 million jobs in 2000, projected to reach about 2.12 million by 2010 (8 per cent of the workforce). Such growth represents the creation of 66,000 new jobs per year, about 6 per cent of the net entries per year into the working population for the decade 2000–2009. Tourism represents on average near 12 per cent of Mediterranean *exports* of goods and services (see Part 1 p17). *Expenditures* per international tourist increased from US$96 in 1970 to US$650 in 1995 and US$576 in 2000. Tourism is especially important on the islands, where it provides an alternative to the social and economic difficulties inherent to insularity and where it can lead to radical changes. In the Balearics, for example, per capita GDP reached 18,249 euros, or 3000 euros more than the national average (15,261 euros) whereas the region was among the poorest in Spain before the development of tourism.

Source: Blue Plan from Becheri, 2001; Chapoutot, 2002 in UNEP-MAP-*Plan Bleu* 2005; WTTC, (2002); WTTC, (2001) and World Tourism Organization (www.world-tourism.org)

To benefit from this dynamic, most Mediterranean countries, except up to now Algeria and Libya, have developed proactive growth policies, mainly centred around a *seaside model*. Operational management plans have been formulated for the coastal fringes to create completely new tourist resorts (for example in France-Languedoc Roussillon region, in Italy-Sardinia, Spain, Tunisia and Turkey) or are underway (Morocco). As part of public–private partnerships the states try to manage property, build infrastructures and define operational rules. As long ago as 1973 Tunisia created its *Agence foncière de développement touristique* (land development agency for tourism activities), and a similar process has started in Morocco, which aims to achieve an average annual growth of 15 per cent in tourist flows and 10 million international tourists by 2010 (compared with 4.2 million in 2001). Apart from these resorts, development occurs through individual or collective initiatives by local actors and outside investors. This less state-initiated dynamic does not imply a lack of support from public authorities. Virtually all Mediterranean countries announce considerable growth objectives every now and then and take steps to promote investment (Box 6.19).

In addition to direct measures for tourism as a whole, indirect investments are made that contribute to increased accessibility and attractiveness of specific territories. Investments in transport infrastructures or cultural facilities can be on a large scale, and the operational costs must still be added (for example, promoting destinations on external markets and the costs of ensuring security at destinations).

Box 6.19 Planned investments in the tourism sector in the Mediterranean

An analysis of planning documents shows the scale of planned investments in tourism over the coming years at the national level, with considerable repercussions for the Mediterranean coastal zones. Various formulae are being implemented to encourage private investment. The most matured destinations are beginning to commit to rehabilitation programmes to restore degraded areas and structures and spread tourist flows more evenly throughout the year.

In **Croatia** the objectives are to reinvest US$100 million of income from tourism per year, attract US$50 million in capital per year, and triple the number of low-season tourists. A reform of investment procedures (laws, grants, a one-stop office) has been undertaken with assistance from the World Bank.

In **Serbia-Montenegro**, tourism has been made one of the development priorities for the next 20 years. A 2001 *Master Plan for Tourism* identifies five major regions for tourism activities, mostly on the coast. It is planning a 50,000-bed capacity by 2010 and 100,000 beds by 2020.

In **Albania** the sector is still weak (395,000 overnight stays, 77 per cent of which are Albanians) and is developing in an

unregulated manner, mostly in the coastal zones. 'Priority zones for tourism' have been identified. An assistance and stimulation programme is intended to attract foreign investment in the tourism sector (exemption from customs duty, tax profit and low rents).

The hotel capacity in **Turkey** should reach 1 million beds of an international standard by 2010. The 8th Development Plan (2001–2005) is striving for a more even spread of activities throughout the year by creating new zones for tourism.

In 1997 **Lebanon** set up the Investment Development Authority of Lebanon (IDAL) to promote and facilitate foreign investment, notably in tourism.

The objective of the **Egyptian** authorities is to increase tourist flows by 10 per cent per year in the whole country (from 4 million visitors in 1997 to 27 million by 2017). The necessary bed capacity is estimated at about 315,000 additional rooms by 2012. And private investments are encouraged through laws that exonerate tourism projects from certain taxes.

Plans exist in **Libya** to build several international hotels with a budget of about US$61.3 million, with the overall cost of the planned projects coming to about US$77 million. The Tourism Development Bank was founded in 2003 and is 80 per cent owned by private interests to finance tourism development projects.

The objectives in **Algeria** are to reach 1.2 million foreign visitors by 2010. The whole country has been divided into 174 *Tourist Sites and Expansion Zones* of which 140 are located in the coastal zone (law No 03-03 of 17 February 2003 on TSEZ), and stimulation measures have been put in place to attract investment.

In **Morocco** the government and the private sector have signed a framework agreement intended to triple hotel capacity by creating 160,000 new beds by 2010. It also sets out to strengthen financing, infrastructures (renovation, upgrading) and train 72,000 professionals.

Greece hopes to attract US$321 million of foreign tourism investment over the next six years. A company was set up in 2000 to act as a liaison between the public and private sectors and to develop investment projects.

A *Plan Integral de Calidad del Turismo Español* (PICTE 2000–2006) is being implemented in **Spain** by the autonomous communities. These action plans bring the private sector and political authorities (national and regional) together around several qualitative programmes, including the sustainable rehabilitation of obsolete seaside facilities; enhancement and development of emerging destinations; certification of tourism establishments meeting quality criteria; and alternative tourism (cultural, urban, sporting and rural). The amount of investments realized under the umbrella of the PICTE programme comes to 17.1 million euros in the Valencia Community alone.

In Mediterranean **France**, after decisive action had been taken in 1965, a plan for sustainable development, representing an investment of 306 million euros, is planned for the 2003–2006 period to rehabilitate natural areas, land management and renovate tourism facilities on the coastal zone of the Languedoc-Roussillon region. To coordinate this plan, an interministerial mission for the development of the coastal zone was established in July of 2001 with an accompanying charter for many private and public partners.

In **Italy** investments are being made to upgrade existing facilities and for sustainable tourism. Several *Programma Operativo Regionale*, with an initial period of six years from 2000 to 2006, have objectives related to sustainable tourism, including upgrading saturated infrastructures, taking the environment into account when developing facilities, developing products for tourism that combine natural and cultural heritage, and a better spread of tourist flows, both in space and in time.

Source: Blue Plan from diverse national sources

Mediterranean tourism is also characterized by changes that are minimally or not controlled. Experience has shown that after the launch phase of a destination, the increase in supply and demand can 'explode', preventing any control of development. Such an 'explosion' can be caused by the short-sighted behaviour of individuals as well as by the speculative or commercial strategies of powerful actors.

I*nvestors* primarily covet the most beautiful coastal sites, and the outcome of their investment almost always leads to a loss in quality of such a territory. An increase in the number of holiday homes can contribute to revitalizing rural areas but also to fragmentation of the landscape, disappearance of agricultural activities, and a misappropriation of local land property. The tour operator business appears to especially favour competition between destinations and lowering prices. The influence of these professionals is considerable in some of the countries where tourists originate (for example Germany and the UK), in tourist destinations accessible by plane, especially some of the islands (Cyprus, Malta, the Balearics), and in countries where tourism is developing rapidly such as Tunisia, Turkey and Egypt. This influence is not quite as strong in Italy or Mediterranean France where destinations are more easily accessible to European customers coming by train or car, and where the proportion of individual tourism and the diversity of what is on offer are high.

Faced with strong economic powers, development strategies are still characterized by a spirit of *competition* rather than *cooperation*. Given this context, authorities can have a hard time resisting arguments of short-term private interests. In Kemer, Turkey, for example, investors won over the initial development plan of the region (the South Antalya Project) that took the natural and cultural wealth into account. By the end of the 1970s, the increase in tourist-bed capacity and tour-operator policies of low prices shifted this area towards a 'tourism-only' zone, reaching a 65,000-bed capacity,

which is far beyond the initially planned 25,000 beds.

This difficulty in managing tourism development is characteristic of many attractive destinations around the Mediterranean. And it makes the question of the relationship between tourism and sustainable development a real and current issue.

Better evaluate the benefits of tourism

Without underestimating the major economic and socio-cultural importance of tourism for countries and specific destinations, it is, however, necessary to put the benefits into context.

Public expenditure allocated by national governments and local authorities to develop tourism is indeed high (infrastructure and operational costs, such as tourist police and environmental management of the coastal zone). F*oreign currency balance sheets* would probably show that in several countries, particularly in the south and east, the proportion of international tourist spending going into national and local economies remains small. The average cost of stays in the large-scale tourist destinations of these countries, which are in competition with one another, is not very high; much of the proceeds go to airlines, tour operators, hotel chains and producers operating outside the countries or destinations visited.

Insufficient control of tourism development generates negative impacts (environmental and socio-cultural) and risks that are considered important by the local people, confirming the *ambiguous effects* of the sector on coastal societies. For example, the main advantages perceived by the people living in Rimini (Italy) and Estartit (Spain)[49] are job creation, increased income, improvement in the standards of living, and the development of services and infrastructures. But almost 60 per cent of those interviewed complained of badly controlled urban growth, a rise in disorder and degradation of landscapes. Nearly half of those interviewed also accused tourism of making economic dependence likely, and approximately a quarter blamed the sector for generating social tension and posing a threat to culture and tradition.

As mentioned several times, tourism has an important responsibility when it comes to *degrading the coastal environment* (coastal urbanization, waste, pollution, noise, ecosystem degradation, and wastage of landscapes). The islands are especially concerned (Box 6.20). In some cases, however, the development of tourism has made it possible to avoid the installation of more polluting heavy industry or inspire the creation of remarkable new heritage (such as villas, gardens).

The risk of *economic unsustainability* should be stressed. The risks of economic dependence and exposure are high in many Mediterranean coastal zones where traditional activities have not been preserved, tourist supply has not diversified and activities other than tourism have not been developed. In several countries, nominal spending by tourists has decreased considerably, which could lead to a questioning of the quantitative-type approaches (see Box 6.24). Some destinations have evolved towards a real 'tourism-only' attraction, Side in Turkey for example (50km East of Antalya), where, in 2002, 85 per cent of the local population lived on tourism, and Belek (15km East of Antalya), where 90 per cent of the income of the population was derived from tourism.[50] However, a certain obsoleteness must be feared of the seaside model and of ageing coastal resorts that are not well integrated into the local societies and have been dragged down by the business logic of low-pricing. Problems of decline have been observed in buildings constructed in the 1960s in the Languedoc-Roussillon region of France. To meet these problems, rehabilitation programmes are being initiated with public funding. The risks of derelict tourism sites between 2000 and 2025 are not insignificant on several Mediterranean coasts.

Box 6.20 Tourism puts considerable pressure on island environments

Tourism has become an essential factor in the development of islands, compensating for a decline in the primary sector. It is nevertheless a risk for islands, their identity as well as their natural and cultural resources.

The summer tourism-related *seasonal over population* (even in the least-visited islands the population regularly doubles in summer) affects all fields, social, environmental, cultural and economic: ring-shaped occupation of the territory, oversizing of facilities, degradation and pollution, noise, social tension, a low level of professional training, seasonal saturation of means of transport disturbing the mobility of island dwellers, and risks of land disenfranchisement.

The *tensions generated over limited water resources* are especially tight. To meet summer demands that continue to increase, there is more and more recourse to importing costly water by boat (in Greece, Italy and the Balearics) or desalinization (70 desalinization plants have been built on islands to produce drinking water: Cyprus, the Italian islands, Malta and the Balearics). These trends have growing impacts on supply costs and the environment, and open the way to urban growth, which can make things even worse.

Tourism also generates considerable development of seasonal *transport* and its side effects. Today islands host 46 of the 112 Mediterranean coastal airports. Traffic growth can be phenomenal (Palma de Majorca, for example, saw 19.4 million travellers arrive in 2000 compared with 11.3 million in 1990 and 7.4 million in 1980). Without strong regulatory measures, the near doubling of tourist flows projected between 2000 and 2025 will concern the islands and further increase the pressures on their territory. The development of new fast maritime means of transport (high-speed boats) is especially worrying because of their possible impacts.

E*nvironmental* and *geopolitical risks* must be added to the economic ones. They are high for coastal economies that depend too much on tourism, while they are located in a region of the world with a high concentration of maritime traffic in hydrocarbons, a large gap between rich and poor, and frequent conflicts. An oil spill on a par with that of the P*restige* affecting Mediterranean coastal destinations would have disastrous consequences. Recent history has shown to what degree tourism and tourist destinations are often the first victims of conflicts if not even the primary targets of terrorists. At the first warning, tour operators sell other destinations and turn the flows away from the Mediterranean.

What form of governance for sustainable tourism?

To redirect tourism developments towards making a contribution to sustainable development, work by the MCSD/Blue Plan has stressed three complementary objectives: (1) managing territorial and environmental impacts of tourism; (2) promoting tourism as a factor of sustainable social, cultural and economic development; and (3) strengthening Mediterranean cooperation.[51] Although implementation of the recommendations adopted in 1999 by MAP still has to be assessed, it appears that the responses and progress made in some environmental sectors (including resource consumption and pollution) remain insufficient in terms of managing territorial impacts, redirecting strategies and regional cooperation.

Instruments for reducing pollution and resource consumption

Progress has been made on some *environmental issues* such as the consumption of water resources, the fight against pollution (except in the case of transport, which is expected to become an ever-greater problem) and waste management, where the tourism sector may be a driver for improvement. Some countries, such as Tunisia, have implemented differentiated pricing systems for water and sanitation, which contribute to improved performances (Box 6.21).

Increasing the number of labels and certifications contributes to better management. The Blue Flag ecological label awarded to beaches and marinas under good environmental management was created in 1987 by the Foundation for Environmental Education in Europe (FEEE). In 2003 it was in place in 24 countries, 8 of which were Mediterranean, with a total of 1450 beaches and 264 marinas. Malta is just beginning to use the label, while Morocco and Serbia-Montenegro are in the process of joining (Table 6.3).

Box 6.21 The contribution of tourism to the water sector in Tunisia

Tourism can contribute to good water-demand management, as this Tunisian example shows. In this system, pricing is the preferred instrument. The price of water consumed by tourism establishments is invoiced by Sonede, the distributor, at 0.650 dinars per m^3, which is higher than the cost price (0.410 dinars per m^3). Drinking water consumption per tourist bed and per day dropped between 1997 (526 litres per bed per day) and 1999 (473 litres per bed per day), while at the same time overnight stays increased significantly in the four- and five-star hotels. In 1999, drinking water consumption by the tourism sector accounted for only 6 per cent of the total water consumption, whereas hotel keepers paid for about 11 per cent of Sonede income. Similarly in the sanitation sector, tourist users, who accounted for 0.24 per cent of network subscribers and 9.8 per cent of the total treated wastewater volume in 1994, paid 23 per cent of the total bill. Fifty-three treatment plants have been built in the whole country, 35 of which are on the coast, and the eight existing golf courses are watered with treated water.

Source: Chapoutot, J. (2002) in UNEP-MAP-*Plan Bleu* 2005

Tourism-specific environmental regulations remain, however, insufficient, especially for yachting. The Contracting Parties to the Barcelona Convention have asked for a draft regional legal instrument for this high-impact activity. Without strong commitment and forward-looking regulations, uncontrolled development of new activities that disturb coastal zones, such as motorized nautical and land-based sports, are to be feared.

Various charters and voluntary initiatives undertaken by professionals, NGOs and international institutions bear witness to individual or sectoral commitments to 'sustainable development of tourism' or 'sustainable tourism', depending on the ambiguous definition of the subject. Examples are the Tour Operators' Initiative (with support from UNEP, UNESCO and the World Tourism Organization), the International Hotel Environment Initiative (IHEI), which brings together major tour-operators and hotel chains for a better understanding of the environment, and the Green Globe programme, which calls for environmental labelling of companies and destinations on a global scale. Furthermore, the EU has recently implemented a European-wide eco-label for tourism called 'the Flower', meant for tourist lodging facilities that respect the environment. This certification programme concerns, among others, water, energy, training, waste and awareness-raising among visitors. A hotel in Kallithea (Rhodes) is the first candidate for this European eco-label. There are also international certification systems for tourism. In Turkey, the tour operator VASCO in Antalya is the first company of the sector to receive the ISO 14001 environmental certification.

Table 6.3 The Blue Flag as applied in Mediterranean-rim countries

		1990–1998*	2000	2003
Mediterranean regions of Spain	Beaches	170	273	318
	Marinas	42	65	80
Mediterranean regions of France	Beaches	109	121	118
	Marinas	20	39	41
Italy	Beaches	27	145	159
	Marinas	29	41	47
Greece	Beaches	85	319	363
	Marinas	6	8	5
Cyprus	Beaches	11	29	39
Slovenia	Beaches		5	7
	Marinas	1	3	3
Croatia	Beaches	1	10	58
	Marinas		12	16
Mediterranean regions of Turkey	Beaches	12	61	88
	Marinas	4	7	6

Source: www.blueflag.org

* Last year available between 1990 and 1998

Insufficient instruments to reduce impacts on coastal zones

However, progress in limiting the negative impacts of developments, urbanization and tourism infrastructures, is still very insufficient. On this topic the Blue Plan and MCSD have stressed five types of responses to be developed in the Mediterranean: (1) timely impact assessments of tourism-related programmes and projects; (2) definition of and respect for accommodation capacities at destinations; (3) strengthening of legislative, regulatory and landownership management instruments to control urbanization from tourism and protect natural sites; (4) rehabilitation of the environment in mature destinations; and (5) the development of instruments to ensure that tourism contributes financially to the protection and management of natural and cultural sites (the 'the user pays' principle).

Assessments of *accommodation capacities* in destinations are being experimented with in order to limit the supply to a maximum level deemed acceptable. In Malta, the Maltese Tourism Authority intends to plan tourism development while using the conclusions of the accommodation capacity assessment carried out in 2001. It remains to be seen if such an instrument will move beyond the experimental stage, and if the intended limits will be effectively applied over time. It would be desirable to follow the example of Portofino (Italy), which, better than Saint Tropez (France), has maintained its character by banning all new construction and limiting the number of visitors (mandatory parking with limited capacity).

Efforts to *locate buildings away from the coastline* remain too rare. The tourist area of Belek in Turkey (near Antalya) is an example. Here hotels are located at significant distances from the sea – a vital measure for a coast that is a marine turtle nesting site – but have been built on dunes. An integrated coastal area management programme started by Albania in 2002 focuses on the fight against ad hoc tourism development and illegal construction on the coast. A study of the potential accommodation capacity recommends that tourism development projects in some sensitive areas (for example Lazelit Bay) be located at least 300 metres from the coastline, but these recommendations have so far had little effect (many projects are located at 100–150 metres from the coast).

Economic tools, based in particular on the 'the user pays' principle at the level of coastal territories, which is difficult to implement, are also insufficiently developed. They are, however, justified by the fact that foreign tourists, mainly northern Europeans, who enjoy the Mediterranean environment, could contribute to its maintenance and restoration. In addition to conventional instruments (taxes, paid parking garages, fees for accessing sites) new instruments have to be designed to ensure that financial contributions from tourism are in line with the requirements. Examples to be advocated, improved and applied more generally are the tourist eco-tax in the Balearics (even though abandoned these days) and the tax levied on maritime transport going to islands in France that have a protected status (Box 6.22). A reorientation towards an alternative future would depend heavily on such tools.

Box 6.22 Examples of a tourist eco-tax in Spain and France

The contribution of tourism to sustainable development can be facilitated through eco-taxes.

In 2001 the **Balearic Islands** instituted such a tax on stays in tourist lodgings. The revenue supplies a fund which was intended for improving the tourism sector and conserving the environment. This fund could be used to finance projects for:

- rehabilitating tourist areas (quality, water and energy savings, use of renewable energy);
- buying, protecting and managing natural areas and resources in a sustainable manner;
- protecting and restoring the historical and cultural heritage in tourist areas;
- revitalising agriculture by promoting the re-use of treated wastewater;
- managing natural areas to conserve their biodiversity.

The tax (a maximum of 2 euros per night-stay) was charged for every night spent in an accommodation, adjusted by category (hotel, apartment hotel, tourist apartment, holiday village, country hotel or camping ground), and was collected from customers of these various establishments. Children under 12 and stays subsidized by social programmes were excluded. The law entered into force in 2002, and in its first year of implementation income amounted to 17 million euros, 52 per cent of which went to protecting natural areas and parks, 25 per cent to restoring historical and cultural heritage, 20 per cent to rehabilitating tourist sites and 3 per cent to promoting agriculture (cultivation and raising livestock).

However, the law ran up against opposition from professional accommodation-providers who protested that private holiday homes and non-registered accommodations (estimated at 24 per cent of the total offer) did not pay the tax. The new government that came to power after the 2003 election removed the tax, claiming that the number of foreign tourists had declined (a drop of 8 per cent in 2002), for which the tax was certainly not the main explanation.

The 1995 *Barnier law* in **France** imposes an eco-tax on maritime transport companies, based on the number of passengers embarking to visit a classified natural site, a national park, a nature reserve or a site belonging to the *Conservatoire du Littoral* (Coastal Area Conservation Centre). The tax is added to the ticket price charged to passengers and is intended to finance the management of the visited natural areas. Enforced since 1995, it provides 120,000 euros per year to the national park on the island of Port-Cros.

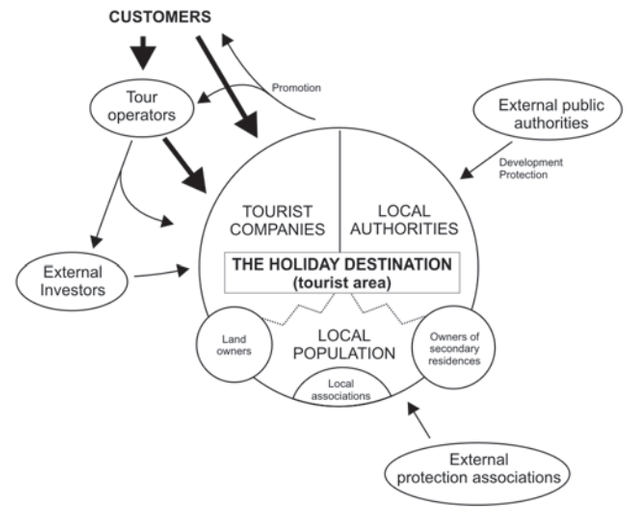
Source: Segui Llinas, 2003; Parc National de Port-Cros, 2004 (www.portcrosparcnational.fr)

Succeeding in changing current trends

Changing current trends would require a reorientation of most of the *national and local strategies for tourism development*. Choices in this sector are often made without prior consultation or sufficient investigation of the possible options and their respective costs and advantages. However, experience shows the importance of looking ahead and successful reorientation, and, conversely, of the high costs of not looking ahead and making corrections.

Regulation of the tourism system should take place at the level of local destinations where the tight interdependence between tourism and the environment calls for the implementation of integration strategies. Such integration implies the emergence of common interests in *projects for specific territories* in order to overcome short-term interests and get the various actors involved in defining a common discipline that they will respect over time (Figure 6.22). Attempts are being made along these lines, notably in Spain and Italy as part of Local Agendas 21 (Box 6.23). Another example is given by the charts of French regional natural parks in which medium-term (ten years) and high quality territory-specific projects have to be formulated.

Figure 6.22 Tourism system in a specific territory: actors and operational levels



Source: Ph. Moisset, Blue Plan, 1998

Making these participatory approaches work requires a commitment and an ability of *local authorities* to bring actors together and develop collective procedures. Monitoring through indicators makes it possible to assess progress over time and decide on re-orientations when necessary. The commitment of major actors (states, regions, international cooperation and professionals in the tourism sector) to support this type of procedure through time remains rare. Such a commitment by tour operators and subsequent changes

of business plans would require another level of investment in sustainable development than is currently the case. In current charts the long-term effectiveness at destinations remains uncertain.

Box 6.23 The Calvia Local Agenda 21 (Balearics, Spain)

The Calvia district, the leading tourist destination of the Balearic Islands, adopted its own Local Agenda 21 in 1998. The district has a population of 50,000, receives 1.6 million tourists a year and offers 150,000 hotel beds, five marinas and four golf courses on less than 143km^2. It started developing tourism in the 1970s with a short-term view that led to overall degradation in the 1990s, related to the destruction of typical island landscapes and the environment, congestion in tourist areas, which threatened tourism attractiveness and local development.

Starting in 1997, an action plan is being implemented along ten strategic lines. Forty initiatives are focusing efforts on the preservation of the natural heritage, modernizing the tourism sector, rehabilitating the architectural heritage and enriching human resources. A revision of the Overall Urban Development Plan made it possible to safeguard more than 1500 hectares from urbanization (89 per cent of the land that was destined for urban use in the old plan). More than 80 per cent of the district area is now protected. Tearing down obsolete hotels made it possible to rehabilitate key areas, and permission to construct new accommodation is only given on the condition that an at least equal number of run-down rooms are demolished in return. The plan enabled the demolition of 12 hotels in five years and the renovation of several others. A mediator is appointed to facilitate the resolution of conflicts between tourists, residents and local governments. A Local Agenda-21 Observatory is in charge of monitoring the sustainability of developments and the quality of life in Calvia.

Source: Ajuntament de Calvia. Calvià Local Agenda 21. Observatory on sustainability and quality of life: 1997–2000, www.calvia.com

Shifting to an alternative scenario would also require a reorientation of tourism strategies on a wider regional and national level with the particular objectives of an improved *contribution by the sector* to the overall socio-economic development of countries and to less coastal overdevelopment.

Mechanisms need to be developed for tourism's financial contribution to improving the *living conditions of impoverished peoples*. The Tourism For Development (TFD) initiative deserves to be highlighted. It was started by Egyptian professionals after the terrorist attacks at Luxor in 1998, based on the idea that economic development is the best weapon against terrorism. Voluntary TFD-member hotel keepers commit to paying one dollar per tourist night-stay to a fund used to develop Egyptian villages with a view to equitably re-distributing money derived from tourism. Today the TFD is certifying travel agencies and tour operators (13 in all) who commit to paying 1–2 per cent of the price paid by tourists to financing micro-development projects in the destination country. In the Mediterranean region, only Morocco and Turkey (other than Egypt) have similar initiatives.

Another path relates to encouraging the *diversification of tourism* by promoting different accommodation formulae and better integrated lodgings (existing rural and urban environments can be upgraded with contributions from tourism or in continuity and harmony with tourism). Such diversification would particularly benefit inland areas that often possess unexploited potential. Creating *synergies* with other economic activities (agriculture, fisheries, local services, crafts, industry) is also very important for a balanced development. Such a *re-orientation* seems all the more necessary given the major challenges of urban and rural development (see Chapters 4 and 5) and the role that tourism can play as a driver of economic, cultural and social recovery. It would also make it possible to relieve the pressures on the coastal zones, ensure development with a smaller ecological footprint and enable a better encounter between visitors, residents and the heritage. Strategies and other policy instruments should be put in place to help the emergence of territory-specific projects and encourage project sponsors (training, guiding local development, subsidies, heritage enhancement and tourist information in rural revitalization areas). Many examples of integrated rural and urban development policies show their possibilities and advantages. A detailed assessment of measures implemented in the Mediterranean region would show vast differences between countries but also the insufficiencies in most of them. Some reorientations are underway or suggested, for example in Greece (Box 6.24).

Box 6.24 Towards a reorientation of Greek policies for tourism development

The Greek tourism sector has been growing over the past 20 years, fed by *public-sector investments*. Between 1982 and 1995, 2180 projects were supported by the Hellenic Tourist Office with subsidies covering on average 40 per cent of the total investment. Accommodation capacity is now more than 130,000 beds, benefiting regions that already have a developed tourism infrastructure (such as the South Aegean and Crete).

But this development model is also experiencing problems. The hotel occupancy rate is relatively low (69 per cent from May to September and 34 per cent the rest of the year), and, with growing competition from neighbouring countries, the profit margins continue to fall. Besides, there is a significant *drop in nominal* tourist spending (26 per cent between 1985 and 1998). The developing tourism sector has increased the environmental and socio-cultural pressures and *impacts* on

the coastal zone: ad hoc construction, especially on public land (facilitated by the absence of a land registry), degradation of coastal ecosystems, compaction of beach and dune sand due to the use of motorized vehicles, abandoned litter on the shores, noise pollution (vehicles, discotheques), disturbance of marine turtles by motorboats (20 per cent of the turtles arriving to nest in 1991 on Zante Island were wounded) and by artificial light (tourist facilities and airports), excessive extraction of groundwater (in the high season, drinking water is transported by tankers to 14 islands in the Aegean Sea at an annual cost of 1.5 million euros), a decline in traditional farming, and pleasure-boat discharges of solid and liquid waste.

These trends made it necessary to *reconsider the conventional approach* relying on mass tourism and competitive pricing, looking more for orientations aimed at a better use of existing capacities, better evaluation and improvement of environmental performance, and more diverse products (eco-tourism, conferences, spas) and profiles (ecological, cultural and rural). New criteria for allocating subsidies and tax breaks have been defined. A national land registry is being set up in 2005. And remarkable local initiatives are emerging, including women's agro-tourism cooperatives, special limited-access zones (for example a pedestrian district in Athens and a natural park on Zante Island), and networks of footpaths along the Epirus coast.

The OECD questions the justification of maintaining a policy of subsidies (luxury hotels, marinas, golf courses) by the Ministry of Economy and by the EU (93 million euros under the 'tourism' sub-programme of the European support framework). It is calling for the development of a *strategic action plan* for the sustainable development of tourism in consultation with participating parties. This plan could re-direct part of the funds towards enhancing the natural and cultural heritage, local strategies of integrated development that rely on externalities and positive synergies between tourism, agriculture, fisheries and the environment (for the benefit in particular of the poorer regions), and the promotion of micro-projects. The plan would be assessed using indicators.

Source: OECD, 2000

Recent developments in supply and demand in European destinations call for a reorientation of strategies since the seaside model would be 'running out of steam'. Italy offers an example of a well-articulated development of tourism. The strongest growth is being registered in art and historical cities, and rural tourism is experiencing a large increase. The creation of natural parks is contributing to this. In Tuscany, where non-hotel offers (agro-tourism, self-catering cottages and furnished flats) account for 19 per cent of the accommodation capacity, agro-tourism has registered a 16 per cent growth in one year, while the hotel share fell during the same period. France also has examples of developing rural tourism (see Chapter 5).

Tourism strategies and development would gain much from a more structured *revaluation of the heritage of territories*, whether along the coast or further inland. Heritage inventories (nature, culture and landscapes) and the creation of systems for experiencing heritage (coastal footpaths, special routes in urban, rural and natural areas, museums and centres of the old or modern Mediterranean[52]) would be a major component of an alternate scenario. According to such a scenario, the Mediterranean would derive the greatest benefit from the diversity of its social and economic development. Projects and achievements have recently been put in place (coastal restoration in old and degraded destinations, eco-museums), but they remain insufficient in number and support. This scenario would, among other things, see destinations emerging while looking ahead, avoiding the degradation and restoration costs that mature degraded destinations are facing today. Heritage appropriation and strategies will also be strongly stimulated by the *names* given to coasts (for example the 'Carthage Coast' in Tunisia).

Faced with these multiple challenges, it appears vital to create more *awareness* and *train* more professionals, local government officials and the general public in both originating and destination countries. Several NGOs are already doing this, but a more resolute commitment by the community of countries appears necessary, that is by the European Commission and professionals from originating and receiving countries.

A sustainable coastal management scenario

Implementing good governance in the Mediterranean coastal areas is essential to avoid further unsustainable development, and to shift towards a more satisfactory alternative future. As a necessary complement measure to the liberalization of economies, such governance needs to be organized mainly at the national and local level, although it may be stimulated by strengthening regional cooperation.

The risks of the baseline scenario

The prospects for the Mediterranean coastal areas raises questions and concerns. How will this geographically limited region and its societies be able to sustain the projected increase in the coastal urban population (20 million additional urban dwellers between 2000 and 2025, a 1 per cent annual increase), the near doubling of tourist flows (an additional 137 million in the coastal regions, a 2.3 per cent increase per year), and the even greater increases in transport (passenger transport by 2.8 per cent per year, and freight by 3.8 per cent)? The baseline scenario paints a fairly undesirable picture of

the future, stressing coastal overdevelopment, diminished quality and integrity of coastal areas, and increased natural and social risks.

Under present conditions of governance, such trends would result in a continuing *loss* or *degradation* of the natural and landscape heritage of the coastal areas. Many examples have been quoted in the chapter (5000 additional km of urbanized coastal fringe between now and 2025, coastal water polluted by persistent substances, loss of biodiversity), all resulting in impacts on human health and the economy (tourism and fisheries).

With such losses, the *risks* that weigh on coastal societies and economies increase under the baseline scenario. The coastal societies that have managed to eradicate the risks that confronted them in the past[53] will have to face new risks that are enhanced because of increased *contingencies* (global warming, biological invasions, accidental pollution related to increased maritime traffic, terrorism, the versatility of tourists and tour operators in the choice of their destinations), and a *loss of resilience*[54] of their coastal areas due mainly to a *loss of diversity*, as projected under the baseline scenario in various fields. For the *environment* the loss of ecosystem diversity and physical degradation (for example coastal erosion) deprive the Mediterranean coastal zones of their potential to react to future contingencies (bioclimatic and economic). E*conomically* speaking, the development towards 'tourism-only' makes coastal territories more vulnerable to environmental, geopolitical, terrorism and economic risks. Concentrating establishments in restricted risk-prone areas increases the impacts of natural hazards (floods, earthquakes). In *governance* terms, overly centralized approaches discourage diversity in strategies for coastal territories.

Increased losses and risks (and the financial costs they induce) are also the result of a *failure of governance* in managing coastal zones, and, more generally, in regional and local development and integrating the environment and development. This failure concerns all countries, including those most advanced in implementing specific policy instruments. P*ublic policies* have certainly contributed considerably to modern changes in the Mediterranean coastal zones, without taking due account of their possible consequences for natural areas, with their complex physical and biological functions and the overall territorial balance. Too many roads have been built along the coastline, promoting ribbon urbanization. Too many buildings and public facilities have been constructed along the coast or on flood plains, dunes or wetlands, all resulting in serious coastal zone degradation. Too many tourism strategies have led to artificial development models with serious impact and increased urbanization in the coastal zones, rather than promoting a solid and balanced development. Too many subsidies have supported investment projects, such as in the industrial fisheries sector, which are only now showing their negative impacts. In some countries *decentralization* has made it possible to increase mobilization for a sustainable management of coastal zones but has also added negative changes in some cases, because the long-term perspective was not taken into account. Under pressure from particular short-term interests, too many local authorities have allowed their regions to develop towards an unstructured land use, while wasting space.

Without radical changes in policies and behaviour, one cannot exclude the possibility that residents and tourists themselves will start questioning such developments in tourism and transport.

The objectives of an alternative scenario

An alternative scenario for Mediterranean development would focus on *urgently stopping and reversing the continuing degradation of coastal areas*[55] and *reducing risks*, while involving coastal areas in the globalization process and ensuring harmony with their hinterland, all in order to contribute to a balanced economic development. Such an objective mainly implies protecting and enhancing the coastal heritage (including the productive sectors that contribute to the Mediterranean identity), making its transport system more efficient[56] and responsible,[57] integrating tourism and sustainable development more effectively, avoiding development towards 'tourism-only' and 'urban-only' outcomes, and relieving coastal zones as much as possible of pressures resulting from the projected growth.

These objectives can vary according to the coastal region. On coasts already badly affected by urban sprawl, reparation and restoration will predominate (ecosystems, landscapes and buildings). On coasts not yet too badly affected, more innovative anticipatory strategies will make it possible to develop in ways that are less costly in the long run. Some heavily industrialized and international business-oriented coastal regions will favour improvements in their transport network. Other regions will opt for creating more valuable landscapes by playing the quality card and enhancing the character of their territory, and the synergy between tourism and other economic sectors (even if this would mean reducing accessibility and urbanization). In this respect, some islands might well become sustainable development laboratories (Box 6.25).

Depending on its location, history, heritage, developmental needs and particular identity, each country, region, area and island should define its own objectives and find the proper balance between protection and development and between coastal and inland areas.

Despite a wide variety of situations, some of the *alternative paths* described in this report are especially relevant for coastal areas. They show possible significant shifts

Box 6.25 Islands as new sustainable development laboratories?

Changes in the Mediterranean are exacerbated on the islands (the vulnerability of traditional economies, developments towards 'tourism-only'). The importance of social pressures exercised by tourism on a limited space, the scarcity of natural resources (water, soils, energy) and the generally strong awareness of the close relationship between people and nature, are such that the dead-ends of the baseline scenario are more quickly perceived than on the mainland. The isolation of islands, their singularity and originality, and old and new problems can be sources of innovation. Rather than adopting ready-packaged and extremely expensive solutions (for example drinking water transport and building desalinization plants which are often the cause of urbanization serving tourism), they can also benefit from their specificity and innovativeness. There are many possible fields, including the integrated and economic management of resources, the creation of local value-added by enhancing a specific image and short round trips, the introduction of new technologies (in the field of information, aquaculture, renewable energy and food-processing), and implementing new governance instruments (such as Local Agendas 21, eco-taxes on tourist transport, defining limited accommodation capacities, landownership management, transport regulation and specific regulations for fisheries).

Changes along such lines have already started on some islands. For example, Minorca tried to avoid the mass tourism of Majorca and succeeded in evading a too-strong mono-activity. It opted for 'Biosphere Reserve' management that tries to reconcile conservation and development. The Island of Elba is also trying to implement such an approach. Porquerolle Island in France has been able to take advantage of the protection provided by Port Cros Park and to innovate in water management (biological treatment in ponds keeping wastewater discharge from entering the sea and enabling water re-use, thereby benefiting quality wine production, a botanic conservation centre and market garden production). Malta is also cited regularly for its excellent measures for managing water demand. Crete is developing major activities in the field of research and new technologies. 'Virtual campuses' and distance education issue accredited degrees. An optical fibre network connects Crete to several countries, and the use of modern means of communication (data transfer, satellite connections) and medical imaging make it possible to realize tele-consultations and establish 'diagnoses-from-a-distance'. The universities in the six major Mediterranean islands and the Aegean Sea are networked.

Under the alternative scenario, subsidiary principles and contractual agreements (with the upper levels of government) would be confirmed to encourage this role of a laboratory for sustainable development. Strengthening the role of decentralized political institutions and some adaptations in national and community rules could prove to be necessary. This would allow for the emergence of new ways of regulating the fisheries, agriculture, transport, business and tourism sectors to serve sustainable development.

and progress that may be derived from better governance of coastal zones, regional development, and sectoral and economic policies. By integrating the territorial and environmental aspects of sustainable development, it should be possible to considerably reduce the pressures that are projected in the baseline scenario.

Strengthening *policies for coastal zones* would make it possible to reduce land-based pollution in compliance with the Strategic Action Plan of MAP (reducing industrial and urban waste), reduce coastal artificial cover and ensure a more sustainable management of marine resources. An alternative scenario could, for example, between now and 2025, aim to restore the ecology and landscape of 4000km of urbanized coast (in tourist destinations and coastal cities) and conserve/ sustainably manage an additional 4000km of coast that is not yet built-up. This would, in particular, put a brake on the linear urbanization of coastal zones while ensuring the maintenance of a productive agricultural sector and green belts between coastal cities. Thus, by 2025, about one-sixth of the Mediterranean coast, or 8000km, would be improved, compared with the baseline scenario, and projected new urbanization (5000km) could be reduced (less concentrated along shores) and be pushed back by at least half to a sufficient distance from coastlines. In parallel, a shift to fisheries through eco-management would contribute to the protection of the aquatic environment and enable the replenishment of stocks and higher catch levels, complemented by aquaculture, a sector which would grow strongly while complying with sustainability objectives.

The *general integration of the environment with development* would make it possible to reduce the projected pressures. Although particularly important for the tourism and industry sectors, given their direct impacts on coastal zones (pollution and physical degradation), this integration concerns all sectors. As already indicated, a shift towards integrated management of resources and water demand would enable a possible overall saving by 2025 of 54km^3 at the catchment area level. This would avoid the construction of many dams on increasingly problematic sites. These savings would reduce the risk of saline intrusions and coastal erosion, the drying-up of springs, regression of coastal wetlands and the need for new infrastructures and facilities on the coasts (desalinization plants, wastewater treatment plants). More efficient energy management would make the construction of about 80 thermal plants along the coast between now and 2025 unnecessary, so reducing by half the additional pollution and land occupancy compared with the baseline scenario. Successfully 'decoupling' transport growth from environmental degradation, orienting it towards maritime or rail transport and strengthening the fight against maritime-based pollution would also contribute to reduced

pressures and risks. A shift to agriculture that respects the environment (well thought-out and organic agriculture) would result in a drop in nitrate and pesticide discharges in the developed countries and a reduction by at least half in their projected increase in the developing countries. Reducing urban waste production at the source could contribute to savings of 28 million tonnes of waste produced in coastal cities by 2025.

Pressure on the coastal zones could also be greatly reduced by *regional development limiting urbanisation along the coasts*, through solid and balanced urban and rural development. A better *distribution of tourist flows in space* and time, particularly by diversifying the forms of tourism (urban, rural and cultural tourism) would enable a shift from the coast towards the hinterland of at least a third of the additional tourists projected for the coastal regions between now and 2025. This would also contribute to reducing rural depopulation, particularly in mountainous regions.

All this cumulative progress could lead to a clear slowing of the continuing degradation of the coastal fringe and marine and land *diversity*, enable the preservation of coastal ecosystems and the health of sea-produce, consumers and bathers, and reduce *risks*.

Conditions for better governance of coastal zones

The alternative scenario assumes, as a primary condition, a strengthened *commitment* by Mediterranean people to sustainable development of their coastal territory. This commitment would be derived both from an ethic dimension, which could be based on the philosophical heritage of the region, and from a better understanding of key issues for the future. In this scenario, coastal societies and national and local government authorities will learn from the past and give themselves mid- and long-term progress objectives. The assessment of diverse experiences and the implementation of collective prospective exercises will highlight the contradictory debate and clarify the possible choices included in *national and local strategies* that commit partners in the medium-term. These forward-looking procedures will be carried out at different relevant geographic scales, not only at the coastal zone but also the broader levels of coastal regions and catchment areas that influence coastal zones.

These objectives for progress will be integrated into different *sectoral policies* (tourism, urban development, transport, water, agriculture, fisheries) that interact directly or indirectly with the coast and will be subject to regular public evaluation by means of indicators. *Coastal policies*, also subject to regular evaluation, will be strengthened through law implementation and dedicated agencies.

The *heritage dimension* will be systematically monitored, as will the threats and causes of degradation. Ecosystems, landscapes and remarkable elements of cultural heritage, traditional production activities and local expertise will all be recorded. This heritage dimension will inspire the formulation of *projects for specific territories* that will enhance such areas economically. Activities of sustainable management in the coastal zone will thus be carried out around a harbour, a bay, an island, a delta or a lagoon complex. They will bring together decision-makers, terrestrial and maritime administrations, donors, scientists and local and professional actors in a spirit of participation. Better targeted, they will aim to reduce pollution, develop specific productive activities, protect, rehabilitate or enhance the coastal heritage (for example eco-tourism), and develop a tourism model that is compatible with the objectives of sustainability. They will gain in effectiveness and will be the subject of innovative procedures such as charters. New public/private/local community partnerships will be experimented with to develop a form of tourism that respects coastal zones and is linked to the development of the hinterland. The management of coastal sites will take highly diversified forms with a growing mobilization of civil society. Protected areas will be developed in the spirit of UNESCO's Biosphere Reserve programme. Their role as instruments of management and sustainable development will be acknowledged, financed (also by the market) and enhanced.

New *economic instruments* for the sustainable management of coastal zones will be implemented. 'Visitor pays back' formulae, levelling out property and tax values, and systems of taxing and pricing inspired by 'the polluter-pays' principle will become more common. Protective districts and farmers and foresters will be paid for their multifunctional role. Their function as 'agents of sustainable development' will thus be recognized and rewarded through regulatory, economic and property-tax measures. In the hinterland, these mechanisms will contribute to the sustainable management of catchment areas, the diversification of tourism and rural revival. Tourists, tourism professionals and coastal cities will thus become major actors in the sustainable development of the Mediterranean.

Coastal policies will be consigned to *master plans* (sometimes requiring the creation of land registries) that organize the spatial distribution of facilities and activities, taking environmental and heritage imperatives into account and defining the areas to be protected or rehabilitated. Special attention will be paid to coasts that are still free of coastal roads. New roads will be built at sufficient distances from the sea with access roads perpendicular to the coastline. Master plans will also organize the protection of marine ecosystems and fish resources and the modalities for development of new activities at sea.

The coastal dimension will be fully recognized and integrated into master plans formulated on the *broader scale of coastal regions*. An infrastructural scheme will be planned to promote a more balanced and fraternal development between coastal and inland areas. Urbanization pressures will be directed to areas that are adequately connected by public transport. Construction rules, adapted to the risks and landscapes and highlighting local expertise, will be defined. Conservation will not be limited to natural areas but will be extended to agricultural land and will incite action from yet-to-be created 'land agencies'.

This alternative scenario assumes *radical changes*, which will not be self-evident because they will run up against political and administrative inertia and dominant, short-term interests. They will not be obtained without establishing, or strengthening, an *enabling environment* for managing coastal zones.

To encourage this shift in the coastal countries, the *regional Mediterranean level* needs to be considered. In line with the orientation given to the new Barcelona Convention, MAP could play an important role by promoting the adoption of an overall *strategy* up to 2025 or 2050, already planned by the Contracting Parties to the Barcelona Convention, and a *regional protocol* for the sustainable management of coastal zones. Such a protocol would make it possible to recognize the Mediterranean coastal areas as having regional public interest and requiring cooperation for their sustainable development. It could propose a delimitation, define the basic principles for its management and monitoring, and serve as a framework for national and local strategies and policies. The *strategy* could set overall progress objectives, invite each country to set its own objectives and develop approaches for integrated management at appropriate spatial levels, specify the desired development of the role of MAP, and encourage the mobilization of other regional partners. Its implementation would be monitored over time using indicators and stimulated by a regular exchange of experiences.

In the strategic tourism sector, implementation of a *regional cooperation mechanism*[58] would make it possible to promote the development of demand towards a tourism that is more respectful of the principles of sustainability (by enhancing the role of the market in this direction), define and promote operational instruments to help the various actors to control developments better, and strengthen Euro-Mediterranean awareness. There are many possible fields for cooperation, including raising public awareness, exchanging experiences, training programmes, technical assistance, strategic consultations, monitoring and forward-looking activities, promotion and marketing, and Mediterranean eco-labels.

The shift towards an alternative scenario, would be facilitated by a greater *synergy* of action between MAP, the Mediterranean countries, the European Commission and donors (and the GFCM for fisheries and aquaculture). This strengthening of regional cooperation would benefit from the adoption of a *common and differentiated approach*, taking situational, particularly institutional, differences between countries into account. It would require increased *financial transfers* towards the southern- and eastern-rim countries, without which the objectives that have been set may well be compromised. Programmes to abate land-based pollution and protect coastal biodiversity would, in this framework, be regularly evaluated and, if necessary, intensified or reoriented. Broader programmes to strengthen coastal policy capacities would be conducted over time. Examples would be: setting up land registries; organizing statistical data, monitoring and assessing the state of the environment; supporting the installation of coastal agencies, national and local strategies, demonstration projects, exchanging experience, and research and promotion of inexpensive technologies for pollution abatement. Networked, structured mechanisms for regional cooperation would be created or strengthened (tourism, coastal cities, fisheries, protected areas, environmental information, islands and coastal agencies) with the participation of professional actors.

Notes

1 But cities such as Rome or even Athens, although near the coast, are not included in the coastal zone.
2 Definition: an urban area with more than 10,000 people, located on the coastline.
3 Saidi, 2000.
4 Egyptian Tourist Authority.
5 AFIT, 2003 (www.afit-tourisme.fr).
6 Updated from Giri, 1991.
7 UNEP/MAP/MEDPOL, 2001.
8 J. Margat, *Plan Bleu*, 2004.
9 New analyses are being developed by EEA and the EU Joint Research Centre in 2004, in addition to a Coastwatch project. These developments will bring new data and methods for monitoring coastal zones.
10 The spatial limits of urban areas are defined by the continuity of built-up areas (a maximum of 200m between buildings).
11 Information contained in this section relies mainly on an analysis of transboundary pollution (*Transboundary Diagnostic Analysis for the Mediterranean Sea* – TDA) by UNEP/MAP/MEDPOL, 2003
12 A condition of water when it is too acid and poor in oxygen to support life, resulting from excessive organic matter content.
13 UNEP/MAP/MEDPOL, 2003.
14 UNEP/MAP, 1996a. The PAH volumes dumped by the refineries of 12 Mediterranean countries investigated in this report were, in 1996, estimated to be more than 780,000 tonnes per year, compared with an estimated 100,000 tonnes from de-ballasting at sea in 2000.
15 UNEP Chemicals Programme. *Mediterranean regional report*, 2002
16 UNEP/MAP/MEDPOL, 2003.
17 Micro-organisms consume oxygen for the oxidation of polluted water. Measuring oxygen demand gives an indirect estimate of the faecal concentration.
18 CITET *news* no 7 2002, Tunis.
19 Under the auspices of the United Nations Environment Programme (UNEP).
20 Cities with more than 100,000 Population Equivalent should be in

compliance with the protocol by 2005.
21 UNEP/MAP/MEDPOL, 2002: 99.
22 UNEP/MAP/MEDPOL, 2003: 70.
23 Primary treatment reduces BOD by only 20 per cent, and secondary treatment reduces it by between 70 and 90 per cent.
24 UNEP/MAP/PAP, 2001.
25 UNEP/MAP/MEDPOL, 2002.
26 Collection and secondary treatment.
27 Based on an average cost of 100 euros per population equivalent for upgrading, and 400 euros per population equivalent for the new infrastructures. (See the EEA Study on countries acceding to the EU, Chapter 1).
28 Compared with 60 billion for all SEMC countries, cf. Chapter 1.
29 UNEP/MAP/MEDPOL, 2003: 110.
30 Larid, 2002.
31 A. Golik. *Dynamics and management of sand along the Israeli coastline*. In Briand and Maldonado, 1997.
32 Snoussi and Long, 2002.
33 Briand and Maldonado, 1997.
34 EEA, 2003.
35 CIESM, 2002.
36 UNEP/MAP/MEDPOL, 2003: 18.
37 Algeria. Ministère de l'Aménagement du Territoire et de l'Environnement. 2002. *Plan National d'Actions pour l'Environnement et le Développement Durable* (PNAE-DD).
38 Since 1995, 23 coastal protected areas have been created in France (5155ha), 2 in Croatia (24ha) and 2 in Albania (6100ha).
39 Data relating to fishing and fish stocks must be handled with care because of the high level of uncertainty.
40 Charbonnier et al 1990.
41 Including 25 in the Valencia region, 13 in Andalusia and 12 in Catalonia.
42 The Barcelona Convention as amended in 1995 and recorded as the 'Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean'. It has not attempted to define 'coastal region', leaving this up to the Contracting Parties.
43 France. Conseil national d'aménagement et de développement du territoire, Commission du littoral. 2003. *Communiqué du 8 juillet 2003: Le littoral français. Pour un nouveau contrat social*. (DATAR, www.datar.gouv.fr).
44 This section relies in particular on a comparative analysis carried out by Prieur and Ghezali for MAP in 2000, which has been updated and complemented.
45 In 2003 Italy intended to regularize some 360,000 illegal constructions throughout the country (*Courrier international*, no 674, October 2003).
46 Even though it has been largely adopted as common terminology, the concept of *coastal zones*, traditionally used by oceanographers, is in fact ambiguous because it may not include the land part, which is obviously essential to coastal areas.
47 Such as the latest 'systemic and prospective analyses of sustainability' developed by the Blue Plan as part of the coastal area management programmes.
48 The Andalusian plan for coastal areas 1995–2000; the Balearics management plan for coastal areas.
49 Commission of the European Communities, Tourism Unit, 1993.
50 Larini F., Université de Genève. Mémoire de DESS. 2003. *Tourisme et développement durable en Méditerranée, le cas d'Antalya (Turquie)*.
51 Recommendations adopted by the Contracting Parties to the Barcelona Convention, Malta, 1999.
52 Such as the future Musée des Civilisations de l'Europe et de la Méditerranée planned for Marseilles in 2008.
53 As, for example, the insecurity of sailing or malaria.
54 Capacity to react and adapt to contingencies.
55 As stated by the Contracting Parties to the Barcelona Convention (Catania Meeting, November 2003).
56 By lowering excessive prices that penalize exporting companies.
57 By internalizing its environmental impact in its costs.
58 Recommended by MAP, inspired by what already exits in south-east Asia and the Caribbean.

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Legal references

Coastal water pollution

Multilateral relevant agreements

The United Nations Convention of the Law of the Sea (UNCLOS, 1982)
The Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and

Pesticides in International Trade (1998)
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel, 1989)
International Convention for the Prevention of Pollution from Ships (1973) as modified by the Protocol of 1978 (MARPOL 73/78)
Stockholm Convention on Persistent Organic Pollutants (Stockholm, 2001)
International Convention on the Control of Harmful Anti-fouling Systems on Ships (London, 2001)

Barcelona Convention and its associated protocols

Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean, Barcelona 1976, amended in 1995, entered into force in 2004
Dumping Protocol: Protocol for the prevention and elimination of pollution in the Mediterranean Sea by dumping from ships and aircraft or incineration at sea, 1976, in force since 1978, amended in 1995.
Emergency Protocol: Protocol concerning cooperation in combating pollution of the Mediterranean Sea by oil and other harmful substances in cases of emergency, 1976, in force since 1978, amended in 2002, entered into force in 2004
Land-Based Sources Protocol: Protocol for the protection of the Mediterranean Sea against pollution from land-based sources, 1980, in force since 1983, amended in 1996
SPA *and Biodiversity Protocol*: Protocol concerning Specially Protected Areas and biological diversity in the Mediterranean, 1995 (replacing the 1982 SPA Protocol), entered into force in 1999
Offshore protocol: Protocol for the protection of the Mediterranean Sea against pollution resulting from exploration and exploitation of the continental shelf and the seabed and its subsoil, 1994
Hazardous Wastes Protocol: Protocol on the Prevention of Pollution of the Mediterranean Sea by transboundary movements of hazardous wastes and their disposal, 1996

Other regional treaties

Convention on long-range transboundary air pollution (Geneva, 1979) and its related protocols
Convention on the conservation of European wildlife and natural habitats (Bern 1979, entered into force in 1982)

European Union Directives

Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a Community framework for action in the field of water policy, for the protection of the ecological state of water from local and diffuse pollutions, devised for the integration of the many directives related to water pollution into a single text
Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control (IPPC Directive) submitting the industrial plant discharges to a prior permit (provided for by Annex I)
Council Directive 91/676/EEC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources
Council Directive 91/271/EEC of 21 May 1991 concerning urban wastewater treatment; amended by Directive 98/15/EEC, according to which by end of 2005, all the discharge from cities of more than 2000 inhabitants equivalent should be preceded by a secondary treatment
Council Directive 76/160/EEC of 8 December 1975 concerning the quality of bathing water, under revision
Council Directive 76/464/EEC of 4 May 1976 on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community
Directive 2001/106/EC of the European Parliament and of the Council of 19 December 2001 amending Council Directive 95/21/EC concerning the enforcement, in respect of shipping using Community ports and sailing in the waters under the jurisdiction of the Member States, of international standards for maritime safety, pollution prevention and shipboard living and working conditions (port state control)
Directive 2002/6/EC of the European Parliament and of the Council of 18 February 2002 on reporting formalities for ships arriving in and/or departing from ports of the Member States of the Community
Regulation (EC) No 417/2002 of the European Parliament and of the Council of 18 February 2002 on the accelerated phasing-in of double hull or equivalent design requirements for single hull oil tankers and repealing Council Regulation (EC) No 2978/94

Marine and coastal biodiversity

Multilateral relevant agreements

Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar, 1971)
Convention for the protection of the world cultural and natural heritage (Paris, 1972)
Convention on international trade in endangered species of wild fauna and flora (CITES, Washington, 1973)
Convention on the conservation of European wildlife and natural habitats (Bern, 1979)
United Nations Convention of the Law of the Sea (Montego Bay, 1982)
Convention on the conservation of migratory species of wild animals (CMS, Bonn, 1979)
Convention on biological diversity (Rio de Janeiro, 1992)
Agreement on the conservation of African–Eurasian migratory waterbirds (AEWA, The Hague, 1995)
Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS, Monaco, 1996)

Directives and other relevant legal instruments of the EU

Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds
Council Regulation (EEC) No 348/81 of 20 January 1981 on common rules for imports of whales or other cetacean products
Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora
Council Regulation (EC) No 338/97 of 9 December 1996 on the protection of species of wild fauna and flora by regulating trade therein
Commission Decision 97/266/EC of 18 December 1996 concerning a site information format for proposed Natura 2000 sites
Commission Decision 2002/11/EC of 28 December 2001

adopting the list of sites of Community importance for the Macaronesian biogeographical region, pursuant to Council Directive 92/43/EEC

Commission Regulation (EC) No 1808/2001 of 30 August 2001 laying down detailed rules concerning the implementation of Council Regulation (EC) No 338/97 on the protection of species of wild fauna and flora by regulating trade therein

Commission Regulation (EC) No 349/2003 of 25 February 2003 suspending the introduction into the Community of specimens of certain species of wild fauna and flora.

Fisheries

Agreement for the establishment of a general fisheries council for the Mediterranean (GFCM, FAO, Rome, 1949)

International convention for the conservation of Atlantic tunas (Rio de Janeiro, 1966)

Part 3

Summary and Call for Action

Summary and Call for Action

The Mediterranean in motion

The Blue Plan scenarios, published in 1989 and based on 1985 data, highlighted possible futures for 2000 and 2025 for a region with one of the richest histories in the world, not to mention its diversity and fragility. Three years before the Rio Summit, the report called for an increased commitment to sustainable development, a concept that was then still in its infancy. The present report, requested and funded by all Mediterranean-rim countries and the European Commission, makes it possible to arrive at a new diagnosis.

The diagnosis confirms the gloomy trends projected 15 years ago. The drastic demographic developments projected have been realized and trends continue. The practically stable population of the northern Mediterranean countries from Spain to Greece (193 million in 2000) has been overtaken by that in the southern and eastern Mediterranean countries from Turkey to Morocco, which in 2000 totalled 234 million people, an increase of 65 million in 15 years. Urbanization, especially in the coastal zones, has been even more extensive than projected. The growth in tourism and the amount of irrigated land have also been confirmed, and unsustainable consumption and production patterns are continuing to spread in the developed countries.

However, the recent fall in fertility rates in the south and east has been of an unexpected scale and swiftness. It is a factor that draws the two shores closer together and gives these countries opportunities to develop under favourable population ratios: a high percentage of working-age adults compared with retired and young people. It should also result in a more moderate increase in pressures on the environment and natural resources.

Despite this more favourable demographic context, economic growth remains insufficient in the south and east. It has fallen in most countries, also in the north, and north–south imbalances continue to exist. Only the three Mediterranean countries that joined the European Union in 2004 (Cyprus, Malta and Slovenia) come close to the average of the other EU Mediterranean countries (Spain, France, Italy and Greece) and Israel. Standards of living (per capita and in purchasing power parity) are still 3–5 times lower in the developing and transition countries, while east Asia has recorded exceptional GDP growth rates.

Several countries (Croatia, Bosnia-Herzegovina, Serbia-Montenegro, Albania and Algeria) have experienced very difficult times related to international changes (the fall of the Berlin wall and the East-bloc system) or to internal problems. The conflict in the Near East has not yet been resolved and north–south, and especially south–south cooperation, has remained quite limited.

In the environmental field, the risks projected in the Blue Plan scenarios have also been confirmed, especially the greater stresses on water, soils and coastal zones and degradation of natural resources and ecosystems. The social and economic repercussions are becoming increasingly obvious.

Another major feature of the past 15 years has been globalization, leading to a considerable change in the relative prices of products and services and a strengthening of international and regional trade. The trade of Maghreb countries and Turkey has increasingly and strongly focused on Europe, the main regional centre of gravity. The Mashrek and Egypt have also continued to strengthen their links with Europe, but have at the same time maintained a significant amount of trade

with the rest of the Middle East. A strong American presence can be seen in a few strategic countries.

The local, regional and international impacts of globalization have so far been insufficiently assessed, but they appear to be both positive and negative. The increase in global risks (climate change, loss of biodiversity, continued or worsening inequalities) and certain Mediterranean weaknesses in terms of free trade are real topics of concern.

In contrast, the 1995 initiation of north/south cooperation (the Euro-Mediterranean Partnership) and environmental policies in all countries, called for in the 1989 alternative scenarios, have been positive developments.

However, these policies are not enough. The first observation to be made is the growing disparity in resources and prospects between the northern shore, which benefits from European integration (with, among other things, rigorous directives on the environment and funds for strengthening capacity, infrastructures and agriculture) and the southern and eastern shores, which do not.

By 1985 Europe, already mature but still divided, had little presence in the southern part of the region. Has it now become sufficiently aware of the Mediterranean interdependencies and challenges, risks and strong points for the future of the EU? Has it understood that its future depends to a large extent on the Mediterranean south and east?

Fortunately the international and Mediterranean communities have now become aware of the value of their common heritage, the profound transitions underway and the risks that might result from them.

At the global level, several international summit conferences have warned about the unsustainable nature of developments in the world and called for the implementation of action programmes to remedy the situation. Following the Rio Summit in 1992, which, together with Agenda 21, highlighted the need for environmentally sustainable development, the Millennium Development Goals approved by 189 countries in September 2000 and the direction taken at the Johannesburg Summit in 2002, all reiterate the multidimensional character of development, including social questions, problems of access to drinking water, energy, education and health, in short all the conditions required for sustainable human development. The issues of global inequalities and poverty, which had been overshadowed in the 1990s, have returned to the international agenda. A strong emphasis has also been put on the need to change our unsustainable production and consumption patterns.

Dynamic analysis of some indicators of the Millennium Development Goals shows the strengths and weaknesses in the Mediterranean region by comparison with other regions in the world: low rates of infant mortality and extreme poverty, but considerable relative poverty that is not decreasing; good levels of primary education, but still high rates of illiteracy; a substantial delay in gender equality, although it is slowly being overcome; and a rural world that is seriously falling behind. The scale of unemployment among young people is especially worrying. High in the developed Mediterranean countries, unemployment rates in the south and east are approaching record levels. Another worrying trend is that development remains very wasteful of natural resources. And finally, the level of official development assistance in the Mediterranean developed countries remains well below the objectives set at the international level.

The Mediterranean people have become more aware of the risks that threaten their environment. And they have strengthened their common mechanisms for protecting the sea and coastal zones: in 1995 the Barcelona Convention was revised and expanded to include the coastal zones (which entered into force in 2004); a framework and regional strategy for curbing pollution and the protection of biodiversity in coastal zones has been adopted; a Mediterranean Commission on Sustainable Development has been created, and is open to a civil society that is much more active than 15 years ago.

Although the heavy trends may not have been reversed, substantive policies and actions are being implemented in all countries. This has limited degradation and shows the path to possible progress towards sustainable development.

Today the Mediterranean can no longer measure its state and reflect on its future while only considering the enclosed sea and the limited 46,000 kilometres of coastline where its active strengths are mainly concentrated. As required by the Johannesburg Summit, the Mediterranean has to position itself within the sphere of its worldwide responsibilities. Its future needs to be thought about in relation to the organization of major regional poles that tend to be strengthened by globalization, especially the Euro-Mediterranean region, a fundamental key for its future.

The present Blue Plan analysis has endeavoured to measure these developments. It leads to a further warning about the risks of ongoing trends for which the assumptions have been explained in the baseline scenario.

However, this report goes beyond assessment, diagnosis and warning. It identifies possible win–win alternatives (environment and development, north and south), and highlights the obstacles that need to be overcome as well as possible tools for response. It shows that alternative policies and measures are beginning to be put in place and should definitely be spread more

widely. It stresses some of the actions that could cause a trigger effect capable of changing paths that are anything but inevitable. Finally, it ends with a determined call for action to build a Mediterranean region that is responsible and united.

The risks in the baseline scenario

According to the assumptions of the baseline scenario, by 2025 the Mediterranean region will not have reduced the disparities in internal incomes or those between the two shores. Its relative weight in the world will be reduced, and its natural heritage and lifestyles will be even more degraded, often irreversibly. Its vulnerability to risks will increase.

North/south gap

The main risk for the Mediterranean in 2025 is the prospect of increased social, economic and environmental disparity between the two shores.

In the baseline scenario, five Mediterranean countries (Croatia, Bosnia-Herzegovina, Serbia-Montenegro, Albania and Turkey) are seen to be likely to join the *European Union* which, in the long run, will include 12 Mediterranean coastal countries. These new member countries will consolidate peace, democracy and a social market economy as well as a certain economic and environmental convergence with the rest of the Union.

This convergence will be based on the powerful cultural and institutional pillars of EU values and advantages. Moreover, the EU will provide stimulation funds to facilitate the convergence and consistency of infrastructure investments (environment and transport) and development investment in new member countries. This is how Spain and Greece, in previous decades, were able to benefit from cohesion funds, which, added to other structural and agricultural funds and environmental directives, made it possible to achieve parity with the other EU countries. The recent new members (Malta, Slovenia and Cyprus) are currently benefiting in their turn.

Despite this transitional support, the effects of the large market and the rising standards of living in the member countries will nevertheless increase their environmental and territorial impacts: a rapid reduction in the number of farmers; accelerated urbanization along the coasts; a rapid increase in volumes of transported goods, the private car fleet and the production of household waste; urbanization from tourism in the coastal zones; and rising per capita energy consumption and greenhouse gas emissions.

The *southern and eastern shores* will not benefit from comparable regional dynamics, although cooperation between the EU and the Southern and Eastern Mediterranean Countries (SEMC) has been organized since 1995 within the Euro-Mediterranean Partnership (more recently strengthened with the new European Neighbourhood Policy). This cooperation includes a Euro-Mediterranean free-trade zone (with a target date of 2010), implementation of topic-based cooperation, support of a MEDA fund, and investment facilities. Unfortunately this partnership is presently lacking sufficient resources and political commitment; it is undersized in relation to the huge challenges the region is facing. In addition, it has until recently not been much inspired by the principles of sustainable development. The free-trade zone itself was originally proposed without being preceded or accompanied by an impact assessment study.[1] Nevertheless, progress is being made following decisions by the European Council relating to integrating sustainable development issues into external policies and cooperation.

Under the baseline scenario, it is assumed that the SEMC will have difficulties in engaging in the necessary reforms, and south–south cooperation will remain limited. Europe will probably not be able to provide to its southern neighbours the required resources that would be justified by the importance of its interdependencies and clearly understood interests. Therefore the region will, in general, remain penalized by a lack of dynamism and economic innovation, continued conflict situations and rivalries, and inadequate supporting measures (structural and agricultural funds, environmental policies). The harmful environmental consequences of this scenario would be considerable.

Clear development differences may, however, appear between countries, depending on differences in political, institutional and socio-economic pathways taken and in the degree of success in engaging in reforms. The new EU neighbourhood policy may not alleviate these differences by giving preferential treatment to the countries that are most committed to and advanced in reforms (the differentiation principle). But this individual progress will remain limited because of the lack of perspectives and progress in the region as a whole. Disparities with the northern shore will grow wider.

In this context, the projections for economic growth (4 per cent per year in the Maghreb countries and 4.7 per cent in the Mashrek countries), although improving, will be insufficient to meet the demands of a strongly growing population (91 million more people between 2000 and 2025 for all SEMC, including Turkey) and for jobs (34 million new jobs to be created in 20 years just to maintain present-day employment levels).[2] The disparities in incomes between the two shores will remain wide up to 2025 (between one and three, even up to five times in terms of purchasing power parity).

Thus a whole generation of young people will be partially deprived of jobs and prospects. There will be strong social dissatisfaction and much pressure for

emigration. Another consequence will be the relative weakening of the economic power of Europe, which, with its 'neighbours', will represent no more than a fifth of world GDP by 2050 instead of the current one-third (giving way to Asia, with North America maintaining its position).[3]

These trends could result in growing risks of instability, a source of potential conflict. The Mediterranean and Europe as a whole (and the world in general) will suffer the consequences. An evolution towards even darker development paths (such as under a 'fortress scenario') cannot be excluded.

Internal disparities

The risk of domestic disparities is no less worrying. In all countries, urbanization along the coasts and social and territorial disparities will increase, especially in transition and developing countries.

A rural revival will remain limited in the developed countries of the northern shore, and a *marginalization of inland areas* will be confirmed and strengthened in transition and developing countries. Serious signs of decay and rural-to-urban migration will appear in the still highly populated mountainous areas of the northern shore (for example in Albania). Problems of desertification and rural poverty will be much more serious (and may increase with changes caused by free trade and desertification) in some fragile regions of the south and east (mountains, arid plateaux). This will result in precarious social situations and increased recourse to emigration. Lacking prospects in cities or abroad, rural populations in these countries will, however, remain large (little or no reduction in absolute terms) and socially marginalized. Differences in standards of living between cities and rural areas, and the very strong agricultural duality that is characteristic of several countries (the contrast between subsistence farming and modern agriculture) will be maintained or even strengthened.

Even with developments of agricultural policies, irrigated agriculture (an increase of 6 million hectares projected between 2000 and 2025) will continue to benefit from a polarization in investments that will exacerbate pressures on limited and already sorely-tested water resources.

The growth in SEMC agricultural production projected under the baseline scenario (50 per cent) will not, however, result in reducing a trade deficit in agricultural produce.

But more than anything else, it is *urban growth* that will put a mark on the next 25 years. The southern and eastern shores will have to absorb 98 million more people between 2000 and 2025, a good third of which will be in the urban areas of coastal regions, with 20 million along the coastline itself. The vigour of this urban expansion will continue to pose the question of the economic development required to meet it, especially in middle-sized cities, not only in large urban areas. Urban planning will be severely stretched with the continuation of unregulated housing. Local authorities, lacking any real resources for action, will have difficulty in responding to the increasing demand for basic services and infrastructures. The risk of developing new urban poverty is high.

The number of Mediterranean people (both rural and urban) earning less than US$2 per day and without access to water (30 million people in 2000), sanitation (29 million) and electricity (16 million) may thus remain high in many countries.

Urban issues will evolve differently in the northern shore countries with very moderate population growth, where a process of suburbanization and dispersal of population and employment will continue to predominate. In such a situation, urban planning will not manage to compensate for the powerful mechanisms that encourage urban sprawl (the real estate and housing market, transport). The expansion of motorized travel will significantly increase fuel consumption, polluting emissions (CO, NO_x and CO_2) and the proportion of household budgets devoted to transport.

Despite resource stress, this consumption model and urban sprawl, with its high energy and environmental costs, will also develop in the south. Indeed, before 2025 we will see mass motorization (as exemplified by what is happening in Lebanon), boosted by a fall in car prices.

Another large growth sector is *tourism*, with drastic assumptions under the baseline scenario (273 million more tourists in 25 years, including 137 million in the coastal zones). The destinations in full growth in the eastern Adriatic and the southern and eastern regions will be particularly affected (Turkey, Egypt, Croatia, Morocco and Tunisia). But the development will also spread to other coasts (Libya, Algeria, Syria, Albania and Serbia-Montenegro). These countries will see a large increase in domestic tourism. A rise in tourist flows is also projected for the 'mature' destinations in the more developed countries of the north-western quadrant.

Although tourism will continue to be an engine for economic growth, there may be insufficient contributions from tourism to local economies and sustainable development in the region, so threatening a *risk of crisis*. An excessive focus on seaside tourism, the power of large tour operators and competition between countries is tending to result in a standardization of products. This could result in a relative drop in tourist expenditures, of which only a small share gets back to local inhabitants. The repercussions may prove high at the socio-cultural level (loss of identity and a large number of poorly qualified, temporary jobs), the economic level (a fall in income and deterioration of buildings) and the

environmental level. Concentrating pressures on the summer season and coastlines will result in over-construction of infrastructures. And with investors seeking out the best venues, this concentration will contribute to increasingly artificial coastal fringes. Land consumption will be higher in destinations where the development of holiday-home tourism, rather than stimulating tourist accommodation companies, has been fostered. Some of the most important impacts from tourism will be pollution from increased transport, which will get worse as holidays become shorter but more frequent. Over-dependence on tourism (moving towards a single activity) will also be a risk in some regions (weak economic resilience, crises in the event of geopolitical instability, loss of territorial identity and socio-cultural effects).

Expanded *transport* will become a major issue in the coming quarter century. In the context of accelerated free trade, maritime traffic (the Mediterranean already handles 30 per cent of traffic in the world) may grow by 270 per cent over 25 years, and freight traffic (road, rail and air) by 150 per cent. This rise, greater than economic growth, will particularly affect road transport with serious territorial and environmental impacts. With urban sprawl and increased tourism, the demand for individual transport will grow in parallel. Passenger traffic could well double and air traffic increase by 90 per cent.

To meet their demands, the SEMC are projected to experience significant growth in their *industrial sector*. Cement and steel production could increase by as much as 150 per cent and 138 per cent respectively. The number of sea-water desalinization plants will grow significantly in all resource-poor countries, including Spain. More than 220 power plants may also be built (including 160 new thermal-power plants). A large part of these industrial structures will be concentrated along the coasts.

Projected developments in cities, industries and transport combined will trigger a strong rise in *energy* demand. Between now and 2030 this could nearly triple in the SEMC. Fossil fuels will provide 85 per cent of this demand. In non-producing countries, it will be accompanied by increased energy dependence, and all countries will see a significant rise in greenhouse gas emissions.

In both north and south development patterns appear to be unsustainable today, and this will become worse.

A neglected environment

The developments under the baseline scenario would have serious consequences for the Mediterranean environment.

Soils would be especially affected, both by urban sprawl and by the crisis in rural areas. Degradation of soils and vegetation cover by desertification (salinization, wind and water erosion, deforestation and the degradation of grazing and cultivated land) would continue at the present pace and could even increase in some regions.

This desertification, which already affects 80 per cent of the arid or dry zones of the southern and eastern Mediterranean, would result in new, irreversible degradation in these areas. This could mean more than 1 million hectares being more affected between now and 2025 (it is difficult to give a precise figure because comparable data and time series are lacking). Accelerated degradation of soils in upstream catchment areas would result in the gradual filling-up of reservoirs; the 21st century would be characterized as the post-dam era.

The change of agricultural land into urban land and infrastructures would be as irreversible and problematic, if not more so, because of the high productive value of agricultural land in all areas around the Mediterranean. More than 1.7 million ha of prime agricultural land (on coastal and fluvial plains) could be lost by 2025.

Up to 2025 *water stress* would continue to increase markedly in the southern and eastern Mediterranean, with 63 million people having less than 500m^3 per capita per year (a threshold defined as a 'shortage'). Because of the increased demand for agriculture and urban water and the scarcity of freshwater resources, one country in three would have to draw more than 50 per cent of its annual volume from renewable natural resources. The portion of non-sustainable water supplies from fossil or overexploited sources would increase (up to 30 per cent in Malta and Libya). Under these conditions some fossil resources would be rapidly used up, and coastal aquifers would continue to be destroyed by salt sea-water intrusions. The quality of water and aquatic systems would also be affected in the SEMC by an increase in industrial and urban waste and the reduction in supply resulting from increased withdrawals. The minimum flows needed to maintain biodiversity in aquatic systems (lakes, rivers) is difficult to estimate and is rarely considered to be an important issue. The retreat of *wetlands* is likely to continue under these conditions; they would also suffer from the construction of infrastructures, real estate and tourist complexes along coastlines.

The effects of *sudden natural hazards* (floods, mudslides, earthquakes, volcanic eruptions and forest fires) would have increasingly serious consequences. The already high costs would probably increase further under the combined effect of increased hazards and vulnerability. Global warming would, among other things, increase climate hazards and risks (intensifying the problems of drought, torrential rains and floods) as well as the water stress typical of the eco-region. Rising sea levels would threaten low-lying coastal areas (deltas) in the long term,

some of which are highly populated; and warming may well disturb marine ecosystems (intensifying biological invasions and the 'tropicalization' of the sea). But global warming is far from being the only cause of increasing natural risks. The decline in agriculture with uncontrolled growth in the north of highly combustible biomass, increasing artificial use of soils, the reduction of natural flood plains and continuing construction in high-risk zones or construction poorly adapted to risks, are among the many factors that considerably increase vulnerability. The baseline scenario projects increased risks and costs due to major fires (in the north) and flooding.

The uncontrolled development of urbanization and insufficient public transport systems would contribute to degrade the *urban environment*, except in some ancient centres where programmes of renovation, development of public transport with reserved lanes, and restriction of car traffic will be confirmed. Congestion, having already high annual costs (estimated at some US$41 thousand million) especially in the north (US$14 thousand million in France alone, compared with US$1.6 thousand million in Turkey and US$400 million in Egypt), will increase with the growth of urban areas and the expected mass motorization. It would be accompanied by reductions in air quality and an increase in the number of people exposed to noise (32 per cent of Turkish people could be affected by 2025). *Waste* would also be an ever more serious problem with waste generation more than doubling in the northern Mediterranean Countries (NMC) and tripling in the SEMC. Given the poor supervision of dumping sites in the SEMC, this increase in waste generation will have a detrimental effect on the pollution level of soils, water and air. Impacts on health would be noticeable.

Overall Mediterranean development would contribute to an exceptional concentration of pressures and impacts on the coastal plains, particularly near the *coastlines*. The permanent population density and tourists (during the peak months) per coastal kilometre could reach record numbers (3300 people per coastal km by 2025 compared with 2300 in 2000). The simultaneous growth in urbanization, tourism and infrastructures would confront societies and governments with major problems, answers for which would be difficult and costly.

By 2025 more than 5000*km of coastline* may be built up, bringing the percentage of artificial coasts to about 50 per cent of the total (only a rough estimate due to a lack of detailed available data). Coastal waters would also see biological invasions, which would only be exacerbated by warming seawater and expanded maritime transport. *Caulerpa taxifolia* seaweed could significantly change the Mediterranean marine ecosystem. The quality of ecosystems and coastal landscapes (both land and sea) would be greatly affected: there would be more coastal erosion, loss of biodiversity and fisheries production. Fisheries would fall victim to degradation of the marine environment and overexploitation of fish stocks (already occurring) with prospects of higher job losses.

With a nearly tripled maritime traffic on such a limited sea, the baseline scenario projects increased risks of *marine pollution* by ships. Although the vast majority of this pollution is of an operational nature, serious pollution from accidents has to be feared because of the large proportion of ships carrying dangerous products (nearly 42 per cent contain chemicals and hydrocarbons), the present state of the fleet (the average age of some national fleets is well beyond 20 or 30 years), and the number of recorded accidents (311 in the past 23 years, including 156 that resulted in hydrocarbon dumping). The coastal economy of several countries would be seriously affected, especially that of coastal regions that are over-dependent on tourism.

The *accumulation* of multiple *environmental pressures* and impacts would inevitably result in degradation of very valuable common goods on a global scale, including the loss of terrestrial (including agriculture) and coastal biodiversity, the degradation of Mediterranean landscapes and historical and cultural heritage (sites and monuments).

Apart from the loss of an irreplaceable potential for future economic development (bio-technologies), the loss of biodiversity would diminish the ability of ecosystems to adapt to future change (loss of resilience). Several symbolic Mediterranean species (monk seals and turtles) and many species related to forest, pastoral and wetland environments could disappear forever.

The Mediterranean region would see its portion of worldwide greenhouse gas emissions increase from 7 per cent in 2000 to 9 per cent by 2025. With an additional 1.4 thousand million tonnes of CO_2 emitted by 2025, the region would thus increase its contribution to global climate change, while at the same time suffering from the effects mentioned above.

The *annual global costs* of these multiple negative impacts, which already amount to several percentage points of GDP, would rise.

Facing sustainable development challenges

Prospective work makes it possible to make warnings about future risks and problems, but it can also help in building up other future outlooks. The future is never pre-ordained, and the ability of societies to adapt to new challenges or anticipate events in order to remain masters of their fate should not be underestimated.

Principles and objectives of an alternative scenario

This report envisages a win–win scenario for the Mediterranean that is characterized both by stronger economic growth in the SEMC (and thus a gradual convergence of incomes between the two shores, requiring annual GDP growth rates of about 7 per cent) and a better integration of the environment and development.

The report has not delved into great detail on the general question of SEMC *economic growth*, since many other specialized publications tackle this.[4] In general, they stress the efforts required in terms of investment and incorporating technological progress aimed at improving productivity: better labour organization, upgrading production systems and infrastructures, encouraging innovation, improving the quality of products, and, last but not least, training scientists and technicians (who can be encouraged to remain in their countries[5] by financing university programmes and local research centres). They emphasize the profound reforms needed to institute or strengthen the principles of a rule-based state, redefine the steering role of government, improve governance and make that the economic and social actors, companies, administrations, local authorities and households evolve towards new forms of behaviour adapted to a modern market economy (see in particular the UNDP reports on human development in 22 Arab countries).

The *alternative scenario* is based on the assumption that, by 2025, the Mediterranean economy will largely be based on the quality of its environment. It assumes that the ambitious responses of integration and anticipation will have materialized so as to avoid the dead ends projected under the baseline scenario and give more value to the natural resources and territories in the region. A shift to such an alternative development path would enable considerable economic benefits. Even though some objectives would be harder to attain than others, the many concrete examples given in the various chapters of this report show that such a shift is not impossible.

The alternative scenario inverts the rationale that prevailed in the baseline scenario. This relied on end-of-the-pipe approaches, where it is assumed that economic growth can provide the financial means required to repair environmental and social damage that it caused in the first place. In contrast, the alternative scenario relies on a more *integrated and forward-looking approach*, based on development patterns that use resources carefully, integrate and give value to the specific strong points of the Mediterranean eco-region, and contribute to reducing the risks of internal disparities, thus resulting in greater *cohesion*.

Anticipation is especially important for the transition and developing countries, because these countries generally have limited natural resources, and will continue to experience major demographic changes and economic transitions. They will be particularly interested in integrating environment with development from the very beginning and in planning ahead in order to avoid the degradation and costs observed today in the developed countries of the north. These will be constrained to correct their consumption and production practices and consent to costly repairs for restoring lost quality.

The strategic importance of environmental, regional and worldwide public commons (the sea, climate, biodiversity) and the situational difference between the two shores call for the implementation of the principle of both *common and differentiated responsibility*. Responsibility is *common* because the degradation of these common goods, no matter where it happens, affects all countries. It is *differentiated* because the most-developed countries are generally the main polluters (for example the emission of greenhouse gases). However, these countries have the resources and technology to reduce pollution. It is in their interest to invest in the developing countries where the margins for possible progress at lower costs are much greater. Applying this principle will enable a large, rapid and least-cost collective gain. Moreover, by strengthening support for the developing countries, transitions towards sustainable development can be accelerated. The clean development mechanism set out in the Kyoto Protocol and the Global Environment Facility are a first manifestation. The alternative scenario assumes a general application of this principle in several sectors.

To unblock the deadlocks of current trends, the alternative scenario focuses on sustainable cities and towns, revitalized inland areas, protection and enhancement of natural and cultural heritage, and changes in behaviour. The objectives for curbing trends have been specified in the six thematic chapters in Part 2 devoted to water, energy, transport issues, and urban, rural and coastal areas (the cross-sectoral issue of tourism is considered in the last two chapters). The orientations proposed can be grouped around *four major objectives*, which are both complementary and interdependent:

- protecting the natural and cultural heritage and preventing natural risks;
- decoupling economic growth from pressures on the environment;
- reducing internal disparities and promoting in-depth development of countries;
- creating added value by enhancing specific Mediterranean assets, in particular the wealth and diversity of its heritage, and exploiting synergies between activities.

Protecting the natural and cultural heritage and preventing risks

No development can be sustainable if irreversible processes that affect the fundamental common good are not discontinued. To succeed on an alternative development path in the region, priority issues include the protection of the sea, climate, soils, biodiversity and the cultural and landscape heritage, and reducing natural risk-related vulnerability.

Protecting the sea and coastal zones

The coastal zone, terrestrial as well as maritime, is the most valuable, most coveted and most threatened of all Mediterranean areas. Its social (freely accessible public spaces), cultural and economic values are considerable. It is a unique heritage: original highly valued ecosystems with multiple functions (water purification, biodiversity, a basis for fisheries and aquaculture), sites, monuments and landscapes of exceptional quality. What is particularly serious is its degradation by pollution and artificial land cover. B*alanced development* of coastal zones and *ending their continuing degradation* are major objectives of the alternative scenario.

However, sustainable coastal zone management is made difficult by the large number of actors, sectoral policies and short-term economic interests involved, resulting in situations that are often incompatible with public interest. The absence of political and administrative institutions in charge of coastal zones does not facilitate appropriate handling of the problems. However, several responses have been initiated, which show that progress is possible.

The Barcelona Convention with its protocols and the Mediterranean Action Plan (MAP) have been strengthened, and strategies and action plans have been or are being adopted (combating land-based pollution, preventing maritime pollution, the biodiversity programme and the 100 Historic Sites Programme). One condition for their success will reside in the ability to mobilize actors and donors at the right level so that a widening disparity between present and future member countries of the EU (who benefit from directives and cohesion funds) and the other Mediterranean-rim countries can be avoided. Synergies between MAP, the Euro-Mediterranean Partnership (EIB and MEDA) and international funds for the environment need to be strengthened in order to help the developing Mediterranean countries to upgrade their capacities (monitoring systems) and environmental protection infrastructures (pollution treatment and fitting ports with waste-reception equipment).

Although the proportion of protected coastal areas is growing (as seen recently in Egypt), it remains small. Other tools (coastal zone laws and agencies, economic instruments and integrated management programmes) have been initiated in some countries, resulting in noticeable progress. In France, for example, implementing a coastal area law and a coastal conservation centre, and mobilizing public opinion, land-owners and associations, some political decision-makers and judges have made it possible to limit urban sprawl along the coasts, push back second-line urban pressures, and protect and enhance a number of exceptional natural and cultural locations. Regional strategies and approaches for integrated coastal area management have been successfully initiated in the very de-centralized countries such as Italy and Spain. Local authorities, companies and NGOs have initiated exemplary projects in all countries.

However, this progress remains insufficient on the scale of the entire Mediterranean perimeter. To ensure sustainable management of coastal zones, new, more encompassing and ambitious initiatives need to be designed and implemented without delay, keeping in mind that for some regions it is more a matter of restoring artificial and already very degraded coastal land, whereas elsewhere the issue is to integrate the fragility of the natural environment into development choices. One goal suggested in Chapter 6 is to achieve a sustainable conservation and management of additional 4000*km of coastline* between now and 2025.

The implementation of a coastal areas protocol under the Barcelona Convention would go a long way in helping countries provide themselves with the tools for protection and integrated management. It would constitute a legal innovation at the international level.

The sustainable management of coastal areas would also benefit from strengthening other action frameworks that contribute to this objective, such as the RAMSAR Convention on wetlands, the General Fisheries Council for the Mediterranean (GFCM), and through improved synergy with MAP. The alternative scenario assumes in particular that the objective of protecting wetlands is taken into account in national water policies (quantification of water demands for ecosystems), as well as a development of fisheries that is based on an ecosystem approach. Fisheries regulations could become a powerful tool for protecting and managing the seaward aspect of coastal zones in a sustainable way. To achieve this, a much more resolute collective commitment within the GFCM will be necessary by the Mediterranean-rim countries and the EU.

Conserving water, soil, terrestrial biodiversity and landscapes

A major component of the alternative scenario concerns strengthening awareness and the effectiveness of policies to protect agricultural land and conserve water, soil, forests, biodiversity and rural landscapes. Such an

alternative development path will have to be typified by progress in three complementary directions.

The first priority is to significantly reduce *desertification* in the mountains and arid plateaux of the southern and eastern developing countries. Very rare examples show the possibilities and effectiveness of integrated and participatory processes for sustainable management of pastureland and forests, especially in Morocco (see Chapter 5). Cultivation techniques are also being implemented to reduce soil erosion. These practices should become more widespread.

The second priority is to increase the relative percentage of protected areas (currently 7 per cent) and above all to make the role they play more important by favouring formulae such as *natural regional parks* or *biosphere reserves*, which favour the involvement of local communities and make them benefit from the protection and enhancement of their natural and cultural heritage. Several examples in the developed countries of the northern rim demonstrate the effectiveness of this approach. Achieving success requires resources for action in local development. A rapid development of these formulae in the entire Mediterranean perimeter is especially desirable, particularly in mountainous areas.

The third priority should result in reducing of at least one-third of the projected loss of *suburban agricultural land* between now and 2025.

The implementation of sustainable rural development policies and management plans through law enforcement would enable progress in these directions. A more resolute application of conventions on desertification and biodiversity should be encouraged, as well as development along these lines of policies for agriculture, forests, water and soil conservation and nature protection. Relaunching regional cooperation mechanisms (especially the FAO *Silva Mediterranea* network between forestry administrations) could contribute to progress in this area.

Reducing natural risks

The alternative development path calls on countries to resolutely commit to *preventive measures* to reduce an increasing vulnerability to natural risks and the resulting economic and human costs that have become unacceptable. Such measures would complement the very costly corrective responses that are currently being developed. In particular, what is needed is to develop instruments aimed at effectively banning construction in certain high-risk zones (flooding, mudslides and fires), promoting well adapted (present and future) risk-resistant construction and avoid excessive artificial land cover along shorelines and in upstream catchment areas. To reduce the risk of forest fires, a preventive approach would result in improved forest and agricultural policies in sensitive areas (reintroducing forest grazing, planting of more fire-resistant trees such as olive and almond trees, and agricultural fields). A regional structure for cooperation and risk-sharing could be implemented with the support of local authorities.

The alternative development path also requires a real mobilization of countries to contribute to mitigating global warming, through an exemplary implementation of the *Kyoto Protocol* mechanisms (see below). And, finally, a better assessment of the possible risks of the development of genetically modified organisms (GMOs) for the eco-region should be undertaken.

Decoupling economic growth from pressures on the environment

One of the major components of the alternative scenario is the decoupling of economic growth from pressures on the environment (pollution and resource consumption). It aims to reverse the trend that makes economic growth dependent on a parallel, if not stronger, exploitation of the environment, leading to an ever greater irreversible degradation of natural resources and ecosystems. By creating a high added value per unit of natural resource consumed, both a *reduction of negative externalities of the economy* on the environment (levies on resources and pollution), which are in fact paid for by all of society (especially its poorest members), and *large financial savings* are possible. It is also a way to attain the objective of protecting environmental common goods, since it contributes to ensuring the sustainable management of renewable resources, delaying the exhaustion of non-renewable resources, and reducing pollution.

Decoupling would enable the region to commit to a double *win–win development* (the environment and development, north and south).

Recent progress made in the *industrial sector*, through the adoption of cleaner production technologies, demonstrates the possibilities and the economic and environmental benefits of decoupling, both for the business community and for society as a whole (several examples are given in Chapter 6). The challenge for the next 20 years is to accelerate this development (it is a condition for successfully carrying out the MAP programme of reduction of land-based pollution), and, above all, to succeed in expanding it to other sectors of the economy, such as energy, construction, transport and agriculture.

Such an alternative development will not occur by itself. It calls for a break with the current, mostly very demanding, economic, financial and social behaviour that characterizes the region. The accumulation of such behaviour has resulted in enormous wastage and degradation of valuable resources (water, energy, soil, coastlines). Actors should be made more accountable by avoiding waste-encouraging services and subsidies. Strategies and policies need to give an essential place to

demand management as well as to developing *new services* with lower environmental impacts than traditional ones (public transport, renewable energy, desalinization of sea water). These strategies rely on technological innovations and gradual internalization of the external costs of environmental degradation caused during production or operations.

The required acceleration would be facilitated by studying win–win approaches between countries of the northern and the southern and eastern shores. Investors, who still too often finance infrastructure projects that contribute to wastage, have an important role to play in encouraging the implementation of measures and projects that would achieve a successful decoupling.

Decoupling would also be strengthened by re-orienting the Mediterranean economy, which remains too dependent on, and a consumer of, natural resources (for example agriculture/water, tourism/coastal zones, and residential economy/agricultural land) towards new industrial specializations. New technologies and the information economy, which enable a certain dematerialization of the economy, provide new opportunities that are favourable to sustainable development.

Enhancing water supply by managing demand

It is estimated that a quarter of the current water demand could be saved in the Mediterranean Basin without jeopardizing user needs. The largest potential for savings in terms of volume comes from *irrigated agriculture*: this accounts for nearly two-thirds of the total water-saving potential identified in the region (modernizing equipment, organizing and operating irrigation zones). U*rban drinking water supply* accounts for about 15 per cent of the potential savings (with leaks exceeding 50 per cent in some cities). Given its much higher cost, such savings represent a considerable financial challenge. With the dissemination of cleaner technologies the industrial sector also provides water-saving possibilities. All together, it is assumed under the alternative scenario that by 2025 nearly 54km^3 (from a projected total demand of 210km^3) would be saved, thus stabilizing water demand on a Basin-wide scale at its 2000 level.

This orientation would make a large part of the many constructions planned for water supply redundant (dams, networks, transfers, desalinization plants), and their costs, environmental impacts and energy consumption for producing water would be avoided. The potential financial savings have been estimated at about 10 thousand million euros per year over the next 25 years, which represents 30 times the amount of official development assistance currently received per year by the SEMC for this sector. The expenses required for improving management will be markedly lower.

Compared with the conventional approach that focuses on supply, these win–win solutions limit environmental impacts, risks of conflicts, and cost of access to water, and make way for the potential economic growth and stability in the region. For the NMC, where demand is stabilizing, the challenges relate mainly to controlling water-supply costs, which are increasingly passed on to the user, and environmental impacts. Less well-endowed in water and financial resources and faced by an increasing demand, the stakes for the SEMC are considerable and coupled with social and geopolitical challenges. Social, because through the financial savings and the preservation of water quality, it would become possible to approach the Millennium Development Goal and the Johannesburg action plan: halving the number of people without access to clean water or sanitation between now and 2015. Geopolitically, because the dependence of countries would be reduced without new water transfers or recourse to desalinization (which usually requires imported energy) or imports of virtual water via food imports. Some SEMC have understood this and are far advanced along these paths (for example the confirmed policy of demand-control in Tunisia and Israel).

Desalinization is expected to progress in the Mediterranean with technological advances, a fall in costs (already less than US$0.5 per m^3) and determined policies as recently implemented in several countries (Israel, Algeria and Spain). Quantities are relative though: this resource represented 0.2 per cent of the total water used in the entire region in 2000 and could rise to 0.7 per cent by 2025 (compared with 8.1 per cent for re-used water). Although locally essential for meeting urban and industrial demand (or agriculture) in areas with very few water resources, this solution would only be *complementary* to demand-management policies.

Energy efficiency: A strategic priority

Energy poses a similar problem to that of water. It is a crucial resource for development but a major part of the energy resources (at least 20 per cent) is in fact wasted or poorly managed, whereas it could be saved without changing responses to user needs (tackling low efficiency in energy production and distribution systems, energy waste by users).

If the important increase in oil prices seen in recent years, which has not been integrated in the baseline scenario, were confirmed on a longer term, it will accentuate the need for energy saving policies and renewable energy development.

It is, moreover, not possible to envisage that the rising trends between 1990 and 2003 in greenhouse gas emissions by some northern-rim Mediterranean countries (Spain, Greece) will continue, or that the developing and transition countries will continue to be exempted from commitments to the Convention on

Climate Change. It is high time to start preparing for post-2012, which can only entail obligations for each country in a spirit of common and differentiated responsibility.

The alternative scenario favours the win–win search for a *more efficient use of energy* combined with more intensive use of the potential for *renewable energy* (solar, wind), still insufficiently explored. On such an alternative development path it would be possible to reduce dependence on energy supplies and improve the eco-efficiency of supply, while creating jobs in the sectors that need to be developed. The use of cleaner technologies in the industrial sector, especially in the *household sector* (building techniques, household appliance standards), represent opportunities for large energy savings, especially in the SEMC with population, urban and industrial growth in full swing. The *transport sector* has considerable savings potential, but these will be harder to realize.

By following these orientations, nearly 208Mtoe (out of 1365Mtoe) could be saved by 2025 compared with the baseline scenario, or nearly half of the growth in demand projected for the region between now and 2025. Along with these savings, nearly 860Mt of CO_2 emissions could be avoided,[6] as well as the risks of pollution related to hydrocarbon transport. The number of facilities required for energy production and distribution would be reduced (nearly 150 power plants avoided between now and 2025) as well as their environmental impacts and their costs.

A rough estimate of the financial savings at stake by such orientations is about 18 *thousand million euros per year* over the next 25 years on a Mediterranean-wide scale, or 18 times the amount of official development assistance currently received per year by the SEMC in this sector.

In the perspective of the inevitable 'post-oil' phase that the 21st century will experience, technological advance is also an issue, as are millions of jobs that could be created in the fields related to this new knowledge. For the NMC, the premier strategic challenge is to reduce energy dependence and global responsibility for climate change. For the SEMC the social challenge is added to this: access to energy for a greater number of people, facilitated by the financial savings that would result.

Transport: Breaking the current vicious circle

The alternative scenario is based on two priority objectives: developing sustainable transport and promoting more efficient modes of transport, both in the socio-economic and environmental fields.

As with the water and energy sectors, *organizing sustainable transport* implies satisfying transport demands while reducing wastage or superfluous travel. One goal could be a rate of decoupling of economic and transport growth twice that in the baseline scenario[7] (3.3 per cent average annual growth of freight traffic compared with 3.8 per cent in the baseline scenario and 2.5 per cent compared with 2.8 per cent for passenger traffic). Dematerializing economies can play a role in this decoupling, with new technologies offering new opportunities. Spatial planning and urban planning (densifying the urban fabric to reduce distances between home and work, choice of distribution patterns, industrial development patterns) as well as tax schemes would contribute to such faster decoupling. The goals would depend on reorganizing company logistics (for example regrouping distribution points and practices for large stock management), loading of vehicles (particularly higher occupancy rates) and promoting non-motorized modes.

Promoting *more efficient transport* means using public and semi-public transport (the shared taxis that exist in many Mediterranean countries are a solution that deserves greater support) and abandoning the 'all-road' model, which is especially costly at the environmental level compared with other means of transport (gaseous emissions, noise) and at the social level (accidents, high costs of travel, congestion). Opting as much as possible for rail or maritime transport would benefit everyone (both are less polluting and less risky than road travel). The potential exists (especially in the west) for maintaining railroads for combined rail/road/sea transport or for coastal navigation. The rail tradition in the Balkans and Egypt are strong points worth enhancing.

This could translate into a modal shift of about 20 per cent between road and rail (the trans-Pyrenees scenario by 2020) or 5 per cent between road and sea (the Marseilles–Barcelona seaside motorway by 2010, for example).

The construction of infrastructures needs to be rethought by taking their potentially negative impacts into account (urban sprawl, the urbanization and destruction of coastal zones and the degradation of landscapes and biodiversity). It is important to build roads some distance from the coast whenever possible. Unfortunately, in some countries, roads are being built along the shoreline itself, sometimes with support from major donors. Transport safety is also a priority to limit the risks of pollution and accidents, which remain very high compared with the mileage travelled. The alternative development path would also see an immediate transfer to the SEMC (with support from the EU) of technological advances recorded for cleaner vehicles and new pollution standards, including diesel engines equipped with particulate filters, the Euro 4 standard for trucks made operational starting in 2006.

Increased economic effectiveness of transport links between the two shores would make it possible to enhance the advantage of their geographic proximity to

Europe in globalization and to develop domestic markets in the SEMC (cost reductions, inter-modal transfers, services to all regions).

However, these shifts will not be realized without a strong input from the EU, the only one that, in agreement with countries, can regulate regional transport, which is largely predetermined by globalization. Seeking fiscal instruments for sustainable transport and putting inter-modal facilities in place that incorporate the objective of sustainability will require Euro-Mediterranean concerted action.

Such shifts are simulated in Chapter 3 (20 per cent of traffic by rail, a faster decoupling of economic/transport growth than in the baseline scenario, progress in enforcing regulations in maritime accords). They would make it possible to avoid many socio-economic costs by 2025: reduced road, rail and air traffic by between 8 and 10 per cent compared with the baseline scenario; 9 million Mediterranean dwellers spared from road noise; 15,000 road deaths avoided; 41 thousand million euros per year of congestion costs saved; stabilized household expenses on transport (18 per cent of total expenditure compared with 25 per cent). Many negative environmental impacts could be avoided by 2025: 90,000 tonnes less VOCs, 185,000 tonnes less NO_x, 191,000 tonnes less CO_2 and 2.6 million tonnes less polluting waste into the sea.

Cities: Prime candidates for decoupling

Cities are prime candidates for promoting decoupling through lifestyles that are more 'eco-efficient', less wasteful of space, energy and water, and better equipped to reduce pollution at source.

Potential savings are particularly large in the *energy sector* through construction standards for housing, public buildings and street lighting.

Policies for reducing *domestic waste* at source and recycling could, by 2025, result in savings of more than 145 million tonnes of waste per year throughout the Mediterranean Basin (75 million tonnes per year less than under the baseline scenario) with average annual financial savings of about US$3.8 thousand million.

In the alternative scenario, *upgrading* and increasing the density of the urban fabric would make it possible to reduce suburban sprawl and the excessive use of cars by half, improve the living environment and social cohesion and achieve even greater cumulative social, economic and environmental gains, but over a longer term.

This implies strong anticipation in the transition and developing countries in order to avoid the negative and largely irreversible developments of urban sprawl, which accompanied urban growth in the northern countries. Measures would be enhanced if they were put in place in the early stages of development, for example by protecting agricultural land or siting large shopping centres within the existing urban fabric rather than at the city periphery.

For both sides of the Mediterranean, such an alternative development path would be achieved mainly through *closely linked transport and urban planning*. In this scenario, public transport is developed in the outlying areas, including the outskirts and the suburban areas of agglomerations, while the density of the urban fabric is increased, particularly along public transport lines. The objectives of protecting agricultural land and reducing vulnerability to natural risks are also taken into account in planning. Some cities (especially in Italy and Spain) started to implement such orientations as early as 2000 and thus demonstrate that such a scenario is certainly possible.

Agriculture: Better water management and soil conservation

In the alternative scenario agriculture is decoupled from desertification (the degradation of soil and vegetation cover) through new techniques that avoid soil erosion, by better management of irrigated lands to avoid salinization, and through sustainable and participatory management of pastureland and fragile forests.

The alternative scenario also includes a better valuation of *water resources*. The route has already been laid by remarkable examples like the Tunisian strategy for water savings in irrigated agriculture. In Tunisia, success has been ensured by implementing a range of appropriate tools (irrigation associations, targeted subsidies and increased prices) and by a gradual and continuous mobilization of actors that makes them more accountable over time. Putting incentives in place (subsidies for water-saving irrigation equipment amounting to as much as 60 per cent of the cost), and associated improvements in pricing and agricultural performance have been decisive. But no progress is possible in the agricultural world without improvement in incomes. This example shows the need to give an inter-ministerial dimension to water policies. Sustainable management objectives need to be included in each sectoral policy, defined at the national or catchment-area level. The Tunisian example also shows the importance of *subsidies* for successful environmental policies. In the alternative scenario this type of policy would expand rapidly in countries that are not yet very involved in them. The scenario also assumes much progress in *rainwater management*, a sector all too often forgotten although of interest to a majority of farmers.

Shifting to an efficient agriculture would also make it possible to rationalize, and thus reduce, the use of mineral fertilizers and pesticides. The alternative scenario assumes a growth in consumption only half that projected in the baseline scenario. This is often in the interest of farmers, and awareness-raising or

cancelling subsidies for fertilizers could be enough for progress to be made. An increasing demand for organic products would also contribute to less fertilizer and pesticide consumption. There are possibilities for Mediterranean agriculture in this sector, as shown by the Italian example (world leaders) and some recent developments in the south and east. The overall goal for the Mediterranean could be 15 per cent of arable land cultivated under organic agriculture by 2025.

The alternative scenario also envisages a coupling between agriculture and sustainable development, recognizing the positive externalities of agriculture (creating amenities) and consequently the role of *farmers as agents of sustainable development*. This recognition would make it possible to reduce vulnerability to forest fires, maintain *green zones* between urban areas, contribute to rural revival, expand sustainable tourism by safeguarding jobs and quality landscapes, and promote healthy diets.

Tourism and the environment: A necessary reconciliation

Tourism plays an important role in the strategy of decoupling economic growth from pressures on the environment in the Mediterranean. It is absolutely in the *interest* of (or *necessary* for) the sector to stop contributing to environmental degradation and work on its improvement (one of the conditions for its development). Tourism could be an *innovative field*, capable of driving collective progress at destinations, as shown by many examples in the region. In the alternative scenario it is therefore assumed that significant progress will be made in decoupling the sector in several directions:

- implementing programmes to *upgrade* mature and degraded destinations;
- *preventive action* in growing and potential destinations to avoid irreversible degradation of coastal zones as observed at mature destinations. This requires building roads and housing at a distance from coasts, promoting local transport with low environmental impacts (hiking, cycling, buses using natural gas or electricity), accommodating commercial ports for yachting rather than building completely new infrastructures, and developing business tourism rather than building private holiday homes so avoiding excessive consumption of space and land seizure from local populations;
- *minimizing consumption*, emissions and pollution (for example management of water and energy demand and waste). This can be achieved through the promotion of *new technologies* (solar, wind, water management, bio-climatic construction and the internalization of environmental externalities into prices;
- *regulations* for land use to reconcile environment and development and to avoid degradation of coastal zones through unsuitable leisure activities;
- *extending the length of visits and spreading visits throughout the year* to reduce pollution from transport, create more permanent jobs and increase local incomes.

To make such an alternative development path come true, tourism-specific economic and regulatory tools will have to be developed, especially the definition of maximum *accommodation* capacities at destinations and the development of quality charters and labels. An alternative development also assumes the conditionality of public aid and better contribution from tourists to maintain the Mediterranean environment (applying the user-pays principle). Formulas with the *visitor pay back principle*, which would draw lessons from the recent failed experiences in the Balearic Islands, could be developed and applied successfully. For example, duties imposed on boat transport towards islands and at airports could be conceived and implemented. These formulas have several advantages compared with taxes paid only by professional accommodation providers: they encourage longer stays, so reducing pollution from transport, allow significant resources for developing destinations in a sustainable way, and do not discriminate between categories of tourists and accommodation providers.

Successful decoupling also requires a greater contribution from tourism towards enhancing Mediterranean diversity and in-depth development of countries. In this scenario, strategies no longer aim at purely quantitative goals (indicators of the number of beds or tourist flows) but at sustainable development goals (indicators of quality and added value created for local populations and countries).

Reducing internal imbalances and enhancing the Mediterranean heritage

In the alternative scenario, domestic disparities are reduced, social cohesion is maintained and the strong points and specificities of the region in a globalizing world are enhanced.

Reducing domestic disparities and relieving coastal zones

Reducing domestic disparities relies on rural and urban development to alleviate poverty, desertification and social segregation, and relieving coastal zones to reduce the currently proliferating pressures and rebalance tourist flows.

The alternative scenario first assumes that *fragile rural areas* in the developing and transition countries are upgraded.

The issues are social, economic and environmental. At the social level, the goal defined for this alternative development path is to succeed between now and 2025

in reducing most of the disparities currently observed between cities and rural areas. It is assumed that rural illiteracy will be wiped out, and that rates of access to basic services (such as water, roads, electricity, education and health) will be generally improved, approaching the averages in urban areas. At the economic level, a rural revival is assumed to start by improving agricultural productivity (mainly in rain-fed agriculture, too long ignored in agricultural developments despite its major importance) and diversifying activities (for example tourism, handicrafts, industry and services). This will contribute to a growth of domestic markets and national economies, which would, otherwise, remain strongly impeded by keeping a large part of the population marginalized. Maintaining a large rural population also gives the SEMC the possibility to revive rural areas rather than abandon them, so avoiding the developments currently observed in northern countries where revival was started too late to prevent devitalization and abandonment of many mountainous areas. And finally, at the environmental level, it is assumed that combating desertification will be possible through rural development.

Such a scenario implies shifting from what is still a top-down administered development to an accountable development in which adapted rural policies are put in place. This requires basic public services to be upgraded (roads, drinking water and sanitation, electricity, education and health). This could be achieved by structuring rural centres (villages and small towns), stimulating and supporting the involvement of local and professional actors in integrated local development processes, and diversifying the economy. Chapter 5 discussed the importance and difficulties of such policies. Successful examples stress that one of the main conditions is encouraging local development and training. NGOs can play an important part in this.

The objective of reducing domestic disparities also concerns *cities*. The alternative scenario assumes specific preventive efforts (to avoid an explosion of informal residential neighbourhoods where possible, the re-absorption of which is always difficult and expensive) and upgrading actions (improving the living environment in existing poor neighbourhoods). This means ending, as far as possible, the current trends of segregation and exclusion, and making cities 'all-inclusive'. Chapter 4 highlighted the need for more specific support to small and medium-sized cities, which in many countries still lack the capacities for coping with the challenges facing them.

To enable this balanced and in-depth development, the alternative scenario assumes that *coastal zones* will be relieved in favour of inland areas. Chapter 6 assumes a *transfer to inland areas of a third of the additional tourist flows* projected for the coastal regions up to 2025. This transfer would make it possible to reduce the current pressures on coastal zones and coastal agricultural plains and assist in dynamic local development in rural and urban areas. It will require considerable diversification in tourism and policies for territorial management (for example on infrastructures and the development of inland areas).

Enhancing the strong points of the Mediterranean region

Developing the exceptional wealth and diversity of the Mediterranean heritage can be an essential contribution to the economic renewal of the region.

With its bio-geographical, cultural and historic characteristics, the Mediterranean has great potential for another kind of development. The sea, its common element, has always provided many benefits, especially through the trade it facilitates and the exceptional attractiveness of its coastlines. The convergence of geography and history have endowed the region with an exceptionally *rich heritage*: species diversity, unique plant life communities, agricultural products, diet, the beauty and variety of its landscapes, the architectural quality of its historic cities, its incomparable archaeological remains, the diversity of its villages and the wealth of its rural traditions. This cultural heritage has become richer through the contributions of its varied civilizations. Its climate, its landscapes and its lifestyles still make it one of the most pleasant places on earth to live.

Many examples illustrate the need for a heritage approach. Entire regions on the northern shore have managed to emerge from serious economic crises through new strategies based on enhancing heritage and local specificities and adapting to new markets. The wine-cultivating regions are a good example, where renewal has enabled companies and regions to engage in quality policies. Many other examples exist of urban and mountain renewal based on heritage strategies. Some regions have used a high quality of living as a basis for developing technology centres. The northern countries have not nearly exploited all their possibilities; those in the south and east would gain much it they too were to engage in the development of their rich potential.

The challenges are important for cities and for agriculture and rural areas. Under the alternative scenario, which could be called the 'Tuscan development' (after the controlled development of the Tuscany region of Italy), the garden vocation of the Mediterranean would be confirmed in its cities, coastal zones, countrysides and mountains in response to new market demands. The scenario assumes the development of new synergies as sources of added value between tourism, agriculture, industry and handicrafts, which would make it possible to encourage a more qualitative rather than a quantitative development.

This scenario assumes a *reorientation of agricultural, tourism and food policies* based on local certifications of quality, diversification of agriculture and agro-industries towards unique local products, promoting the Mediterranean diet and cultural, rural, agri-, and eco-tourism as well as tourism around conferences. The benefits would be considerable with a changing Mediterranean tourism image through forms of tourism that are complementary to those of coastal resorts, increased incomes from agriculture and tourism for local people, the emergence of new generations of local entrepreneurs who contribute to safeguarding and restoring the cultural and natural heritage, improved satisfaction of domestic and international tourist demand, recognition of the economic value of high-quality landscapes and Mediterranean products, a shift towards healthy diets, and, finally, decreased pressures on the environment. All these aspects would put the Mediterranean in an advantageous position on a world scale.

The alternative scenario in particular assumes a widespread adoption of heritage strategies in the various specific territories. Concerted projects of *urban renewal* involving local people, associations and companies and relying on the heritage identity of Mediterranean cities would increase, like the many experiences already underway (from Tunis to Aleppo, Naples and Genoa to Barcelona and Valencia). In rural areas a reorientation would highlight the unique village lands (*terroir* in French) and natural sites by exploiting all the diversity and typical local heritage. These strategies could result in significant development of territorial dynamics in special project areas. *Biosphere Reserves* and *Natural Regional Parks* could be promoted in natural areas by providing proper technical and financial tools and resources (investment budgets, training programmes and subsidies for projects by local actors).

Striving for more sustainable development

Moving towards the alternative scenario that has just been described will require important changes. It will benefit from *technological advances*, which will certainly increase in the next 20 years, but it will not be possible without basic progress in *governance*, both in individual countries and at the level of regional cooperation.

The 1989 Blue Plan scenarios called for (1) the implementation of national policies that would integrate the environment with development and (2) policies of north–south and south–south regional cooperation. Although all countries have subsequently set up environmental strategies, policies and plans and, increasingly, sustainable development policies, and although an ambitious Euro-Mediterranean Partnership was inaugurated in 1995 between the EU and 12 partners in the southern and eastern Mediterranean, this progress has not yet made it possible to reverse, even marginally, the strong current trends.

There is, therefore, a need to examine the *constraints* that explain this lack of success and the conditions that need to be created to overcome them. The analyses in the previous chapters highlight a number of weaknesses and paths to progress.

The main weakness is most certainly the *insufficient mobilization and accountability of the various professional and local actors* for sustainable development. This elicits questions about the 'governance' of sustainable development in the countries. The issue of governance calls, in particular, for new forms of dialogue and *participation*, expressed by more fluid relationships between governments and public institutions, and the private sector and civil society. This opening up should be manifest both in the early stages, through transparency in deliberation and decision making, and further down the line in the effective implementation of policies. Even in the countries where the decision-making process has really been opened up, much remains to be done to improve participation and public debate, for example by increasing opportunities for consultation, diversifying forms of consultation, strengthening pluralistic expertise and through the framing of procedures. It should also be stressed that participation is only one side of the coin, the other being *responsibility*, which calls for defining common rules and commitments that each side should adhere to.

The alternative scenario also assumes significant progress in *regional cooperation*, which is currently insufficient and has not yet really integrated the principles of sustainable development.

Obstacles to be overcome

A slack economy that lacks innovation

The region suffers from an *entrepreneurial deficit* and a *lack of innovation*. This weakness owes much to the slack and 'mining' nature of the Mediterranean economy: seeking maximum income sources (land/real estate, commercial monopolies) rather than added value from directly productive activities; exporting manpower and executives (brain drain); and excessive polarization of the economy by exploiting natural resources (agriculture/water, tourism/coastal areas, energy/hydrocarbons).

The *financial sector* in many developing countries is dominated by a banking system that has a near-monopoly of savings and has remained fairly traditional despite slight progress made since the 1990s. This is expressed in high real interest rates, poor access to financing for small and medium size enterprises, little encouragement for

innovation and difficulties in financing sustainable development (for example energy savings that often require an immediate overcharge for a deferred benefit and innovative relay devices). Expenditure on *research and development* is particularly feeble, and *training institutions* are not sufficiently committed to creating enterprises and local development.

Declining and undervalued links between society and the environment

The specificities of the Mediterranean environment and culture have, over the centuries, favoured the development of extensive well-adapted know-how. The past few decades, however, have seen a clear reduction in this know-how. The decline has been especially marked in regions that are undergoing various rapid changes, including rural-to-urban migration and urbanization, accelerated development of standardized tourism and a residential economy, and conflicts and population displacements. There are many indicators of this decline, including buildings that are poorly adapted to the climate and risks; abandonment of town planning practices that had created the beauty of Mediterranean cities; a regression of collective rules for sustainable management of land and water, soil, grazing-land and forest resources; and a retreat from the Mediterranean diet just when its qualities are being recognized and promoted elsewhere in the world.

The move of economic and technological centres towards the northern hemisphere has contributed much to this. For several centuries, the models for consumption, development and administrative organization have been designed in the north. For the past few decades the Mediterranean has copied these exogenous models, which are poorly adapted to the Mediterranean's specificities. At the same time, insufficient benefit has been derived from its particularities to carry out research and development that is adapted to those characteristics, or to assume a significant place in worldwide innovation.

Poorly adapted systems of public administration

Despite their economic, environmental and social advantages in the mid-term, priority actions identified in the alternative scenario are often difficult to finance in the real world of either the NMC or the SEMC. One of the reasons is that the benefits are not always monetary, they are deferred to the future or do not benefit the investor.

The room for manoeuvre for *governments* in budgetary terms is limited, even in the more developed countries of the northern shore. Many obstacles can paralyse actions by governments: efforts to try to satisfy demands from diverse categories; a natural tendency to add levels, structures and services without ever removing any; reducing expenses in all sectors in proportion to the budget without a real budgetary choice; the permanence in some parts of the Mediterranean of conflict situations; and the difficulty some governments have with relinquishing tasks that can be addressed by the private sector. All these obstacles limit the abilities of governments to play their fundamental role of being 'strategists' for sustainable development.

Budgetary problems are particularly troublesome in the SEMC, where countries will face enormous requirements in the coming decades for their social and economic development and environmental protection with only limited public financial resources. In particular, the very heavy weight of sovereignty expenses and debt servicing are worth recalling. Tensions and conflicts in the region, moreover, explain the large proportion of national budgets devoted to security and defence (between 3 per cent and 7 per cent of GDP compared with a world average of 2.3 per cent). The weight of public sector salaries is also a major element of expenditure. On the other hand, capital expenditure (from 5–8 per cent of the GDP) and research and development expenditure (0.6 per cent in the SEMC compared with a world average of 2.3 per cent) are limited.

Another important obstacle is the *lack of integrated policies* and policy inconsistency. Economic policies have remained highly sectoral (tourism, transport, agriculture, etc.) and in general continue to favour traditional supply approaches (major irrigation, roads, seaside resorts, hydrocarbons), with little integration of environmental issues. Environmental policies basically remain top-down, command-and-control and regulatory; implementation is often hard and beleaguered by a lack of resources (e.g. number of inspectors) or by effective and dissuasive sanctions. Initiated by new administrations with weak authority and inter-ministerial power, policies have little encouraged local mobilization and have not succeeded in promoting the upfront integration of environmental concerns into consumer and production patterns or into economic and sectoral policies. The incentive, taxation and regulatory mechanisms for sustainable development are insufficient, which encourages overexploitation of natural resources, especially water, soils and the coastal zone.

Local authorities in most developing countries in the region do not have all the necessary capacities to act effectively for sustainable development. In the southern and eastern Mediterranean, the share of expenditure by local authorities compared with total state expenditure is one of the lowest in the world. In rural areas and coastal zones, many participatory and undeniably successful projects have only been able to operate through outside support and ad hoc facilities placed outside the usual administration systems (for example the GEFRIF project in Morocco). In many countries

protected areas do not have the resources to act as a laboratory for development.

The more developed *decentralized systems* that exist in several EU-Med countries do not necessarily address long-term issues. All too often, local authorities have developed strategies driven by short-term financial and electoral gains (land tenure opportunism and vote-catching), which have only accelerated a wild urbanization of coastal zones, reduced productive activities and degraded the living environment and identity of specific territories. Decentralization policies have also led to unnecessarily multiplied levels of administrative decision-making procedures (particularly in France).

International and regional cooperation that is not up to the challenges

International and regional cooperation is not yet up to the challenges to be met. It has had the merit, however, of signalling, both at the international and regional level, the need for a change towards sustainable development. Nevertheless, the vision remains insufficiently shared and is seldom translated into strategies or action programmes. The gap between speech and reality remains considerable.

The major global actors are encountering difficulties developing a convergent approach for tackling the vital problems of the planet, whether these concern the loss of biodiversity, mitigating the greenhouse effect, reducing poverty or resolving conflicts in the Mediterranean region.

Donors and the major actors in regional and international cooperation, although increasingly making reference to international or regional commitments relating to sustainable development (for example those formulated in Rio, Kyoto, Monterrey, Johannesburg, the EU sustainable development strategy), are still having difficulties in changing their strategies and methods. For example, economic reforms undertaken at the advice of international financial institutions and the EU have mostly put the accent on reducing the role of states, trade liberalization (without lifting the barriers to the free circulation of individuals), removing subsidies, and privatization, rather than improving the performance and competitiveness of local and professional actors or facilitating better relationships with governments to engage in processes of sustainable development together.

An analysis of the official development assistance to the Mediterranean countries shows that the share devoted to the environment, urban and rural development, fisheries, agriculture and forestry, rail transport, human capital and democracy remains relatively limited: on average 19 per cent of the total over a period of 30 years.[8]

In this general context, the EU is a unique example of regional integration. It nevertheless still has difficulties in integrating sustainability into its actions.

Insufficient awareness and information

With increasing problems, awareness has improved significantly, so that sustainable development has become a popular subject in the media and in economic and political speeches. Socio-economic, environmental as well as ethical considerations are contributing to this and reminding us that our societies rely on value systems that are powerful determinants of future developments.

However, the concept of sustainable development has remained vague, largely due to a *poor understanding of the issues and the potential benefits* of sustainable development policies, especially those of decoupling. One of the weaknesses is derived from the reluctance of decision-makers to evoke and analyse certain failures of consumption patterns in the developed countries. As for the capability to develop and structure information that truly helps in decision making, mobilizing various actors and getting them to become accountable, it remains insufficient.

A first weakness is related to the *available data*. Of the 130 indicators for sustainable development adopted by the Mediterranean Commission on Sustainable Development and selected on the basis of criteria of relevance and availability, only 60 are regularly documented by countries and used by international institutions.[9] This reveals a paradoxical situation: there is a considerable amount of data available but of little use, while few but essential data are lacking. The many gaps concern in particular:

- There is very little information that is comparable over time and between countries on the state of the environment (for example water and air quality, biodiversity) and land use. In most developing and transition countries, laboratories, monitoring stations and appropriate methodologies are largely lacking. The environment is also a new field for statistical departments. They are, however, structuring and acquiring experience in this field, especially due to the strong impulse given since 1999 by the Euro-Mediterranean Medstat Environment Programme for the 12 partner countries of the EU.
- There is poor understanding of negative externalities (the costs of the impacts of degradation) and positive externalities (amenities) of economic activities on the environment. Heritage accounting, which takes non-commercial capital and degradation into account, is either non-existent or insufficient. The costs and effects of environmental degradation on health remain poorly measured. And, similarly, the real effects of tourism on local destinations are inadequately quantified.

- Specific territorial information is inadequate, even in the most developed countries. There is not enough information to follow up strategic questions about the environmental and socio-economic evolution of cities, coastal zones and various kinds of rural areas such as mountains. Follow-up on 'Mediterranean' issues should also call for detailed data on the scale of coastal regions. This is rarely the case because of the absence of an official and operational definition of these areas or because of different definitions in countries, which does not facilitate international comparisons.

A second weakness relates to a lack of *policy assessment* in the light of sustainable development (ex ante and ex post assessments of public policies, impact assessments of plans and programmes,[10] monitoring methods and periodic re-examinations). Adapted analytical tools, such as strategic environmental assessments of sectoral plans and programmes and cost–benefit analyses of different options, carried out beforehand, would make it possible to direct choices towards win–win strategies, but such tools are seldom applied. In any major sectoral programme (transport, energy, industry), planned measures result in positive and negative impacts in other fields that need to be understood if they are to be corrected. The present inconsistency results from a lack of integrating analytical tools, a reluctance to effectively open up deliberations (if not decisions) despite a growing recognition of the need for participation, and a lack of real political will to change the ways things are done.

Strengthened by the first two weaknesses, the third relates to the lack of capacity to structure and disseminate summarized information for sustainable development. Of course all countries, and many companies, are producing reports and strategies on the environment and increasingly on sustainable development. Some southern and eastern countries have managed to implement their first environmental and sustainable development observatories or equivalent agencies, which have produced worthwhile reports. But monitoring and assessment facilities generally remain weak. It often appears difficult to shift from a static or purely statistical approach in environmental observation towards a dynamic and prospective approach relying on a new generation of indicators and producing information more likely to be of interest to, reach and convince political and economic decision-makers.

Towards governance for sustainable development in the countries

This report identifies three major levers of progress in governance for sustainable development:

1 decompartmentalization of policies and integration of the environment in economic and sectoral policies;
2 promotion of specific territorial approaches of sustainable development;
3 an enabling framework with new tools and methodologies.

Decompartmentalizing sectoral policies and integrating the environment into economic policies

The alternative scenario assumes a strong integration of environmental concerns and sustainability into the various economic policies.

This integration has started in EU fisheries and agricultural policies. Indeed, after an initial phase of agri-environmental measures, the entire common agricultural policy is being reformed with the introduction of eco-conditionality principles in assistance and the launch of the second pillar relating to rural development.

Integration is also making progress in developing and transition countries. Examples are the reorientation of agricultural policy in Tunisia based on a water-saving strategy in the irrigation sector, and the success of Egypt that has become the eighth leading country in the world in using natural gas in vehicles (52,000 vehicles).[11]

Shifting developments in the region to those described in the alternative (decoupling) scenario requires a strong acceleration of integration efforts and an evolution towards *innovative and integrated supply and demand policies*. Challenges are especially important in the sectors of water (and thus agriculture), energy (thus housing) and transport. Particular attention should be paid to tourism policies given their importance in the region and the possible benefits of their reorientation.

The alternative scenario also assumes a reorientation of *environmental policies* in the following three directions:

1 First, environmental policies would gain much from a better integration of cultural, social and economic aspects, especially when their success depends on economic and social progress and on the know-how of local people, as is the case in rural areas. Such integration will also be important in policies on waste management and public transport, where developing countries would gain by avoiding European-like developments, which are often costly and do not create much employment.

2 Second, they would gain by acquiring a more strategic dimension. The struggle against climate change and the sustainable management of water resources require long-term visions and strategies that could be included in each sectoral policy.

3 Third, they will have to ensure risk prevention and protection of environmental common goods through powerful measures (protecting coastal zones, agricultural land and valuable ecosystems, construction bans in flood-prone areas). It is essential to ensure that the scarce resources which are protected by environmental policies are not sacrificed on the altar of sustainable development.

As for *land-use planning and regional development policies*, they should gain in importance because of the specificities of the Mediterranean area. This calls for both a Basin-wide planning vision and a reconsideration of planning in the light of sustainable development, by reorienting transport services to succeed in decoupling, revitalizing inland areas, protecting and sustainably managing coastal zones and agricultural land, and developing new participatory methods for territorial planning and development.

One path of progress towards integration is the *mutual strengthening of policies in pairs* (environment and health, transport and regional planning, energy and global warming, agriculture and sustainable water management, tourism and sustainable rural development), with specific strategies and programmes. This path can increase the effectiveness of policies much more than juxtaposing single-discipline analyses and sectoral policies, as remains too often the case in certain 'integrated' plans and some early strategies for sustainable development that have had no results.

Strengthening the territorial approach and sustainable local development

Questions of sustainable development first emerged in a context very far from local concerns: global risks and north–south relationships. Today several reasons argue for a special place for *local territories* in sustainable development strategies. The *territory* can be defined as a space of affiliation: a neighbourhood, city or town, an urban area, a unique village land or countryside, an island, a catchment area, a bay, a mountain valley. This specific territory can become a project area for local development or for management of a commonly-held asset. Hence, its limits can coincide (or not) with administrative or political boundaries.

The specific territory level is inescapable when engaging in *heritage development strategies*. Each territory has its own wealth of culture, nature, landscapes, products, know-how and skills, traditions and enterprises. A local project can be defined on the scale of a coastal area, a mountain range, a small region or an urban area. On such a scale, a project will be able to enhance and dynamically conserve this heritage, isolate added values thanks to synergies between activities, and organize the mobilization of actors for its implementation.

For many environmental and sustainable development issues, solutions can only be found at the appropriate territorial scale, requiring the cooperation of several administrative units and the participation of the people and enterprises concerned. Such is the case for cleaning up a polluted bay, sustainably managing a body of water or a catchment area, organizing public transport, managing waste in an urban area, preventing natural risks, combating desertification, and implementing integrated rural development or sustainable management of coastal fisheries.

Even the conservation of regional or international public commons requires local approaches. For example, reducing greenhouse gas emissions or cleaning up the Mediterranean Sea needs the mobilization of cities that can monitor emissions and set measurable progress goals. Protecting biodiversity will not be achieved without more local processes that can reconcile the environment and development.

The territorial scale corresponds with *very substantial realities*. It is the scale at which problems of sustainable development are better perceived and where fair solutions can be found originating from public debate. It is also the only level that can guarantee a minimum of integration, the issue at the heart of sustainable development. The need to find solutions to substantive problems is a positive incentive to de-compartmentalize institutional rationales and build bonds between the social, economic and ecological dimensions of sustainable development in a more democratic way. At the scale of cities or rural areas, sustainable development processes provide a real opportunity to bring socio-economic and ecological cultures that traditionally ignore each other closer together. Such local action probably has a greater chance of being effective than at the national or global level since responsibilities are easier to establish, the interdependence of actors easier to factor in, and the projects easier to formulate and implement.

Developing *participatory approaches for sustainable development* that mobilize actors can be easier on smaller scales, dealing with a limited area at a time. One of the main characteristics of local strategies for sustainable development, in particular Local Agendas 21 and charters for natural parks, is a reliance on different procedures of dialogue with interest groups, associations, enterprises or even the entire population. They also provide an occasion for strengthening democratic legitimacy.

The alternative scenario indeed assumes a *reorientation of Mediterranean development for the benefit of the local and territorial processes* of sustainable development, so as to move away from the current situation where much of the

experience and committed action remains at a brainstorming or 'declaration' level. Structured initiatives over time will increase, such as Local Agenda 21 processes, strategic plans at the scale of urban areas or regions, urban travel plans, programmes for integrated coastal area management, regional natural parks, biosphere reserves, projects on integrated rural development and to combat desertification, etc.

This reorientation will require action at several territorial levels while implementing the subsidiarity principle, and should not automatically result in ever more administrative levels. On the contrary, flexibility needs to be maintained and actors brought together in *projects*, depending on the various terrirorial scales required. It can lead to the joint formulation of plans (master plans, management plans) making it possible to balance and blend protection and development, share activities in the area and set rules that the various actors in the area will respect over time in order to ensure the conservation of their common good.

Promoting such territory-specific approaches will raise the question of the evolving role and patterns of *state* intervention related to *decentralization* or *deconcentration*. It will be up to each country to find paths for progress adapted to its own context and specificities. No sustainable progress will be achieved without strengthening the capacities, responsibilities and resources of local authorities (fiscal decentralization) and without a greater focus in public policies on specific territories (in particular focusing on rural public policies for sustainable development and management of rural areas). Decentralizing official development assistance (by encouraging decentralized cooperation) would help the developing countries to follow this path.

Another problem to be solved relates to the contrast between short-term political mandates and long-term environmental issues. Decentralization does not guarantee commitment to sustainable development. One solution would be to organize *guidance by upper government levels* (the regional and national echelons) to encourage virtuous processes and penalize processes that do not comply with the principles of sustainable development. A good example is to be found in French regional natural parks: for each park a ten-year development plan has to be developed, which becomes the 'charter' of the park. This guarantees the commitment of the various actors and is supported by granting a quality label (the 'regional park' label) and financial resources that are formalized by contract.

This orientation also assumes a participatory approach: contracts and charters bring social actors together for the specific projects and set objectives measured through *indicators*, while progress is assessed at periodic meetings.

An enabling framework

High-level involvement at various scales

Engaging in a sustainable development process generally implies *breaking* with 'business as usual' trends. But such a break will not be possible if there is no involvement at the highest decision-making levels. This is as true for enterprises as it is for local authorities or national governments.

It is important for governments (guarantors of the public interest and thus also of inter-generational equity) to develop a framework that favours commitment to sustainable development by everyone. Such an enabling framework should in particular lead to the confirmation, either constitutionally or legally, of basic rights and principles – the right to a healthy environment for current and future generations – and the derived principles, including the precautionary principle, the principle of integrating the environment into sectoral politics, and the principles of the polluter pays and the user pays that take negative and positive externalities into account. To make the implementation of territory-specific and local processes possible, this framework also implies de-concentrated or decentralized approaches. It requires a confirmation of the subsidiarity principle, while guiding local development through rules and incentives that ensure long-term consideration.

Long-term strategies and goals; repositioning administrations in charge of the environment

Apart from advocating principles, an enabling framework should lead to organized action. Setting mid- and long-term goals of sustainable development is needed as well as implementing action programmes to achieve these goals. The Johannesburg World Summit, in particular, called on countries to formulate and implement sustainable development strategies. The Mediterranean sustainable development strategy currently under development will only have an impact if it is extended by national strategies that can best be defined along sectoral lines (strategies for sustainable transport, sustainable tourism, sustainable rural development, etc.) and integrated into economic and social development plans. The latter plans would gain when becoming 'sustainable development plans', so emphasizing the will to evolve in this direction.

To make such progress, it is necessary that governments (and local authorities) renew their prospective, strategic orientation and assessment tools so that they can better determine their mid- and long-term priorities and monitor progress on a regular basis through measurable indicators. The elaboration by each Mediterranean country of a national outlook report on the environment and development would contribute to the adaptation of

global and regional considerations on countries' specific conditions.

The challenge of sustainable development could lead to a repositioning of administrations in charge of the environment, land planning and development. These administrations would gain by focusing on their functions of monitoring and assessment, orientation and regulation rather than on management, which should be more the concern of territory-specific authorities and other, more sectoral ministries. It is vital to give these administrations a more strategic role to orient and facilitate the implementation of environmental and sustainable development policies by all actors concerned, in particular the other sectoral ministerial departments and local authorities and enterprises. It is also of major importance to strengthen assessment procedures by independent agencies outside conventional administrative hierarchies. This would ensure cross-cutting approaches and consideration of all the interests and dimensions of projects and policies.

Developing new tools and partnerships

An enabling framework for sustainable development will lead to the setting up of new packages of tools and partnerships. There is no 'one model' to follow, and progress will probably come more from the 'periphery' rather than the 'centre'. This emphasizes the need to experiment and for increased active partnerships (companies, professional associations, syndicates, educational institutions, the media, local authorities, rural communities).

Economic tools are indispensable for correcting market failures, driving economic agents to adopt environment-friendly attitudes, and developing less polluting and less natural resource-depleting practices and technologies. Success often requires simultaneously fiscal incentives (tax breaks, accelerated writing off, and certain exemptions), economic incentives (subsidies, low-interest loans, buying polluting rights or rights for consuming resources, price guarantees), and a gradual internalization in prices of environmental costs generated by economic activity (the externalities). This internalization occurs mainly through increased tariffs for natural resources (in particular water, which is not being paid for at its real value) and by developing new taxation in conformity with the principles of the polluter pays and the user pays. Taxes could be based on damage (air and water pollution), on polluting products and potentially polluting equipment, and the contribution by tourists to maintenance of the Mediterranean environment. The tax issue is especially important in the south and east, where new systems are developing. Dismantling protection measures, other than reducing customs income, is going to change relative prices and the diversity of products (one could, for example, expect lower car and packaging prices). It will be in the interest of countries to anticipate such changes to avoid serious environmental impacts.

Internalization may, however, run up against considerable reluctance. Equity and social acceptance aspects need to be taken into account (several countries, for example, have developed very gradual pricing systems for drinking water). Specific mechanisms would be needed (the implementation of interim financing, subsidies for water-saving irrigation equipment, tax breaks for energy efficiency, free public transport on certain tourist destinations and cities, the restoration of old buildings for tourism), all to achieve sustainability objectives (resource savings, reduced congestion, development of integrated tourism that enhances cultural heritage, development of organic agriculture, etc.).

Incentives (such as micro-credit or subsidies for pilot projects) are also needed in integrated rural development and to enable the emergence of new generations of enterprises. Developing or transition countries would gain, for example, by promoting local tourism enterprises that can respond better to changes in international and domestic demand (this appears not to be the case in several countries that are focused only on international tourism) and by creating positive synergies with other sectors (construction, agriculture, handicrafts), all for the benefit of local development.

Apart from economic tools, there are other very effective tools for sustainable development. Standards, for example, are powerful vectors for implementing innovative technologies and protecting the environment, as can be seen in current developments in the EU. Voluntary tools such as charters, labels, geographic labelling systems, and mandatory labelling (for example on energy efficiency or risks of flooding) can also be far-reaching when reorienting production and consumption models. The same is true for training and awareness-raising campaigns. Eco-conditionality of assistance is another path to develop, especially in agriculture and tourism, where any subsidies should be on the condition that the rules and objectives of sustainable development are respected.

Land tenure is another important issue for sustainable development and justifies specific tools. The development of European agriculture since the 1950s owes much not only to economic tools (especially adjustment and market regulation funds), which have provided a certain financial security, but also to improved land property structures, which have provided long-term management guarantees to farmers (especially through the right to tenant farming), a condition for all sustainable investment. Concession systems in the public maritime domain have made it possible to mobilize local actors and render them accountable (by giving them rights and duties) for developments in shellfish raising.

In developing countries threatened by desertification, clarifying the rights of access to grazing grounds and forest resources and the rules for collective management of pastureland and forests are fundamental conditions for winning the fight against poverty and desertification. Protecting coastal zones requires adapted tools such as coastal agencies (enabling property acquisition or land auditing). Combating urban sprawl calls for the design of new tools, not just regulatory and economic but also for property issues, particularly to maintain green, agricultural and forest belts between agglomerations.

New action methods to involve civil society

Sustainable development will be based on an active civil society that participates in the decision-making process and is involved in the formulation as well as the implementation of sustainable development strategies. The groups of actors identified by Agenda 21 should be called on to play their part in this regard, most particularly women, educators, the media, NGOs, and, of course, business and rural communities.

The implementation of demand-driven management policies and integrated territory-specific development calls for a shift from hard to soft approaches. It is a new art of governing and administering that often still needs to be developed. In particular, administrations could learn how to move away from overly interventionist and technical approaches of the command-and-control type to become partners of local and professional actors and innovative in implementing new tools.

This shift will not occur by itself. It requires an evolution in the role and methods used by consultancy firms. These often advise very extreme technical solutions, which are the very opposite of what is required when trying to find local actors or new partners. Also, in research a profound evolution is needed (towards multidisciplinary and action-oriented research), as well as in training programmes at universities and engineering and administrative schools (towards skills rather than knowledge, development of personal training and social sciences, teaching through projects close to the 'ground', trainee programmes), and in local development organizations. Moves to put mediation facilities in place should be promoted, facilities capable of ensuring interfaces between disciplines and mobilizing and enhancing the different expertises required, including those of relevant local or professional actors.

Mobilizing technological progress

Technological progress, well controlled and targeted to exploit the strong points of the Mediterranean region, can play a major role in shifting towards more sustainable development. This is especially true when combating pollution and promoting the rational use of natural resources. In many countries important efforts, including normative measures, would be necessary in order to introduce and disseminate advanced technologies in the field of vehicles, construction, thermal plants, cleaner technologies in industry, waste and wastewater treatment and prevention of noise from infrastructures. It is also important to develop technologies able to exploit the strong points of the region (solar and wind power, the quality and diversity of unique products) and that are adapted to the specific constraints of the eco-region (relief, climate, urbanization, unique village lands).

Financing sustainable development

The alternative scenario assumes strengthening certain public expenditures: research and development, training and the capitalization of knowledge, tackling environmental liabilities (waste and wastewater treatment) and other infrastructures (public transport, rural services), subsidies, user awareness-raising campaigns, and financing positive externalities in agriculture and forestry for sustainable management of the Mediterranean territory.

Financing these public expenditures in the developing and transition countries requires a considerable strengthening of international solidarity in conformity with the commitments made at the conferences of Rio, Monterrey and Johannesburg, and in the framework of the Millennium Development Goals. However, financing also requires national administrative and tax reforms and the mobilization of private savings. In the developing and transition countries where the general context is one of deregulation and economic liberalization, which implies a loss of tax income related to the dismantling of tariffs, fundamental reforms are required. Partly already committed, these reforms go in complementary directions: a reform of tax revenues and the rationalization of public expenditure.

In tax matters, much effort will have to be made, especially in direct taxation where progress in reform is less than in indirect taxation. One necessary step forward will be the broadening of the tax base. In some countries, taxation at source still mainly concerns civil servants, employees of large companies and the financial sector. It needs to be expanded to other categories of economic agents (other salaried employees, the private sector and wealthy individuals). The IMF[12] stresses that broadening the tax base (and modernizing the collection system) could enable the Mashrek countries to see their direct tax revenues come close to those recorded in Maghreb countries (2–2.5 per cent of GDP). All would gain from getting closer to the levels attained in Turkey and the eastern European countries (4–6 per cent). Another important objective for many countries would be the search for mechanisms that would enable a shift of the current mass of small, private, informal businesses to the formal

economy. This implies very refined actions in order to offer them sufficient benefits in exchange. Subcontracting for large firms and a wider application of micro credits could contribute to this.

A suppression of many exemptions would also make it possible to increase government revenues. As FEMISE has shown, exemptions aimed at attracting foreign capital have not clearly proved their worth.

Increasing the potential of local taxation will also be needed. This could be accompanied by improved management of local public services. The financial resources of local authorities remain relatively feeble in several countries and often rely on special ad hoc taxes (label rights, quarry permits) and local taxation (building taxes, slaughtering taxes), which are insufficient for funding expenditure needs. Some paths have already been successfully explored; they should now be encouraged.

Improved rationalization of public expenditure would leave significant room for manoeuvre. This report has illustrated that preliminary cost–benefit analyses on public investments need to be made more systematic. A few and too little known examples have shown the relevance of such analyses in the water and energy sectors. In some cases, the cost of a cubic metre of water saved thanks to good water management can be between three and ten times less expensive for the community than the cost of the water mobilized by supply policies. There is no doubt that some public expenses for agriculture or tourism, for example, would benefit from being reoriented.

Last, but not least, is the importance of a political and military relaxation in the region. The FEMISE (2003) Report estimates that up to US$9.5 thousand million could be saved in seven southern and eastern Mediterranean countries[13] (this is the equivalent of the total amount of direct foreign investment) if they reduced just the defence part of their total expenditures from 10.8 per cent to 5 per cent (the French average).

Towards Mediterranean governance for sustainable development

The alternative scenario assumes that regional cooperation will be strengthened at several levels and that a better synergy will be created between the various existing cooperation frameworks.

More operational eco-regional cooperation

The Mediterranean level is the relevant scale to understanding the environmental issues specific to the eco-region and drawing up a Mediterranean vision of sustainable development that is common in its design and differentiated in its objectives and implementation.

Because it was faced with common problems and issues, the Mediterranean eco-region has managed for several decades to put in place various frameworks for cooperation on sustainable development issues. ICSEMS, GFCM and ICAMAS are very valuable bodies in the fields of science, fisheries and agronomic training respectively.

The Mediterranean Action Plan, in addition to its legal tools, has always had the commitment of all Mediterranean-rim countries and the EU, and permanent action facilities (MEDPOL and the Regional Activity Centres, including the Blue Plan). These action facilities ensure continuing regional cooperation for protecting marine and coastal environments, managing coastal areas, and monitoring and prospective studies for environment and development. The MAP secretariat comes under the political authority of the member countries and is financed by contributions from member countries, which ensures its autonomy.

MAP has integrated sustainable development as a guiding principle in its thinking and activities. Since the publication of *Futures for the Mediterranean Basin. The Blue Plan* in 1989, and the development of *Agenda 21 for the Mediterranean* in 1994, considerable effort has been made in the context of MAP to tackle the issue of development from a sustainability point of view. It has relied especially on the work carried out on a Mediterranean-wide basis by MAP various components and by institutions such as METAP, ICAMAS, FEMISE, MEDCOAST, MEDFORUM, MIO-ECSDE, MEDCITIES and OME. Each institution works according to its own mandate on building a common regional vision of sustainable development. The Mediterranean vision of sustainable development has been built on this invaluable input around which an 'epistemic community' of specialist networks, governmental and local authority representatives and NGOs has developed.[14]

Thus, the Mediterranean is not just an eco-region in the bio-geographical and cultural sense of the word but also an area of multidimensional cooperation around a common vision of sustainable development.

In 1996 the governments of the region and the European Community put in place a Mediterranean Commission on Sustainable Development (MCSD) with a very broad and ambitious mandate in terms of a sustainable development strategy for the region. Like many comparable institutions, especially the United Nations Commission for Sustainable Development, MCSD has produced some excellent, innovative work, in particular relating to sustainable tourism, water-demand management and the relationships between trade and the environment. Nevertheless it has been criticized on the following points:

- socio-economic organizations, and to a lesser degree local authority organizations and representatives, have not participated greatly;
- many Contracting Parties have been represented by their Ministries of the Environment, which, added to

the active presence of NGOs, has put a strong environmental stamp on the Commission, thus creating a feeling of imbalance to the detriment of the socio-economic aspects;
- feedback on the work of the Commission has been insufficient;
- follow-up by the actors and bodies concerned has remained weak.

MAP undertook to carry out an evaluation of MCSD and gave it a new impetus. The European Commission has shown its confidence in MCSD, and the Euro-Mediterranean Partnership[15] asked that the Mediterranean Strategy for Sustainable Development, which was announced at the Johannesburg World Summit, be developed within the framework of MAP, and MCSD in particular. The process for drawing up this strategy began in 2003.

It is hoped that the future Mediterranean Strategy for Sustainable Development will be subject to a validation and implementation procedure that would give it the political backing required for this process (as seen in the Baltic 21 Agenda, approved by a conference of Prime Ministers). It is also hoped that MCSD will become a framework for effectively engaging all administrations and IGOs involved in the region, not only the environmental actors. Its adoption at the Euro-Mediterranean level, for example by the Conference of the Ministers of Foreign Affairs, also deserves consideration.

In this context, a special place should be reserved for the sub-regional level. RAMOGE, the Ionian and Adriatic initiatives, and the Arab Maghreb Union are all sub-regional cooperation frameworks, which should take up sustainable development issues. Similarly it would be advisable to better structure Mediterranean cooperation for sustainable development around specific territories such as islands, mountains and coastal zones.

Lastly, the search for better synergy between the various regional and sub-regional cooperation frameworks is seen as a necessary and inescapable path to making progress towards sustainable development. In the water sector for example, operational synergy is needed between the Euro-Mediterranean Partnership and the specialized and active networks in the region (EU Water Initiative, GWP Med, MCSD).

More sustainability in EU *enlargement towards the* Mediterranean

It is important that the gradual enlargement of the EU to the eastern Mediterranean countries of the northern shore occurs within a perspective of sustainable development for the entire Mediterranean region. This requires new ideas and appropriate cooperation frameworks.

Concerning the EU itself, lessons could be learned from the past about the impacts of enlargement in terms of sustainable development, which have been both positive and negative for the countries involved.

For new member countries, the pace of development generated by enlargement is an important issue, as are the effects of their integration into a large competitive market. Under the influence of their accession to the single market and the policy of convergence, Spain and Greece have and still are experiencing growth rates higher than the European average. This leads to rapid economic convergence but also to an acceleration of hard-to-control phenomena, such as increases in household waste production, the car fleet and freight transport by road. This rapid pace does not give these countries enough time to adjust their infrastructures and capacities to cope with growing demand. Consequently the OECD has observed a considerable delay in waste management in the European Mediterranean countries.

In addition, the EU does not yet appear to have sufficiently included Mediterranean specificities in its vision and actions. Inadequate support has sometimes been given in the sectors of agriculture, forests, tourism and infrastructures. A shared vision of the multiple roles of Mediterranean agriculture would be useful, as well as on a development model for islands and mountains in Mediterranean Europe, and on the possibilities for encouraging a better reconciliation of tourism with sustainable development.

In the alternative scenario lessons are drawn from past but recent experiences that may be transferable to the new and future members, namely to better integrate the objective of sustainability in enlargement policies: preserving the positive aspects (especially the allocation of EU funds for curbing pollution, urban public transport, and sustainable agriculture and rural development) and reducing negative aspects as far as possible, particularly those related to the enlarged market. This implies better internalization of environmental costs generated by the expanded market, and putting in place more proactive European and national policies on sustainable development matters in the sectors concerned (energy, transport, tourism, urban development, waste, agriculture and rural development). To do so, Mediterranean specificities need to be taken into account, for which the structural, cohesion and agricultural funds could be used.

A new Euro-Mediterranean Partnership, *a laboratory for sustainable development*

The Mediterranean region has been the cradle of European civilizations, and the future of Europe is again being played out for better or (perhaps) worse in the Mediterranean.

This is already the case for its environment with the growing risks of extreme climate events, degradation of the common sea, the effects in time of desertification and the shift northwards of water stress problems. It is

even more the case for its future economic weight in the world and its security and stability. Successfully implementing a common commitment to sustainable co-development between the two shores would be far reaching.

Relaunching the Euro-Mediterranean Partnership through sustainable development

Launched in Barcelona in 1995, the Euro-Mediterranean Partnership was a political response to this immense challenge. Its instigators had hoped for rapid peace in the Near East in the post-Oslo days, but in vain. They thought that putting a Euro-Mediterranean free-trade zone in place would be enough to drive economic revival and prosperity in the region. While recognizing the merits of free trade, many renowned experts now voice the opinion that the EU should recognize its limitations, not to mention risks, and that there is an urgent need to considerably strengthen its intervention in the region so as to contribute to its development.

The experience of European integration shows how much a regional partnership can be a factor in sustainable progress if, in addition to the institution of a large market, it is also based on a discovery and recognition of each other, on a well-understood effort of solidarity towards the less developed (the economic and environmental progress of which benefits all partner countries), and on a shared political commitment to certain values, principles, concrete goals and common rules. However, the MEDA budget remains limited, the problem of free circulation of individuals persists, and current Euro-Mediterranean association agreements only contain real commitments on dates for dismantling tariffs. Other aspects dealt with, including the integration of the environment with development, generally remain very vague.

The question is whether, after nearly 50 years of unison and enlargement, the EU will make its relations with the rest of the world its new major project. The first challenge will lie in its relations with its direct neighbours in the eastern and southern Mediterranean with whom it shares an evident common destiny.

The new neighbourhood policy, which should lead to neighbourhood agreements starting in 2005, along with a new financial instrument in 2007 (the neighbourhood tool) could be the occasion for the EU to make this move. This is on the condition that the scale and nature of the challenges to be met are properly gauged, while relying on a common and differentiated vision, giving a new dimension to the commitments of partners on both shores, and providing sufficient resources to this policy.

In doing this, the EU should not ignore the scale of the disparities between the two shores or the seriousness and specificity of unsustainable development problems, in the Mediterranean region in general and in the southern and eastern countries in particular. In this way, the EU would respond to the appeals being sent out worldwide.

When looking at the action plan adopted in Johannesburg (2002) it can be noted that its philosophy is particularly relevant in the Mediterranean, since it is aimed at developing poor countries, equity, resolving the hardest social issues, controlling energy, protecting and managing water resources in a sustainable way, combating desertification, etc. Its joint application would make the Mediterranean a living laboratory for sustainable development on the confines of the developed countries and the developing ones of northern Africa and western Asia.

The Partnership would gain much if it gradually turned in this direction while relying on various available documents and ongoing studies.[16] Sustainable development could effectively become an excellent vector of association and co-development; determined commitment by partners would make it possible to orient the region towards a win–win scenario (north and south, environment and development). An alternative development path would thus see sustainable development erected as a guiding principle in the neighbourhood policy, in line with the position already assumed on the Euro-Mediterranean level.[17]

Strengthening south–south cooperation

The definitive resolution of many problems and the stability of the region will probably occur through sub-regional political and economic cooperation in the south and east, as called for by the Blue Plan in 1989.

The Partnership would benefit from contributing to this development. Association agreements already call for strengthened south–south trade. Bilateral and especially multilateral south–south agreements (for example the Agadir initiative) are called on to expand and develop. Beyond trade agreements themselves, an alternative development path would see the implementation of south–south initiatives, especially on a sub-regional level (Maghreb, Mashrek). These initiatives may cover multiple fields, including a coordinated development of transport infrastructures while integrating the objective of sustainability, the circulation of individuals, water management, research and development, etc.

The Partnership regional programmes could lead to identifying and initiating sub-regional projects, as has occurred in some cooperation programmes on statistics. A significant portion of funding should be allocated to such programmes.

The Partnership would also benefit much if the southern and eastern countries play a more active role in formulating proposals. These countries are of course largely centred on the Mediterranean Basin, but often they are also part of other regional structures. Special

mention should be made of the Arab Maghreb Union and the Arab League, which should increase their activities with a view to promoting sustainable development among their member countries.

Common and differentiated approaches

A restart of the Euro-Mediterranean Partnership through sustainable development would be all the more effective if it were to favour common and differentiated approaches. This would accelerate the development of the region, while protecting the regional common goods at least cost. At the same time it would result in reduced negative impacts and increased benefits of free trade.

This kind of approach is justified in many fields, especially in protecting the sea, mitigating climate change and rural development.

- *Protecting the Mediterranean Sea.*

It would be in the clear interest of the EU and all Mediterranean-rim countries to reduce and prevent pollution in the SEMC and from the ships that fly their colours. The feeble amount of treatment of land-based pollution in the developing countries, the poor state of the fleet, and the lack of inspection of ships or waste-treatment equipment in ports, call for strengthened support from the EU. The potential overall environmental benefits for a given cost will clearly be higher than those that can be achieved for the same cost in the better equipped, more developed countries. For the SEMC, however, to date there is no equivalent to the very high level of EU assistance to the new EU member countries (the structural pre-accession tool for the ten new members, mainly centred on environment and transport, amounts to 7.3 thousand million euros for 2000–2006). It is also striking that the EU is beginning to ban ships that fly flags of other nations from its ports (between November 2003 and September 2004, 19 ships were denied access), so risking the establishment of a dual maritime safety code in the Mediterranean. Under these conditions the EU would gain from a strong increase in assistance to the SEMC to enable rapid joint progress. It would also be in the interest of the Partnership to put 'codes of good conduct' in place for companies relocating in the region, and to anticipate on rules and agreements to favour cleaner industrial development. Harmonizing some environmental standards in the SEMC with those of the EU should be gradual, while taking the context and available resources into account.

- *Mitigate climate change.*

The principle of common and differentiated responsibility is clearly recognized in the Convention on Climate Change to mitigate global warming. It could result in an exemplary regional application of the Kyoto Protocol with a *carbon fund* put in place or its priority mobilization into the Mediterranean region. The issue of anticipation and upgrading is important in the SEMC. By financing mitigation projects (decoupling) in these countries, European countries could acquire emission rights (at lower cost because of the lower energy intensity in the SEMC), while contributing to the sustainable development of the southern and eastern countries and the protection of the eco-region. In return, the SEMC would benefit from technology transfers, would loosen their immediate financial constraints and reduce their energy and environmental costs.

- *Sustainable agricultural and rural development.*

Given the importance of its social, economic, cultural and environmental issues, agriculture is another sensitive sector. Large disparities in productivity have developed between the two shores and continue to grow. Evolving towards reciprocal free trade presents increased risks of destabilizing fragile rural areas and increasing rural-to-urban migration and migration pressures in general, whereas there are relatively few agricultural export opportunities for most of the SEMC.

A first alternative would be to expand the common agricultural policy to the SEMC, which would involve high costs. For the ten new member countries the total pre-accession assistance, including the special programme for agricultural and rural development, comes to 22 thousand million euros for the period 2000–2006, and the post-accession assistance adds up to 40 thousand million for 2004–2006.

More differentiated transition and partnership equations could be sought by taking the many roles of agriculture and the respective interests of the partners on both shores into account. It would be in the interest of both the SEMC (including Turkey) and the EU to avoid the path taken by European agriculture where more is produced, while employing fewer and fewer people and increasingly harming the environment. In addition, the EU could consider the fact that the reduction by half of its own agricultural workforce, projected between now and 2025, is not in itself admissible.

It is in the common interest of the two shores to acknowledge these multiple roles and encourage a gradual upgrading of the fragile rural areas of the SEMC. This could be done through a Euro-Mediterranean preference (opening up gradually and asymmetrically, and preserving certain protective measures) and generous financial support for policies on sustainable agriculture and rural development in these countries. This common and differentiated vision would be especially relevant in the agricultural sector, which needs to put an agenda in place that defines transition periods, possible exemptions, the necessary level of support and anticipatory measures.

Avoiding the paradigm of a unique development model

These examples and all those mentioned earlier show the importance of avoiding the paradigm of a single development model. They call for a search for innovative options, which will better integrate environment and development in the first place, and will succeed in taking the steps for accelerated transitions towards sustainable development. The diversity of situations that characterize the Mediterranean region could be the opportunity for important progress, including for Europe itself. The Mediterranean may well be the region, which, along with the EU, will invent a new hierarchy of norms and illustrate the strategic value of diversity and the environment.

This implies a clear vision, not only of values and rules that countries would have to adopt in line with the principles of the neighbourhood policy, but also of concrete possible progress on the path of sustainable development and the conditions of its implementation.

With help from the Euro-Mediterranean Partnership and MAP, the region should give itself the tools for optimizing the allocation of resources devoted to the protection of the Mediterranean common goods.

Strong political commitment and innovative mechanisms for cooperation and financing

Faced with these challenges, there is a need for much stronger political commitment by the partners on both sides of the Mediterranean.

Strengthened official development assistance, designed to achieve concrete goals for sustainable development, appears indispensable to help the developing Mediterranean countries face up to the challenges they are confronted with. This strengthened support should come particularly from Europe (the EU, member countries and other European states) since it shares a common destiny with the southern and eastern Mediterranean.

Once the integration of the new member countries has been successfully achieved, the EU commitment to sustainable development in the region could result in a redeployment of financial solidarity towards its neighbours on the southern and eastern side of the Mediterranean through a large increase in EU support, particularly by setting up structural funds. However, the EU will possibly have to devote the best part of its energy and resources, at least up to 2011, to integrating the new central and eastern European members into the union. This could result in uncertainty and dissatisfaction in the Mediterranean world concerning both the SEMC and the EU southern regions who will see a large part of the structural funds being moved away from them.

In this context, a *political strengthening of the Euro-Mediterranean Partnership* seems to be one of the basic conditions for an alternative development path. This transition period and the increasing questions from the Mediterranean world should drive the EU and its partners to give strong political signals of their commitment.

The EU could, for example, move forward in an appropriate way on agriculture and in facilitating the circulation of individuals. It could also clearly state its commitment to postpone financial solidarity to the benefit of the Mediterranean. Without waiting too long, it could start as early as 2007 to significantly strengthen funds destined for the Mediterranean.

EU member countries and SEMC could also use the Euro-Mediterranean Partnership framework to innovate in *debt* matters. Mechanisms would be needed for converting debt into actions such as research and development (to curb the brain drain and give countries the capacity for future development), cleaner technologies or sustainable development programmes to mobilize local and professional actors on both shores. Despite their limited funds (84 and 90 million euros, respectively) the agreements between Italy and Algeria in 2002 and between Spain and Morocco in 2003 are good examples. An alternative development path would see the EU and its member countries develop a real concerted strategy in this direction.

Other options could also be explored such as issuing Euro-Mediterranean bonds on the major financial markets with guarantees from the EU (like the Brady Bonds for which the US facilitated the release) or the creation of a Euro-Mediterranean fund for sustainable development and Mediterranean taxes derived, for example, from tourism and transport.

Commitments should also include sustainable development objectives in the neighbourhood policy instruments. Sustainable development would then become a guiding principle for future EIB/FEMIP agreements, and regional MEDA programmes on water, energy, transport, industry, the environment, would be reviewed as a consequence.[18]

Considerable support should be given in this framework to strengthening technical and institutional capacities for sustainable development.[19] Synergies would systematically be searched with national programmes to enable a real impetus in countries. South–south sub-regional approaches would be encouraged and favoured.

The Euro-Mediterranean Partnership, through commercial components and cooperation supported by MEDA, is also an appropriate framework for promoting the best available technologies by relying on companies, and research and technology dissemination centres.

The Partnership would also benefit from strengthening, initiating or encouraging concrete *decentralized cooperation programmes*. Qualitative steps in cooperation procedures are necessary to escape from bureaucratic

habits all too often inscribed in the tradition of centralized assistance grants from state to state. It is advisable to evolve towards assistance that results in a new kind of partnership that mobilizes local and professional actors (for example to set up natural regional parks and Agendas 21). Pilot projects could be carried out to demonstrate the validity of these new foundations, followed by more general application as part of Mediterranean-wide programmes that ensure a close relationship with the realities of the field.

Options could be explored among the EU, other donors and states to innovate in this direction: broadening the 'project' rationale (major infrastructures) to a 'programme' rationale for mobilizing and supporting projects of a large number of actors; extend formulas already proved valid in the EU to the entire Mediterranean, as done with the ERDF, INTERREG and LEADER programmes; set up financial twinning between local authorities on both shores to enable access to credit for those on the southern shore with guarantees from those on the northern side.

It would also be in the interest of the Partnership to use the typical Mediterranean character as a lever for partnership and regional development. Identifying common values between the European and Mediterranean worlds is to rediscover and recreate the Mediterranean identity together, a condition for better regional cohesion, successful cooperation and new, better positions in the face of globalization.

For their part, the SEMC could review their national development strategies and institutional set up with regard to the principles established and adopted in Barcelona, the neighbourhood policy, the common vision of sustainable development, and the search for a gradual convergence of their standards with certain EU standards. They would also gain from playing a more active role in the Partnership, especially by developing new south–south cooperation initiatives, by getting their EU partners to understand their specificities and their national issues, and by giving a more strategic and innovative dimension to the programmes financed by the Partnership. They could also commit to facilitating a decentralized cooperation between their local authorities and those on the northern shore.

The EU and the SEMC would also gain from sending strong signals to the market about their determination to make sustainable development a guiding principle in their Partnership and as a consequence the evolution of Mediterranean development. A signal on economic policies would, for example, be the adoption of a Euro-Mediterranean agreement on investments containing sustainability rules (adhering to social and environmental rules, transferring the best available technology). Signals could also be sent on various sectoral policies. In the tourism sector, for example, it is in the interest of all countries to show a common determination to commit the region to sustainable tourism and correct market failures. A regional cooperation mechanism would contribute to this. In the transport sector clear favouring of rail and maritime transport would help the companies involved to take risks and invest in the 'seaside highways' and rail freight.

To advance in this direction, it is vital that public opinion in general, and economic and political decision-makers of the Partnership in particular, have a greater awareness of sustainable development issues in the region, the obstacles to its implementation, the progress being made and the diversity and wealth of examples of good practice available. The Euro-Mediterranean Ministers of Economy could, for example, make it a topic of common concern with a view to a certain reorientation of policies. The new bodies established within the Euro-Mediterranean Partnership, the Cooperation and Dialogue Committee for the Facility for Euro-Mediterranean Investment and Partnership (FEMIP) and the Economic Dialogue for MEDA, offer opportunities to mobilize Ministries of Economy for win–win sustainable development solutions.

Finally, the need for a stronger, networked regional environmental information system and greater dissemination of information should be emphasized. Stronger regional input through better synergy between MAP, the Euro-Mediterranean Partnership and the European Environment Agency could contribute to this. It would bolster national and territorial environment and sustainable development observatories or equivalent agencies in the developing and transition countries, and develop 'benchmark' approaches for monitoring sustainable development. Comparisons would be all the more useful since many environmental and developmental problems in the Mediterranean countries have many traits in common. Monitoring through sustainable development indicators, analysing obstacles, highlighting good practices, ex ante and ex post assessments, and exchanging experiences are all important tools for shared progress.

As for the various *donors*, they should adopt a better evaluation, from a sustainable development point of view, of the efficiency and effectiveness of the assistance they provide.

Concluding remarks

Comparing the 1989 Blue Plan report with this 2005 one may give the impression that little has changed: the responses that have been implemented have been insufficient, and developments are rather close to what was feared in the relatively bleak trend scenario. The main global threats (climate change, mass losses of biodiversity, desertification, cultural standardization, exclusion and impoverishment, violence) have only

become stronger, and are at least as present in the Mediterranean as in other parts of the world.

And yet, is the future so dark? The analyses of this report suggest that an alternative development path is more credible than it was 15 years ago. There are even many elements for reasonable optimism.

Demographic transition in the southern and eastern Mediterranean is rapid. The successful integration of three large Mediterranean countries – Greece, Spain and Portugal – into the EU demonstrates that success is possible if resources are provided. These countries have experienced profound transformations of their economies and societies, although, especially in the field of environment, all remains far from perfect.

Through the concept of sustainable development, increasing numbers of leaders, experts and businessmen and -women have become aware that preserving the environment, social justice and economic effectiveness are the three interdependent pillars of the same process of development.

Many environmental and developmental innovations have emerged in fields such as technology, specific territory management, and forms of social organization and lifestyles. They demonstrate that solutions adapted to specific problems and cultures can be found, but they are often isolated and not well-known.

There are thus many elements for hope. What, then, would be the conditions? Three basic keys for success along an alternative development path are here highlighted.

L*inking the environment to social justice*. This was too neglected in the initial generation of environmental policies, which may partially explain their mixed success. It is generally the poorest who suffer most from degraded environmental conditions. Poverty and unclear rights and rules on access to resources, often lead to practices that are very harmful to the environment, especially in rural areas.

L*inking environment to economic efficiency*. The economy is not the enemy of the environment. Indeed, saving resources is an essential dimension of their proper management. Policies should aim at precise objectives and be accompanied by well-defined indicators of goals, resources and results to enable assessment of the efficiency and effectiveness of environmental and developmental policies. The basic thrust of these policies should be the development of better production and consumption patterns.

D*evising new social relationships and international cooperation to manage the environment and sustainable development*. The words participation, partnership and governance are increasingly used, although they are not always clearly defined. The fundamental idea that underlies them is that sustainable development can only succeed if all social actors take part in a 'positive sum game'. This is true for countries and at some international levels where new north–south solidarity around the concepts of common and differentiated responsibility and sustainable development needs to be devised or put in place urgently. Europe could play a pioneering role in this direction by evolving its relations with its Mediterranean neighbours within the framework of a renewed Euro-Mediterranean Partnership.

More than ever, the question of how to reconcile individual interests and the common wealth of nations is being put forward in the Mediterranean. Coercive systems have been ineffective everywhere. The laissez-faire of absolute free trade is increasing social inequalities and impacts on the environment. Between these two extremes, methods and institutions are needed to make individual interests work in favour of the common good. This is the main key for achieving sustainable development. Relying on the immense heritage of ancient cultures, philosophical legacies and modern science, the Mediterranean countries are well placed to meet this challenge.

Notes

1 The Sustainability Impact Assessment of the EMFTA was launched late in 2004.
2 From 2000 to 2020 for all the SEMC, including Jordan (source: FEMISE, 2003).
3 Differences between the baseline scenario and the IFRI 'Europe-Russia-Mediterranean' scenario (see Part 1, Box 7 p36).
4 In particular the authoritative reports by FEMISE, CEPII, the World Bank, OECD, UNDP, IFRI.
5 IFRI, 2002.
6 Or a stabilization in the Mediterranean region at 7 per cent of the global CO_2 emissions (compared with 9 per cent projected under the baseline scenario).
7 The baseline scenario already includes a decoupling assumption similar to the one integrated in the European Union Goteborg strategy. This is the reason why in the alternative scenario traffic is not halved compared with the baseline scenario.
8 Estimate from the OECD's DAC database.
9 The maximum number of indicators calculated for a country is 103 (France).
10 The European directive 2001/42 of June 2001 requires that plans and programmes likely to have a notable influence on the environment should be submitted to an environmental impact assessment.
11 International Association for Natural Gas Vehicles, April 2004 (www.iangv.org).
12 Nashashibi, 2002.
13 Egypt, Israel, Jordan, Lebanon, Morocco, Turkey and Tunisia.
14 Haas, 1990.
15 Meeting of the Euro-Mediterranean Ministers of the Environment, Athens, 2002.
16 In particular the current sustainability analysis of the effects of the implementation of the Euro-Mediterranean free-trade zone, the future Mediterranean strategy for sustainable development, and this report.
17 Euro-Mediterranean Conference of the Ministers of Foreign Affairs, Valencia, 2002 and the 'Athens Statement' of the Conference of the Euro-Mediterranean Ministers of the Environment, 2002.
18 The Athens Euro-Mediterranean Conference of Environment Ministers in 2002 stressed the need to establish integration strategies in each sector and each regional programme.

19 As decided by the Valencia Euro-Mediterranean Conference of Ministers of Foreign Affairs, 2002.

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Statistical annex

Geographical framework

A1 Countries and Mediterranean coastal regions specificities

Population (Permanent and Seasonal)

A2 Population of Mediterranean countries, 1960–2025
A3 Population age distribution, 1970–2025
A4 Average household size
A5 Urban population in Mediterranean countries, 1970–2025
A6 Number of tourists in the Mediterranean countries, 1990–2025

Economy

A7 GDP growth rates in the Mediterranean countries, 1970–2025
A8 Unemployment rate, 1980–2003
A9 Net capital flows to the Mediterranean
A10 Net official capital flows to the Mediterranean
A11 Net capital flows per country compared with the Mediterranean average

Rural areas and agriculture

A12 Agricultural and rural populations in the Mediterranean, 1960–2025
A13 Land use in Mediterranean countries
A14 Agriculture and intensification
A15 Trade in food and agricultural products, and agricultural added value

Fisheries and aquaculture

A16 Mediterranean fisheries
A17 Mediterranean aquaculture

Energy and transport

A18 Energy intensity, per country, 1971–2025
A19 Primary energy supply sources per country, baseline and alternative scenarios, 2000–2025
A20 Primary commercial energy demand, baseline and alternative scenarios, 1971–2025
A21 Electricity production by source, per country, baseline and alternative scenarios, 2000–2025
A22 Electricity demand, baseline and alternative scenarios, 1971–2025
A23 Electricity production potential from renewable energies in the SEMC in 2020
A24 The fluctuation of low-tension electricity prices (residential sector) in a number of SEMC
A25 Motorization rate

Coastal regions

A26 Population of Mediterranean coastal regions, 1970–2025
A27 Density of the Mediterranean coastal regions compared with the density of the country, 1970–2025
A28 Urban population in Mediterranean coastal regions, 1970–2025
A29 Number of tourists in the Mediterranean coastal regions, 1990–2025
A30 Human pressures on coastal regions and on the coastline
A31 Human settlements and infrastructures along the coast
A32 Type and treatment of industrial sewage

Water

A33 Water resources per country, 2000–2025
A34 Water demand by country, baseline and alternative scenarios, 2000-2025

Emissions in the atmosphere

A35 CO_2 emissions related to energy activities per country, baseline and alternative scenarios

Biodiversity

A36 Biosphere reserves in the Mediterranean in 2003
A37 Protected Areas in Mediterranean countries

This statistical annex holds tables showing the basic data and the major quantitative assumptions or results of the scenarios worked out in this report.

Most of these data are extracted from the databases or statistical reports of international agencies such as FAO, World Bank, OECD, etc. The use of these international sources, themselves based on national statistical sources, ensures data comparability and consistency of the analyses carried out by the *Plan Bleu* experts.

For certain topics such as inland waters, urban agglomerations, *Plan Bleu* uses some databases compiled by well-known experts.

Nevertheless, some data from national sources, considered as essential or notably different from the international data used by *Plan Bleu*, have been added as a note to a table or in the text of the related chapter.

Conventions

'—':	Non available
AAGR:	Annual Average Growth Rate
Mt:	million tonnes
Mtoe:	million tonnes of oil equivalent
koe:	kilo of oil equivalent
kWh:	kilowatt hour (1000 Wh)
TWh:	terawatt hour (1 thousand million kilowatt hours = 10^{12} Wh)
GWP:	Global Warming Potential

Groups of countries

NMC (Northern Mediterranean countries): Spain, France, Italy, Greece, Monaco, Malta, Cyprus, Slovenia, Croatia, Bosnia-Herzegovina, Serbia-Montenegro, Albania

- 4 EU-Med (before EU enlargement in May 2004): Spain, France, Italy, Greece
- EAC (eastern Adriatic countries): Slovenia, Croatia, Bosnia-Herzegovina, Serbia-Montenegro, Albania

SEMC (Southern and Eastern Mediterranean countries):

- East: Turkey, Syria, Lebanon, Israel, Palestinian Territories
- South: Egypt, Libya, Tunisia, Algeria, Morocco.

Geographical framework

Table A1 Countries and Mediterranean coastal regions specificities

Country	Area	Mediterranean coastal regions	Area	Coastline (km)		
	km²		km²	% of the country area	Total	Of which Islands
Spain	504,782	12 provinces / 50	95,504	19	2580	910[1]
France	543,965	9 départements / 96	46,248	9	1703	802[2]
Italy	301,333	57 provinces / 103	165,846	55	7375	3766[3]
Greece	131,626	41 nomes / 51	100,975	77	15,021	7700
Monaco	2	1 (the whole country)	2	100	4	
Malta	316	2 regions (the whole country)	316	100	180	180[4]
Cyprus	9251	6 districts (the whole country)	9251	100	782	782
Slovenia	20,273	1 Statistical region / 12	1044	5	47	
Croatia	56,542	7 counties / 21	26,150	46	5835	4058
Bosnia-Herzegovina	51,129	1 canton[5]	4401	9	23	
Serbia-Montenegro	102,173	1 group of communes[6]	6508	6	294	
Albania	28,748	11 districts / 36	7833	27	418	
Turkey	814,578	10 provinces / 80	122,612	15	5191	809
Syria	185,180	2 mohafazats / 14	4189	2	183	
Lebanon	10,452	4 governorates / 5	4892	47	225	
Israel	22,145	5 districts / 6	19,865	90	179	
Palestinian Territories	6020	1 group of governorates[7]	363	6	55	
Egypt	1,001,450	11 governorates[8] / 27	114,767	11	955	
Libya	1,759,540	16 baladyats[9] / 25	274,911	16	1770	
Tunisia	163,610	14 governorates / 24	45,712	28	1298	301
Algeria	2,381,741	15 wilayates / 48	47,027	2	1200	
Morocco	710,850[10]	4 provinces + 3 préfectures / 67[11]	41,950	3	512	
Total Med	**8,805,706**	**234 administrative units**	**1,118,690**	**13**	**45,830**	**19,308**

Source: National Statistical yearbooks and *Plan Bleu* estimates, 2003

Notes:
1 Balearics
2 Corsica
3 of which Sicily 1126km and Sardinia 1387km
4 Including Gozo 43km
5 Bosnia: 10 cantons; Herzegovina: 5 regions
6 Montenegro: coastal and central municipalities
7 Gaza includes 5 out of 14 governorates of the Palestinian Authority
8 of which 1 partial (desert excluded)
9 of which 1 non-coastal and 2 partials (desert excluded)
10 with Western Sahara
11 Morocco: 42 provinces and 25 préfectures

Population (permanent and seasonal)

Table A2 Population of Mediterranean countries, 1960–2025

Country	1970	1985	2000	2025	AAGR 1970–2000	AAGR 2000–2025
	(1000 inhabitants)				(%)	
Spain	34,027	38,156	39,815	40,769	0.5	0.1
France	50,569	55,216	59,412	64,177	0.5	0.3
Italy	53,758	56,951	57,456	53,925	0.2	–0.3
Greece	8716	9905	10,558	10,393	0.6	–0.1
Monaco	24	28	34	41	1.2	0.8
Malta	319	344	389	430	0.7	0.4
Cyprus	615	645	785	900	0.8	0.5
Slovenia	1670	1913	1965	2029	0.5	0.1
Croatia	4406	4662	4473	4193	0.1	–0.3
Bosnia-Herzegovina	3564	4129	3972	4324	0.4	0.3
Serbia-Montenegro	8691	9948	10,856	12,217	0.7	0.5
Albania	2184	2978	3114	3820	1.2	0.8
Turkey	35,666	50,267	65,627	87,303	2.1	1.1
Syria	6277	10,298	15,936	24,003	3.2	1.7
Lebanon	2177	2790	3206	4147	1.3	1.0
Israel	2935	4097	5851	7861	2.3	1.2
Palestinian Territories	1134	1510	3150	6072	3.5	2.7
Egypt	32,364	46,140	66,007	94,895	2.4	1.5
Libya	1986	3719	6038	8832	3.8	1.5
Tunisia	5127	7182	9615	12,892	2.1	1.2
Algeria	13,623	21,492	30,332	42,329	2.7	1.3
Morocco	15,081	21,579	28,505	38,174	2.1	1.2
Total NMC	168,542	184,877	192,829	197,218	0.4	0.1
Total east	48,189	68,962	93,770	129,386	2.2	1.3
Total south	68,181	100,112	140,497	197,122	2.4	1.4
Total SEMC	116,370	169,074	234,267	326,508	2.4	1.3
Total Med	284,912	353,951	427,096	523,726	1.4	0.8

Source: Attané and Courbage, 2001

Table A3 Population age distribution, 1970–2025

Shore	Age group (years)	Size (Millions inhabitants)			Share of total population (%)			AAGR (%)	
		1970	2000	2025	1970	2000	2025	1970–2000	2000–2025
North	<15	43	32	30	26	17	15	–0.96	–0.25
	15–65	106	128	123	64	67	62	0.63	–0.19
	>65	18	31	43	16	16	22	1.80	1.33
	Total	167	192	196	100	100	100	0.44	0.08
South and east	<15	50	75	73	43	32	22	1.33	–0.16
	15–65	61	146	221	52	62	67	2.94	1.66
	>65	5	13	34	4	6	10	3.31	3.80
	Total	117	235	328	100	100	100	2.35	1.33
Total Med		**284**	**427**	**523**				**1.35**	**0.81**

Source: Plan Bleu, Attané and Courbage, 2001

Table A4 Average household size

Country	1985	2000	2025
Spain	3.7	3.1	3.2
France	2.7	2.5	2.2
Italy	3.0	2.5	2.3
Greece	3.2	2.7	2.4
Malta	3.3	2.9	2.5
Cyprus	3.7	3.9	3.8
Slovenia	3.2	2.7	2.6
Croatia	3.1	2.8	2.5
Serbia-Montenegro	3.5	3.2	3.0
Albania	5.6	4.8	4.8
Turkey	5.3	4.2	3.3
Syria	6.5	6.2	4.7
Israel	3.6	3.5	3.1
Egypt	5.0	4.9	4.0
Libya	6.9	7.7	7.5
Tunisia	5.4	4.8	4.2
Algeria	7.0	6.1	4.9
Morocco	5.9	5.3	4.4
Total NMC	**3.2**	**2.8**	**2.5**
Total SEMC	**5.6**	**5.0**	**4.1**
Total Med	**4.0**	**3.7**	**3.3**

Source: UN-Habitat, 2001

Table A5 Urban population in Mediterranean countries, 1970–2025

Country	1970	1985	2000	2025	AAGR 1970–2000	AAGR 2000–2025
	(1000 inhabitants)				(%)	
Spain	23,774	29,125	31,851	32,941	1.0	0.1
France	31,395	34,709	36,982	39,820	0.5	0.3
Italy	37,252	40,788	41,135	39,095	0.3	–0.2
Greece	4504	5782	6289	6717	1.1	0.3
Monaco	24	28	34	41	1.2	0.8
Malta	235	252	292	333	0.7	0.5
Cyprus	238	374	501	699	2.5	1.3
Slovenia	435	602	706	887	1.6	0.9
Croatia	1613	2147	2370	2659	1.3	0.5
Bosnia-Herzegovina	645	1192	1877	2702	3.6	1.5
Serbia-Montenegro	3136	4501	5815	7839	2.1	1.2
Albania	518	816	1112	1877	2.6	2.1
Turkey	12,901	25,664	43,517	66,424	4.1	1.7
Syria	2629	5433	9342	17,273	4.3	2.5
Lebanon	1193	1713	2462	3320	2.4	1.2
Israel	2316	3368	4986	6861	2.6	1.3
Palestinian Territories	632	816	1683	3570	3.3	3.1
Egypt	18,016	28,999	42,485	78,777	2.9	2.5
Libya	862	2447	4449	6798	5.6	1.7
Tunisia	1814	3495	5608	8828	3.8	1.8
Algeria	4772	9132	15,321	25,852	4.0	2.1
Morocco	4948	9078	15,037	25,053	3.8	2.1
Total NMC	**103,769**	**120,317**	**128,963**	**135,611**	**0.7**	**0.2**
Total east	**19,670**	**36,995**	**61,990**	**97,448**	**3.9**	**1.8**
Total south	**30,412**	**53,151**	**82,900**	**145,308**	**3.4**	**2.3**
Total SEMC	**50,082**	**90,146**	**144,890**	**242,756**	**3.6**	**2.1**
Total Med	**153,850**	**210,463**	**273,853**	**378,367**	**1.9**	**1.3**

Source: Plan Bleu, Attané and Courbage, 2001

Note: Urban population is understood as the population living in towns with more than 10,000 inhabitants.

Table A6 Number of tourists in the Mediterranean countries, 1990–2025, (in thousands)

	International tourism			National tourism			TOTAL		
Country	1990	2000	2025	1990	2000	2025	1990	2000	2025
Spain	37,441	47,898	80,759	17,917	20,704	28,538	55,358	68,602	109,297
France	52,497	75,595	116,333	33,405	42,777	48,133	85,902	118,372	164,466
Italy	26,679	41,181	57,345	29,366	31,601	38,287	56,045	72,782	95,631
Greece	8873	12,500	18,708	4072	4751	6755	12,945	17,251	25,463
Monaco	245	300	594	—	—	—	245	300	594
Malta	872	1216	2022	125	156	249	997	1372	2271
Cyprus	1561	2686	4405	143	314	540	1704	3000	4945
Slovenia	—	1090	3993	799	786	1400	799	1876	5393
Croatia	—	5831	11,786	1423	1118	2348	1423	6949	14,135
Bosnia-Herzegovina	—	110	594	871	199	1384	871	309	1978
Serbia-Montenegro	—	239	2689	2599	1086	4887	2599	1325	7576
Yugoslavia SFR	*7880*	—	—	—	—	—	*7880*	—	—
Albania	30	32	215	98	125	879	128	157	1093
Turkey	4799	9586	33,991	11,295	16,407	41,032	16,094	25,993	75,023
Syria	562	1416	4351	1212	1594	6961	1774	3010	11,311
Lebanon	—	742	5442	—	962	2074	—	1704	7515
Israel	1063	2417	4423	2327	3043	5110	3390	5460	9533
Palestinian Territories	—	330	—	—	63	1336	—	393	1336
Egypt	2411	5116	23,983	6800	6601	21,826	9211	11,717	45,809
Libya	96	174	1738	318	604	3533	414	778	5271
Tunisia	3204	5057	10,603	1600	2115	5028	4804	7172	15,630
Algeria	1137	866	1482	4973	6066	11,006	6110	6932	12,488
Morocco	4024	4113	10,962	3843	4561	9544	7867	8674	20,505
Total NMC	**136,078**	**188,678**	**299,441**	**90,818**	**103,615**	**133,400**	**226,896**	**292,293**	**432,841**
Total SEMC	**17,296**	**29,817**	**96,975**	**32,368**	**42,015**	**107,448**	**49,664**	**71,832**	**204,423**
Total Med	**153,374**	**218,495**	**396,416**	**123,185**	**145,630**	**240,848**	**276,559**	**364,125**	**637,263**

Source: Plan Bleu and WTO, 2001

Notes:
The number of international tourist arrivals is assessed by surveys in borders (WTO).
The number of national tourists is estimated by the *Plan Bleu* from assumptions on the rate of holiday departure.

Economy

Table A7 GDP growth rates in the Mediterranean countries, 1970–2025

	AAGR (%) 1970–1985	AAGR (%) 1985–2000	Baseline scenario assumptions AAGR (%) 2000–2025
Spain	2.9	3.3	
France	2.8	2.3	
Italy	3.0	2.0	
Greece	3.1	2.0	
4 EU-Med	**2.9**	**2.3**	**2.4**
Monaco	—	1.6[2]	
Malta	7.4	5.3	
Cyprus	8.7[1]	5.1	
Islands	**—**	**5.1**	**4.0**
Slovenia	—	1.8 [2]	
Croatia	—	–1.4[2]	
Bosnia-Herzegovina	—	25.6	
Serbia-Montenegro	—	—	
Albania	—	0.9	
EAC	**—**	**—**	**4.6**
Turkey	4.3	4.2	**4.7**
Israel	4.8	4.9	
Palestinian territories	—	1.6[4]	
Israel & Palestinian Territories			**3.6**
Syria	7.5	3.9	
Lebanon		3.2[3]	
Egypt	6.6	4.3	
Mashrek	**6.8**	**4.2**	**4.7**
Libya	—	–1.2[2]	
Tunisia	6.3	4.1	
Algeria	5.6	1.4	
Morocco	4.6	3.0	
Maghreb	**5.3**	**2.4**	**4.0**
Total NMC	**2.7**	**2.6**	**2.5**
Total east	**4.7**	**4.8**	**4.2**
Total south	**4.4**	**3.1**	**4.2**
Total SEMC	**4.6**	**4.1**	**4.2**
Total Med	**2.9**	**2.5**	**2.7**
	1970–1985	**1985–2000**	
Sub-Saharan Africa	2.7	2.3	
Latin America and the Caribbean	4.0	2.8	
South East Asia and Pacific	6.8	7.6	
High income OECD countries	3.1	2.8	
US	3.2	3.2	
World	**3.4**	**3.0**	

Source: World Bank for 1970–2000; *Plan Bleu* 2001 from background papers by E. Fontela Mahjoub M. for 2025

Notes:
GDP in US$1995
1 period 1975–1985
2 period 1990–2000
3 period 1998–2000
4 period 1994–2000

Table A8 Unemployment rate, 1980–2003 (in % of labour force)

	1980	1985	1990	1995	2000	2001	2002	2003
Spain	11.1	21.0	16.0	22.7	13.9	10.5	11.4	11.3
France	6.1	10.2	9.2	11.6	10.0	8.8	8.9	9.7
Italy	7.6	10.3	11.4	11.4	10.5	9.5	9.0	8.7
Greece	2.4	7.8	7.0	9.1	11.1	10.2	9.6	
Malta	—	8.1	3.9	3.7	6.5	6.5	6.8	7.9
Cyprus	2.0	3.3	1.8	2.6	4.9	4	3.3	4.1
Slovenia	—	—	4.7	7.4	7.2	5.9	5.9	6.6
Croatia	—	6.5	8.2	14.5	16.1	15.8	14.8	14.3
Bosnia-Herzegovina	—	—	—	—	—	—	—	—
Serbia-Montenegro	—	—	—	—	21.2	22.3	24.7	—
Albania	5.6	6.7	9.5	12.9	16.8	16.4	15.8	15.0
Turkey	—	11.2	8.0	7.5	6.6	8.5	10.6	—
Syria	3.9	—	—	—	—	11.2	11.7	—
Lebanon	—	—	—	8.6[1]	—	—	—	—
Israel	4.8	6.7	9.6	6.9	8.8	9.3	10.3	10.7
Palestinian Territories	—	—	—	18.2	14.2	25.5	31.3	25.6
Egypt	5.2	—	8.6	11.3	9.0	9.2	—	—
Libya	—	—	—	—	—	—	—	—
Tunisia	—	—	15.3[2]	15.6[3]	15.6	15.0	14.9	14.3
Algeria	—	—	19.8	27.9	29.8	27.3	—	—
Morocco	—	—	15.8	22.9	21.5	19.5	18.3	—

Source: World Bank, World Development Indicators 2004; ILO (http://laborsta.ilo.org/)

Notes
1 1997
2 1989
3 1994

Table A9 Net capital flows to the Mediterranean – Annual average (in constant 1995 US$)

	1971–1980		1981–1990		1991–2000	
	Million $	$ per cap.	Million $	$ per cap.	Million $	$ per cap.
Total Net Flows (TNF)	12,820	89	12,719	70	16,805	70
– Official Flows	*7941*	*55*	*9137*	*50*	*9638*	*40*
– Private Flows	*4878*	*34*	*3582*	*20*	*7167*	*30*
GDP	193,627		322,718		517,095	
TNF/GDP	6.6%		3.9%		3.2%	

Source: OECD/DAC, 2004

Notes:
Excluding the 4 EU Mediterranean countries
For each year, population (and GDP) includes population (and GDP) of the Mediterranean countries having benefited from capital contributions.

Table A10 Net official capital flows to the Mediterranean – Share of the multilateral funds (%)

	1971–1980		1981–1990		1991–2000	
Share of the multilateral funds in the net official flows	15.7		17.2		16.5	
– of which European Commission	1.6	*10*	3.2	*19*	13.2	*80*
– of which other multilateral	6.2	*40*	4.5	*26*	6.4	*39*
– of which IBRD	7.8	*50*	9.5	*55*	–3	*–19*

Source: OECD/DAC, 2004

Notes:
Excluding the 4 EU Mediterranean countries
Numbers in italics indicate share of each donor in the total of the multilateral aid.
'Other multilateral' includes IBRD (International Bank for Reconstruction and Development), African Development Bank., Arab Agencies. EBRD, GEF.

Table A11 Net capital flows per country compared with the Mediterranean average

		Net official flows per inhabitant from EU[1] (%)			Total Foreign Direct Investment from DAC[2] countries per inhabitant
		1971–1980	1981–1990	1991–2000	1991–2000
Islands	Cyprus	117	154	141	1361
	Malta	464	302	323	1014
EAC	Slovenia	—	—	135	389
	Croatia	—	—	39	390
	Bosnia-Herzegovina	—	—	572	–6
	Serbia-Montenegro	—	—	100	7
	Albania	—	14	307	15
SEMC	Turkey	68	30	12	123
	Syria	21	32	26	29
	Israel	201	99	15	959
	Palestinian Territories	—	—	397	2
	Lebanon	58	100	127	96
	Egypt	45	70	66	40
	Libya	57	33	4	43
	Tunisia	250	150	115	91
	Algeria	98	58	134	78
	Morocco	81	119	86	26
Mediterranean[3] average (base = 100)		**100**	**100**	**100**	**100**
in US$/inhabitant		**8**	**15**	**21**	**113**

Source: OECD/DAC, 2004

Notes:
1 The average is calculated by dividing the total net flows coming from the EU and received by the Mediterranean countries by their population.
2 DAC members: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States, Commission of the European Communities.
3 Excluding the four EU Mediterranean countries.

This table should be read as follows: during the decade 1971–1980, the net official flow per inhabitant received by Morocco accounted for 81% of the Mediterranean average level of the net official flow received from EU.

Rural areas and agriculture

Table A12 Agricultural and rural populations in the Mediterranean, 1960–2025

Countries	Total population[1]	Rural population[1]					Rural population[2]
	(thousands)	(thousands)				(% of total population[1])	(thousands)
	2000	1960	1990	2000	2025	2000	2000
Spain	39,815	11,941	8700	7964	7828	20	8936
France	59,412	19,372	21,187	22,430	24,357	41	14,588
Italy	57,456	17,693	16,199	16,321	14,830	26	19,018
Greece	10,558	4784	4134	4269	3676	35	4234
Monaco	34	0	0	0	0	0	0
Malta	389	83	93	97	97	25	35
Cyprus	785	379	266	284	201	26	236
Slovenia	1965	1243	1351	1259	1142	58	1010
Croatia	4473	3053	2438	2103	1534	34	1967
Bosnia-Herzegovina	3972	2752	2979	2095	1622	41	2269
Serbia-Montenegro	10,856	5887	5548	5041	4378	40	5109
Albania	3114	1213	2292	2002	1943	62	1808
Turkey	65,627	20,375	24,537	22,110	20,879	32	22,824
Syria	15,936	2932	5444	6594	6730	42	7865
Lebanon	3206	855	1067	744	827	26	359
Israel	5851	573	765	865	1000	17	505
Palestinian Territories	3150	599	769	1467	2502	79	
Egypt	66,007	12,905	18,196	23,522	16,118	24	38,914
Libya	6038	991	1399	1589	2034	34	654
Tunisia[3]	9615	2994	3760	4007	4064	42	3261
Algeria	30,332	7614	13,563	15,011	16,477	54	12,980
Morocco	28,505	8463	13,161	13,468	13,121	46	13,307
NMC	**192,829**	**68,398**	**65,188**	**63,866**	**61,607**	**32**	**59,210**
SEMC	**234,267**	**58,304**	**82,662**	**89,377**	**83,752**	**35**	**100,669**
MED	**427,096**	**126,702**	**147,850**	**153,243**	**145,359**	**34**	**159,879**
Med. France[4]	7082	1265	1610	1775	1998	28	
NMC revised[5]	140,499	50,292	45,611	43,211	39,248	28	
Mediterranean[6]	**374,766**	**108,595**	**128,273**	**132,588**	**123,000**	**32**	

Source: Plan Bleu from Géopolis, World Population Prospects, Attané and Courbage, 2001; FAO (http://faostat.fao.org), AGRESTE (www.agreste.agriculture.gouv.fr), ILO (http://laborsta.ilo.org/)

Notes:
1 Data from Géopolis
2 Data from FAO
3 For Tunisia, data from the 2004 population census: total population: 9.9 million, rural population: 3.48 million, rural population/total population: 35 per cent
4 Med. France = Mediterranean regions of France
5 NMC revised = NMC, excluding the non-Mediterranean regions of France
6 Mediterranean = NMC revised + SEMC

Table A12 Agricultural and rural population in the Mediterranean; 1960–2025 (continuation)

Countries	Agricultural population[2] (thousands)					(% of rural pop.[1])	Agricultural labour force[2] (thousands)					(% of total active population[2])			
	1960	1990	2000	2010	2025	2000	1960	1990	2000	2010	2025	1960	1990	2000	2010
Spain	12,224	4635	2780	1765	1087	35	4727	1892	1293	796	490	41.1	11.9	7.4	4.5
France	10,095	3116	1985	1244	806	9	4243	1356	857	555	359	22.1	5.5	3.3	2.0
Italy	14,965	4878	2911	1828	1075	18	6157	2101	1352	795	467	30.8	8.6	5.3	3.2
Greece	3750	1901	1381	1002	728	32	1735	963	775	563	409	52.2	23.0	16.8	11.9
Monaco	4	1	0	0	0	2	1	0	0	0					
Malta	29	9	6	4	4	6	9	3	2	2	2	9.5	2.6	1.4	1.3
Cyprus	240	92	65	45	31	23	98	44	33	23	16	41.9	13.6	8.6	5.4
Slovenia	1049	119	34	13	5	3	464	55	20	7	2	63.8	5.7	2.0	0.7
Croatia	2759	730	370	203	104	18	1220	338	186	95	49	64.2	16.1	8.5	4.4
Bosnia-Herzegovina	1913	475	194	97	46	9	846	220	96	46	22	64.2	11.3	5.2	2.3
Serbia-Montenegro	5195	3025	2015	1340	888	40	2297	1400	1008	668	443	64.4	29.7	19.9	12.9
Albania	1175	1796	1496	1383	805	75	521	857	751	729	425	71.2	54.6	48.2	41.8
Turkey	18,227	20,950	20,365	18,650	12,244	92	11,043	13,012	14,426	14,570	9565	78.7	53.6	46.2	39.0
Syria	2832	4104	4535	4930	3744	69	899	1147	1434	1815	1378	60.7	33.1	27.8	23.7
Lebanon	697	198	123	74	49	17	197	62	47	31	20	38.3	7.3	3.7	1.9
Israel	304	186	163	129	109	19	110	73	70	59	50	14.4	4.1	2.7	1.8
Palestinian Territories	—	—	—	—	—	—	54	85	—	—	—	24.2	20.2	—	—
Egypt	19,586	24,664	24,805	23,418	22,237	105	6651	7899	8591	9064	8607	65.9	40.3	33.3	26.6
Libya	801	471	303	209	148	19	261	140	107	76	54	59.5	10.9	6.0	3.2
Tunisia	2592	2295	2319	2224	1674	58	838	805	942	1013	763	61.6	28.1	24.6	20.9
Algeria	7594	6396	7307	7463	6593	49	2310	1827	2545	3212	2838	71.1	26.1	24.3	21.3
Morocco	8676	11,110	10,877	10,383	9619	81	3124	4073	4251	4376	4054	73.1	44.7	36.1	29.0
NMC	**53,399**	**20,778**	**13,237**	**8924**	**5579**	**21**	**22,319**	**9230**	**6373**	**4279**	**2684**	**35.7**	**11.4**	**7.4**	**4.9**
SEMC	**61,309**	**70,374**	**70,797**	**67,480**	**56,417**	**81**	**25,487**	**29,123**	**32,413**	**34,216**	**27,329**	**70.2**	**41.3**	**34.5**	**28.2**
MED	**114,708**	**91,152**	**84,034**	**76,404**	**61,995**	**55**	**47,806**	**38,353**	**38,786**	**30,495**	**013**	**48.0**	**25.3**	**21.6**	**18.5**
Med. France[3]	2289	678	450	282	183	25	743	226	150	97	63				
NMC revised[4]	593	18,340	11,702	7962	4956	27	18,819	8100	5666	3821	2388				
Mediterranean[5]	**106,902**	**88,714**	**82,499**	**75,442**	**61,372**	**63**	**44,306**	**37,138**	**38,079**	**38,037**	**29,716**				

Source: Plan Bleu from Géopolis, World Population Prospects, Attané and Courbage, 2001; FAO (http://faostat.fao.org), AGRESTE (www.agreste.agriculture.gouv.fr), ILO (http://laborsta.ilo.org/)

Notes:
1 Data from Géopolis
2 Data from FAO
3 Med. France = Mediterranean regions of France
4 NMC revised = NMC, excluding the non-Mediterranean regions of France
5 Mediterranean = NMC revised + SEMC

Table A13 Land use in Mediterranean countries (1000ha)

Countries	Total area	Arable land				Permanent crops				Permanent meadows and pastures			
	2000	1961	1990	2000	AAGR 1990–2000 (%)	1961	1990	2000	AAGR 1990–2000 (%)	1961	1990	2000	AAGR 1990–2000 (%)
Spain	50,599	16,246	15,335	13,256	–1.4	4484	4837	4965	0.3	12,500	10,300	11,462	1.1
France	55,150	19,606	17,999	18,440	0.2	1799	1191	1142	–0.4	13,134	11,380	10,124	–1.2
Italy	30,134	12,862	9012	8292	–0.8	2746	2960	2841	–0.4	5075	4868	4353	–1.1
Greece	13,196	2794	2899	2741	–0.6	906	1068	1113	0.4	5210	5255	4675	–1.2
Malta	32	17	12	8	–4.0	1	1	1	0.0				
Cyprus	925	100	106	101	–0.5	100	51	42	–1.9	5	5	4	–2.2
Slovenia	2025	—	200	173	–1.8	—	36	31	–1.9	—	328	314	–0.5
Croatia	5654	—	1212	1458	2.3	—	113	128	1.6	—	1079	1570	4.8
Bosnia-Herzegovina	5120	—	800	660	–2.4	—	240	150	–5.7	—	1200	1030	–1.9
Serbia-Montenegro	10,217	—	3720	3406	0.0	—	356	330	–0.9	—	2112	1851	–1.6
Yugoslavia SFR		*7691*				*691*				*6570*			
Albania	2875	432	579	578	0.0	47	125	121	–0.3	753	417	445	0.7
Turkey	77,482	23,013	24,647	24,138	–0.2	2154	3030	2534	–1.8	11,350	12,000	12,378	0.3
Syria	18,518	6146	4885	4542	–0.7	235	741	810	0.9	8560	7869	8359	0.6
Lebanon	1040	172	183	190	0.4	90	122	142	1.5	7	12	16	2.9
Israel	2106	318	348	338	–0.3	79	88	86	–0.2	114	148	142	–0.4
Palestinian Territories	38	8	9	11	2.0	12	10	8	–2.2				
Egypt	100,145	2499	2284	2821	2.1	69	364	466	2.5				
Libya	175,954	1700	1805	1815	0.1	270	350	335	–0.4	9200	13,300	13,300	0.0
Tunisia	16,361	3100	2909	2864	–0.2	1150	1942	2105	0.8	4398	3793	4561	1.9
Algeria	238,174	6472	7081	7662	0.8	594	554	530	–0.4	38,405	31,041	31,829	0.3
Morocco	44,655	6590	8707	8767	0.1	380	736	967	2.8	16,400	20,900	21,000	0.0
NMC[1]	**175,927**	**59,748**	**51,874**	**49,113**	**–0.5**	**10,774**	**10,978**	**10,864**	**–0.1**	**43,247**	**36,944**	**35,828**	**0**
SEMC	**674,473**	**50,018**	**52,858**	**53,148**	**0.1**	**5033**	**7887**	**7972**	**0.1**	**87,286**	**88,630**	**90,755**	**0.2**
MED	**850,400**	**109,766**	**104,732**	**102,261**	**–0.2**	**15,807**	**18,868**	**18,771**	**–0.1**	**130,533**	**125,74**	**834,126**	**0.1**
Med. France[2]	6828		551	517	–0.6		209	494	9.0		1540	1398	–1.0
NMC revised[3]	127,605		34,426	31,190	–1.0		9996	10,216	0.2		27,104	27,102	0.0
Mediterranean[4]	**802,078**		**87,284**	**84,338**	**–0.3**		**17,883**	**18,188**	**0.2**		**115,734**	**117,857**	**0.2**

Source: FAO, Eurostat, Montgolfier, 2002; French Ministry of Agriculture

Notes:
1 The NMC sum does not include the Yugoslavia SFR data
2 Med. France = Mediterranean regions of France
3 NMC revised = NMC, excluding the non-Mediterranean regions of France
4 Mediterranean = NMC revised + SEMC

Table A13 Land use in Mediterranean countries (continuation) (1000ha)

Countries	Total area	Total forest area	Natural Wood-lands	Forest Plantations	Total forests	AAGR Total forests (%)	Forest Plantations	Total forests	Forest area yearly damaged by fire (average)		Number of fire outbreaks (average)	
	2000	1990		2000		1990–2000	2000	2000	1981–1988	1989–1998	1981–1988	1989–1988
Spain	50,599	13,510	12,466	1,904,981	14,370	0.6	12,611	26	219	192	9373	18,217
France	55,150	14,725	14,380	961	15,341	0.4	1833	17,174	37	29	4555	6135
Italy	30,134	9708	9870	133	10,003	0.3	985	10,988	157	96	12,759	11,233
Greece	13,196	3299	3479	120	3599	0.9	3154	6753	56	48	1355	1727
Malta	32	—	—	—	—	—	—	—	—	—	—	—
Cyprus	925	119	172	0	172	3.8	214	386	4	0.4	72	33
Slovenia	2025	1085	1106	1	1107	0.2	67	1174	—	0.8	—	93
Croatia	5654	1763	1736	47	1783	0.1	330	2113	—	12	—	282
Bosnia-Herzegovina	5120	2273	2216	57	2273	0.0	433	2706	—	0.9	—	139
Serbia-Montenegro	10,217	2901	2848	39	2887	0.0	586	3473	—	—	—	—
Albania	2875	1069	886	102	991	–0.8		991	0.3	0.5	112	366
Turkey	77,482	10,005	8371	1854	10,225	0.2	10,695	20,920	11	12	1402	1934
Syria	18,518	461	232	229	461	0.0	35	496	—	—	—	—
Lebanon	1040	37	34	2	36	–0.3	35	71	—	—	—	—
Israel	2106	82	41	91	132	4.9	46	178	4	6	907	969
Palestinian Territories	38	—	—	—	—	—	—	—	—	—	—	—
Egypt	100,145	52	0	72	72	3.3	—	72	—	—	—	—
Libya	175,954	311	190	168	358	1.4	446	804	—	—	—	—
Tunisia	16,361	499	308	202	510	0.2	328	838	2	1.5	443	128
Algeria	238,174	1879	1427	718	2145	1.3	1662	3807	43	14	—	—
Morocco	44,655	3037	2491	534	3025	0.0	1265	4290	4	3.5	217	277
NMC	**175,927**	**50,452**	**49,159**	**3364**	**52,526**	**0.4**	**20,213**	**72,739**	**473**	**380**	**28,226**	**38,225**
SEMC	**674,473**	**16,363**	**13,094**	**3870**	**16,964**	**0.4**	**14,512**	**31,476**	**63**	**37**	**2969**	**3308**
MED	**850,400**	**66,815**	**62,253**	**7234**	**69,490**	**0.4**	**34,725**	**104,215**	**536**	**417**	**31,195**	**41,533**
Med. France[1]	6828	2211			2458	1.1	325	3783	31	20	2822	2668
NMC revised[2]	127,605	37,938			39,643	0.4	19,705	59,348	467	371	26,493	34,758
Mediterranean[3]	**802,078**	**54,301**			**56,607**	**0.4**	**34,217**	**90,824**	**530**	**408**	**29,462**	**38,066**

Source: FAO, Eurostat, Montgolfier, 2002; French Ministry of Agriculture

Notes:
1 Med. France = Mediterranean regions of France.
2 NMC revised = NMC, excluding the non-Mediterranean regions of France.
3 Mediterranean = NMC revised + SEMC.

Table A14 Agriculture and intensification

Countries	Arable land and permanent crops	Fertilizer consumption in kg/ha of arable land and permanent crops		Pesticide consumption in kg/ha of arable land and permanent crops		Organic agriculture (certified and conversion)	
	2000 1000 ha	2000 1000 ha	AAGR 1990–2000 (%)	2000 1000 ha	AAGR 1990–2000 (%)	2003 1000 ha	(% of arable land + permanent crops)
Spain	18,221	118.0	1.9	1.989	0.1	485	2.7
France	19,582	211.7	–3.3	4.978	–0.2	420	2.1
Italy	11,133	155.6	–0.4	13.707	–1.7	1230	11.0
Greece	3854	118.3	–3.9	2.759	4.3	31	0.8
Malta	9	83.3	3.4	36.100	–4.6	—	—
Cyprus	143	100.8	–3.6	—	—	0.052	0.0
Slovenia	204	370.4	4.1	13.862	12.1	5	2.6
Croatia	1586	140.6	0.2	—	—	0.120	0.0
Bosnia-Herzegovina	810	51.6	17.5	—	—	—	—
Serbia-Montenegro	3736	51.1	7.8	0.899	0.6	15	0.4
Albania	699	26.8	–15.5	—	—	—	—
Turkey	26,672	78.3	1.4	2.357	1.3	57	0.2
Syria	5352	68.3	2.4	1.156	16.7	0.074	0.0
Lebanon	332	157.4	6.6	5.571	—	0.250	0.1
Israel	424	221.7	–0.7	5.959	—	7	1.7
Palestinian Territories	19	—	—	—	—	—	—
Egypt	3287	382.8	0.6	2.256	–37.3	15	0.5
Libya	2150	25.6	–3.4	—	—	—	—
Tunisia	4969	22.3	2.6	0.364	—	18	0.4
Algeria	8192	11.3	–3.8	0.331	–13.9	—	—
Morocco	9734	37.7	0.2	—	—	12	0.1
NMC	**59,977**	**149**	**–1.7**			**2187**	**3.6**
SEMC	**61,131**	**73**	**1.3**			**110**	**0.2**
MED	**121,108**	**111**	**–0.9**			**2296**	**1.9**
Med. France[1]	1011					32	3.2
NMC revised[2]	41,406					1799	4.3
Mediterranean[3]	**102,537**					**1908**	**1.9**

Source: FAO, Eurostat, Montgolfier, 2002; Ministère de l'Agriculture et de la Pêche (France)

Notes:
1 Med. France = Mediterranean regions of France.
2 NMC revised = NMC, excluding the non-Mediterranean regions of France.
3 Mediterranean = NMC revised + SEMC.

Table A14 Agriculture et intensification (continuation)

Countries	Irrigated areas				Cereals				Olive groves				Vineyards			
	1961	1990	2000	AAGR 1990 –2000	1961	1990	2002	AAGR 1990 –2002	1961	1990	2003	AAGR 1990 –2003	1961	1990	2003	AAGR 1990 –2003
	(1000ha)			(%)	(1000ha)			(%)	(1000ha)			(%)	(1000ha)			(%)
Spain	1950	3402	3655	0.7	6930	7551	6717	–1.0		2064	2400	1.2	1742	1402	1166	–1.4
France	360	1970	2634	2.9	9140	9060	9307	0.2	45	15	17	1.0	1418	908	852	–0.5
Italy	2400	2711	2700	0.0	6387	4413	4305	–0.2	1229	1134	1141	0.0	1691	1024	868	–1.3
Greece	430	1195	1451	2.0	1773	1470	1296	–1.0	0	691	765	0.8	247	146	129	–0.9
Malta	1	1	2	7.2	4	2	3	1.7	0	0	0	–8.8	1	1	1	–0.7
Cyprus	30	36	40	1.1	142	58	56	–0.2	20	6	8	1.7	35	25	17	–3.0
Slovenia	—	2	3	5.2	—	119	98	–1.9	—	0.2	1	13.9	—	20	15	–2.6
Croatia	—	2	3	5.2	—	593	715	1.9	—	15	15	0.0	—	56	57	0.2
Bosnia-Herzegovina	—	2	3	5.2	—	304	399	2.8	—	—	—	—	—	5	4	–3.3
Serbia-Montenegro	—	78	20	–15.6	—	2399	2094	–1.3	—	2.7	1.5	–5.2	—	89	69	–2.3
Yugoslavia SFR	*121*				*5455*								*272*			
Albania	156	423	340	–2.2	348	321	175	–4.9	19	45	29	–3.3	10	14	7	–5.4
Turkey	1310	3800	4500	1.7	12,865	13,640	13,981	0.2	392	537	597	0.8	775	580	565	–0.2
Syria	558	693	1211	5.7	2116	4138	2974	–2.7	80	391	499	1.9	69	109	50	–5.8
Lebanon	41	86	104	1.9	90	41	54	2.3	27	43	58	2.3	24	29	14	–5.6
Israel	136	206	194	–0.6	155	114	87	–2.2	10	13	19	3.0	12	5	6	2.3
Palestinian Territories	8	11	12	0.9	—	2	2	0.0	0	0	0	—	—	0	8	29.5
Egypt	2568	2648	3219	2.2	1724	2283	2723	1.5	3	9	50	14.0	9	38	64	4.1
Libya	121	470	470	0.0	489	404	342	–1.4	0	60	90	3.2	3	7	8	0.7
Tunisia	100	300	380	2.4	1125	1443	430	–9.6	540	1392	1500	0.6	46	29	27	–0.5
Algeria	229	384	560	3.8	2709	2366	1850	–2.0	0	170	178	0.3	349	88	65	–2.3
Morocco	875	1258	1305	0.4	3773	5603	4955	–1.0	155	365	500	2.5	76	50	50	0.0
NMC[1]	**5448**	**9822**	**10,851**	**1.0**	**30,178**	**26,291**	**25,164**	**–0.4**	**1313**	**3974**	**4377**	**0.7**	**5416**	**3691**	**3185**	**–1.1**
SEMC	**5946**	**9856**	**12,027**	**2.0**	**25,046**	**30,034**	**27,398**	**–0.8**	**1207**	**2980**	**3490**	**1.2**	**1364**	**935**	**857**	**–0.7**
MED	**11,394**	**19,678**	**22,878**	**1.5**	**55,224**	**56,325**	**52,562**	**–0.6**	**2519**	**6954**	**7868**	**1.0**	**6780**	**4626**	**4042**	**–1.0**
Med. France[2]		334	304	–0.9		259	226	–1.1		16	17	0.5		557	410	–2.3
NMC revised[3]		8186	8521	0.4		17,490	16,083	–0.7		3974	4377	0.7		3340	2743	–1.5
Mediterranean[4]		**18,042**	**20,548**	**1.3**		**47,524**	**43,481**	**–0.7**		**6955**	**7867**	**1.0**		**4275**	**3600**	**–1.3**

Source: FAO, Eurostat, Montgolfier, 2002; Ministère de l'Agriculture et de la Pêche (France)

Notes:
1 The NMC sum includes the Yugoslavia SFR data for 1961.
2 Med. France = Mediterranean regions of France.
3 NMC revised = NMC, excluding the non-Mediterranean regions of France.
4 Mediterranean = NMC revised + SEMC.

Table A15 Trade in food and agricultural products, and agricultural added value

Countries	Agricultural export[1] (1000 US$ 1995)					Agricultural imports[1] (1000 US$ 1995)				
	1962	1970	1980	1991	2001	1962	1970	1980	1991	2001
Spain	386,785	728,375	3,504,169	8,731,636	14,985,267	436,564	904,975	4,110,284	9,091,596	11,573,627
France	1,299,096	3,168,208	17,250,124	34,163,489	33,078,925	2,308,853	3,272,555	13,991,269	23,642,467	23,903,173
Italy	757,265	1,248,316	5,783,387	12,059,651	16,248,078	1,701,090	3,462,174	13,944,250	24,302,973	21,571,702
Greece	208,258	326,365	1,288,725	2,820,511	2,502,988	117,817	254,399	1,158,265	3,141,371	3,367,604
Malta	4345	6147	30,236	40,336	61,152	30,340	43,101	161,475	209,157	262,090
Cyprus	26,552	60,746	180,025	326,965	352,268	22,245	37,539	169,973	271,750	613,382
Slovenia	—	—	—	448,682	362,217	—	—	—	611,121	745,022
Croatia	—	—	—	537,820	428,526	—	—	—	575,535	792,653
Bosnia-Herzegovina	—	—	—	40,946	41,631	—	—	—	138,903	638,934
Serbia-Montenegro	—	—	—	494,851	343,276	—	—	—	400,438	468,133
Yugoslavia SFR	*214,495*	*331,065*	*1,036,553*			*253,619*	*380,214*	*1,546,412*		
Albania	5861	19,604	110,708	46,025	23,426	12,787	10,592	37,923	180,218	262,733
Turkey	328,505	490,494	1,949,121	3,429,215	3,730,336	113,212	98,183	267,423	1,866,501	2,907,760
Syria	138,857	143,925	273,871	667,816	792,086	51,865	106,434	613,933	731,265	762,318
Lebanon	33,480	70,723	205,593	129,567	139,819	115,412	158,821	587,450	889,318	1,157,159
Israel	92,618	202,145	870,641	1,189,001	991,609	120,253	224,154	936,048	1,250,347	1,859,489
Palestinian Territories		11,367	81,198	49,820	100,052	—	7853	37,315	42,838	581,600
Egypt	338,303	526,911	674,545	406,407	637,652	242,023	250,392	2,551,398	2,717,815	3,418,643
Libya	3942	1196	29	46,631	28,529	26,637	125,500	1,223,768	1,256,263	1,283,268
Tunisia	73,459	62,255	190,761	365,592	424,476	58,043	85,255	518,450	569,281	874,275
Algeria	267,628	169,863	119,202	60,063	33,899	217,796	182,524	2,097,893	2,429,119	2,737,170
Morocco	157,583	231,893	515,821	632,511	736,173	129,374	157,354	931,889	931,954	1,692,595
NMC	**2,902,657**	**5,888,825**	**29,183,928**	**59,710,912**	**68,427,754**	**4883,315**	**8,365,548**	**35,119,852**	**62,565,528**	**64,199,053**
SEMC	**1,434,374**	**1,910,772**	**4,880,782**	**6,976,624**	**7,614,631**	**1,074,617**	**1,396,470**	**9,765,567**	**12,684,700**	**17,274,277**
MED	**4,337,031**	**7,799,598**	**34,064,710**	**66,687,536**	**76,042,385**	**5,957,932**	**9,762,018**	**44,885,419**	**75,250,228**	**81,473,330**
NMC – FR[2]	1,603,561	2,720,617	11,933,804	25,547,423	35,348,830	2,574,462	5,092,993	21,128,583	38,923,061	40,295,880
MED – FR[3]	2,868,749	3,821,545	9,761,565	13,953,249	15,229,261	2,149,234	2,792,940	19,531,135	25,369,401	34,548,555

Source: FAOSTAT, 2003 (http://faostat.fao.org/)

Notes:
1 The data in this table correspond to three-year averages of the imports and of the exports (calculated by *Plan Bleu*).
2 NMC – FR= NMC excluding France.
3 MED – FR= MED excluding France.

Table A15 Trade in food and agricultural products, and agricultural added value (continuation)

Countries	Agricultural trade balance[1] (1000 US$ 1995)					Agricultural added value per active agricultural worker (US$ 1995)			
	1962	1970	1980	1991	2001	1971	1981	1991	2001
Spain	–49,779	–176,600	–606,114	–359,960	3,411,640	4720	7431	14,666	22,580
France	–1,009,757	–104,347	3,258,854	10,521,022	9,175,752	12,149	19,961	32,482	60,468
Italy	–943,824	–2,213,859	–8,160,863	–12,243,322	–5,323,624	7766	11,416	16,128	27,654
Greece	90,441	71,966	130,461	–320,859	–864,616	6034	8977	11,643	13,850
Malta	–25,995	–36,954	–131,240	–168,820	–200,938	—	—	—	—
Cyprus	4306	23,207	10,052	55,216	–261,114	—	—	—	—
Slovenia	—	—	—	–162,439	–382,805	—	—	16,608	39,172
Croatia	—	—	—	–37 715	–364,127	—	—	6303	10,098
Bosnia-Herzegovina	—	—	—	–97 957	–597,303	—	—	—	—
Serbia-Montenegro	—	—	—	94,413	–124,857	—	—	—	—
Yugoslavia SFR	*–39,124*	*–49,149*	*–509,859*						
Albania	–6926	9012	72,785	–134,193	–239,307	—	1183	989	1900
Turkey	215,293	392,311	1,681,698	1,562,715	822,576	1717	1840	1832	1787
Syria	86,991	37,491	–340,061	–63,449	29,768	933	2468	2103	2669
Lebanon	–81,932	–88,098	–381,857	–759,751	–1,017,340	—	—	—	30,832
Israel	–27,635	–22,009	–65,407	–61,346	–867,880	—	—	—	—
Palestinian Territories	—	3513	43,883	6982	–481,548	—	—	—	—
Egypt	96,279	276,519	–1,876,853	–2 311,408	–2,780,992	618	736	1059	1332
Libya	–22,695	–124,304	–1,223,739	–1,209,632	–1,254,739	—	—	—	—
Tunisia	15,416	–23,000	–327 689	–203,689	–449,799	1377	1863	3055	3072
Algeria	49,832	–12,661	–1,978,691	–2,369,056	–2,703,271	663	1,408,914	1988	2013
Morocco	28,209	74,539	–416,068	–299,443	–956,422	1415	914	2162	1693
NMC	**–1,980,658**	**–2,476,723**	**–5,935,924**	**–2,854,616**	**4,228,701**				
SEMC	**359,757**	**514,302**	**–4,884,785**	**–5,708,076**	**–9,659,647**				
MED	**–1,620,900**	**–1 962,420**	**–10,820,709**	**–8,562,692**	**–5,430,945**				
NMC – FR[2]	–970,901	–2,372,376	–9,194,778	–13,375,638	–4,947,050				
MED – FR[3]	719,515	1,028,605	–9,769,570	–11,416,152	–19,319,293				

Source: FAOSTAT, 2003 (http://faostat.fao.org/)

Note:
1 The data of the trade balance in this table correspond to a 3-year average (calculated by *Plan Bleu*).
2 NMC – FR = NMC excluding France.
3 MED – FR = MED excluding France.

Fisheries and aquaculture

Table A16 Mediterranean fisheries

Captures in the Mediterranean (excluding Black Sea, Azov and Marmara seas) in tonnes							
Fishing area	1970	1975	1980	1985	1990	1995	2000
The Adriatic sea	144,516	195,378	216896	220,359	149,686	144,563	155,271
The Aegean sea	44,043	62,866	91,392	109,236	133,430	172,663	114,551
The Balearic islands	128,668	190,507	218,758	232,823	249,853	277,625	261,373
Golfe du Lion	40,971	35,514	34,983	36,381	40,790	30,636	41,635
The Ionian	83,884	147,059	156,256	245,860	242,003	273,841	199,617
The Levant	22,265	21,241	34,141	37,789	70,668	79,153	80,915
Sardinia	149,436	93,647	75,917	102,997	59,386	84,740	77,902
Unknown (GFCM area)	—	—	—	—	—	24	—
Tunas (GFCM area)	34,093	26,924	44,998	66,568	69,233	75,459	71,577
Total	647,876	773,136	873,342	1,052,012	1,015,049	1,138,702	1,002,841
of which the Atlantic red tunny	4694	11,266	10,040	19,296	17,238	37,560	23,092
Lobsters, spiny-rock lobsters	3553	4363	4045	7473	8758	7539	4057
Marine fishes not identified	65,821	119,766	116,098	113,148	102,124	110,210	67,690
River eels	5494	3183	3156	3042	2638	849	464
Squids, cuttlefishes, octopuses	44,587	47,024	51,659	65,722	72,129	62,526	53,805
Clams, cockles, arkshells	17,813	55,320	30,321	26,954	24,141	38,493	37,403
Herrings, sardines, anchovies	244,829	274,138	345,178	364,026	339,871	380,416	372,518
Miscellaneous pelagic fishes	56,989	50,021	55,177	87,224	68,863	95,066	71,913
Miscellaneous demersal fishes	9203	8026	10,412	17,735	16,952	17,731	17,280
Cods, hakes, haddocks	26,749	32,895	41,936	60,458	46,037	73,466	42,943
Flounders, halibuts, soles	6221	6948	8634	11,031	12,295	12,624	7724
Miscellaneous coastal fishes	91,381	105,804	115,801	140,874	158,652	155,934	142,674
Mussels	14,290	5565	9560	11,897	20,409	34,249	44,831
Shrimps, prawns	10,613	14,677	14,896	29,701	33,718	26,181	32,872

Source: FAO GFCM capture production 1970–2001 (www.fao.org/fi/statist/FISOFT/FISHPLUS.asp)

Note: GFCM = General Fisheries Commission for the Mediterranean.

Table A17 Mediterranean aquaculture

Aquaculture: production (aquatic plants excluded) in tonnes in the Mediterranean – Black Sea (marine + brackish waters)							
	1970	1975	1980	1985	1990	1995	2000
Mollusc – Total	16,304	39,254	55,926	82,613	135,798	185,885	190,618
France	4004	8732	8520	10,454	25,782	29,000	17,181
Italy	12,000	30,000	46,948	70,001	100,910	144,000	147,000
Greece	—	—	18	200	3686	10,889	24,356
Fish – Total	1693	2483	3782	4979	13,083	51,737	177,070
of which total Bass+ sea bream	10	110	375	902	7788	42,864	145,344
France	—	—	—	85	330	3640	4200
Italy	10	110	370	700	1900	6800	14,100
Greece	—	—	5	67	3550	18,926	65,240
Malta	—	—	—	—	—	900	1746
Cyprus	—	—	—	1	52	322	1683
Slovenia	—	—	—	—	—	49	73
Croatia	—	—	—	—	—	337	2100
Serbia-Montenegro	—	—	—	—	—	386	2173
Albania	—	—	—	—	—	—	—
Turkey	—	—	—	—	1133	7620	33,337
Israel	—	—	—	—	84	930	2701
Egypt	—	—	—	—	—	1817	18,893
Tunisia	—	—	—	20	368	390	611
Algeria	—	—	—	4	4	10	20
Morocco	—	—	—	—	157	1123	640
of which total grey mullet	1270	1820	2500	3205	3006	7246	26,793
Italy	1270	1820	2500	3200	3000	3000	3,000
Greece	—	—	—	—	—	443	526
Egypt	—	—	—	—	—	3800	23,265
Tunisia	—	—	—	5	6	3	2
Crustaceans – Total	—	—	—	17	78	130	119
Total	**18,297**	**46,995**	**59,728**	**87,936**	**148,983**	**238,052**	**367,820**

Aquaculture: value (aquatic plants excluded) in 1000 US$ in the Mediterranean – Black Sea (marine + brackish waters)							
	1970	1975	1980	1985	1990	1995	2000
North				87,252	291,760	526,338	68,275
South and east				274	18,865	120,750	372,353
Mediterranean countries				**87,527**	**310,625**	**647,088**	**1,058,627**

Source: FAO, Fishstat 2003 (www.fao.org/fi/statist/FISOFT/FISHPLUS.asp)

Energy and transport

Table A18 Energy intensity, per country, trends and scenarios to 2025 (in toe/US$ constant 95)

Countries	1971	1980	1992	2000	Baseline scenario 2025	AAGR (%) 1980–2000	AAGR (%) 1992–2000	AAGR (%) 2000–2025
Spain	0.143	0.168	0.165	0.172	0.107	0.13	0.51	–1.88
France	0.177	0.165	0.148	0.140	0.102	–0.80	–0.66	–1.27
Italy	0.196	0.170	0.149	0.140	0.106	–0.96	–0.74	–1.12
Greece	0.129	0.155	0.195	0.194	0.174	1.14	–0.03	–0.45
Malta	0.426	0.237	0.273	0.204	0.272	–0.74	–3.53	1.16
Cyprus	—	0.241	0.226	0.222	0.171	–0.42	–0.25	–1.05
Slovenia	—	—	—	0.263	0.110	—	—	–3.44
Croatia	—	—	—	0.329	0.196	—	—	–2.04
Bosnia-Herzegovina	—	—	—	0.689	0.238	—	—	–4.17
Serbia-Montenegro	—	—	—	1.020	0.795	—	—	–0.99
Albania	—	—	—	0.513	0.393	—	—	–1.06
Turkey	0.213	0.297	0.307	0.345	0.390	0.75	1.49	0.49
Syria	1.013	0.818	1.115	1.346	0.791	2.52	2.39	–2.10
Lebanon	—	—	0.308	0.394	0.287	—	3.12	–1.26
Israel	0.221	0.192	0.184	0.190	0.168	–0.05	0.36	–0.49
Palestinian Territories	—	—	—	0.277	0.292	—	—	0.21
Egypt	0.440	0.508	0.631	0.576	0.363	0.63	–1.15	–1.83
Libya	—	—	0.302	0.477	0.319	—	5.87	–1.60
Tunisia	0.240	0.294	0.294	0.282	0.210	–0.22	–0.53	–1.16
Algeria	0.232	0.391	0.640	0.594	0.569	2.12	–0.93	–0.17
Morocco	0.177	0.212	0.235	0.251	0.205	0.85	0.80	–0.80
NMC	0.176	0.167	0.153	0.154	0.113	–0.39	0.08	–1.25
SEMC	0.255	0.323	0.371	0.393	0.354	0.99	0.72	–0.42
TOTAL	0.182	0.180	0.178	0.184	0.156	0.13	0.42	–0.66
					Alternative scenario			
NMC	0.176	0.167	0.153	0.154	0.101	–0.39	0.08	–1.66
SEMC	0.255	0.323	0.371	0.393	0.273	0.99	0.72	–1.44
TOTAL	0.182	0.180	0.178	0.184	0.133	0.13	0.42	–1.31

Source: World Bank, *World Development Indicators*, 2002; OME (2002)

Table A19 Primary energy supply sources per country, baseline and alternative scenarios, 2000–2025

Baseline scenario	Primary commercial energy total demand[1]		Share of renewable energy in % of the total energy balance sheets (TPES)			
	(Mtoe)		A	B	A	B
	2000	2025	2000	2000	2025	2025
Spain	121	157	6.0	2.5	7.0	4.2
France	246	317	6.8	2.4	7.6	4.1
Italy	169	214	5.3	4.0	6.0	5.0
Greece	27	50	5.3	1.6	7.0	5.1
Malta	1	3	0.0	0.0	0.9	0.9
Cyprus	2	5	2.0	1.5	1.5	1.3
Slovenia	6	8	12.0	5.0	10.2	4.6
Croatia	7	15	11.3	6.5	7.7	5.3
Bosnia-Herzegovina	4	4	14.2	10.0	15.8	11.8
Serbia-Montenegro	13	28	9.4	7.6	7.8	7.0
Albania	2	4	29.3	25.7	19.8	18.3
Turkey	71	251	12.5	4.1	6.4	3.9
Syria	18	39	4.6	4.4	2.6	2.4
Lebanon	5	12	3.4	0.9	2.3	1.2
Israel	20	37	3.4	2.9	2.3	2.1
Palestinian Territories	1	3	25.6	9.8	12.1	5.3
Egypt	45	83	5.4	2.7	4.4	2.8
Libya	16	29	0.9	0.0	0.6	0.1
Tunisia	7	16	15.8	0.1	9.3	2.2
Algeria	29	69	0.3	0.0	0.5	0.4
Morocco	10	20	5.0	0.7	6.4	4.3
NMC	**599**	**806**	**6.4**	**3.1**	**7.1**	**4.6**
SEMC	**222**	**560**	**7.0**	**2.6**	**4.6**	**2.8**
TOTAL	**821**	**1365**	**6.6**	**3.0**	**6.1**	**3.9**
Alternative scenario						
NMC	**599**	**724**	**6.4**	**3.1**	**19.1**	**16.4**
SEMC	**222**	**433**	**7.0**	**2.6**	**10.2**	**7.9**
TOTAL	**821**	**1157**	**6.6**	**3.0**	**15.8**	**13.2**

Source: OME from the International Energy Agency from 1971 to 2000, energy balances of the OECD and non-OECD countries, 2001.

Notes:
1 total demand of energy, excluding CWR

A: Share of total renewables in TPES (%);(Hydro+REn+CWR)/TPES.
B: Share of renewables excluding combustible renewables and waste in TPES (%); (Hydro+REn)/TPES.
CWR: Combustible Renewables and Waste: Solid biomass, gas/liquid from biomass, Municipal and Industrial waste.
TPES: Total Primary Energy Supply (methodology IEA); TPES = Total+CWR.

For availability and comparability reasons, the tables only concern primary commercial energy balance sheets; they exclude non-commercial primary energy, in particular the biomass; they therefore have a tendency to underestimate the shares of renewable energy in the energy balance sheet.

For example, France would have had only 2.4 per cent of renewable energies (REns+HYDRO) in the primary commercial energy balance sheet in 2000 whereas with the biomass, this share should be nearly 6.8 per cent of the total primary energy balance sheet (columns A and B). Likewise, by including the biomass in the renewable energies, Turkey would have already had over 12 per cent of its total primary energy demand in the form of renewable energies in 2000, whereas they were in fact under 5 per cent of its primary commercial energy balance sheet.

To convert electricity production and trade into primary energy, the coefficient of 0.086 toe/MWh was used, in accordance with the method recommended by the IEA.

Trend scenarios built by the countries on the basis of different assumptions may lead to other projections. For example, according to Syria's projections the share of renewable energy in TPES in 2025 would be of 3 per cent (figure from the Ministry of Local Administration and Environment).

Table A19 Primary energy supply sources per country, baseline and alternative scenarios, 2000–2025 (continuation)

Baseline scenario	Supply sources (%)											
	Coal		Oil		N. Gas		Nucl.		Hydro		REn	
	2000	2025	2000	2025	2000	2025	2000	2025	2000	2025	2000	2025
Spain	17	11	54	50	13	27	13	8	2	2	0.5	2.3
France	6	4	35	38	14	19	44	35	2	2	0.1	1.9
Italy	7	8	52	42	34	43	0	0	2	2	1.8	2.7
Greece	34	29	58	54	6	11	0	0	1	2	0.5	3.6
Malta	0	0	100	98	0	1	0	0	0	0	0.0	0.9
Cyprus	1	5	99	90	0	4	0	0	0	0	1.5	1.3
Slovenia	21	21	40	40	14	22	20	14	5	4	0.0	0.5
Croatia	6	3	53	52	30	36	0	0	7	5	0.0	0.3
Bosnia-Herzegovina	64	18	22	39	5	30	0	0	10	12	0.0	0.4
Serbia-Montenegro	55	46	23	24	12	23	0	0	8	7	0.0	0.5
Albania	1	0	67	25	1	56	0	0	27	18	0.0	1.1
Turkey	33	38	44	29	18	30	0	0	4	3	0.7	0.5
Syria	0	0	71	56	25	41	0	0	4	2	0.0	0.2
Lebanon	3	1	94	53	0	45	0	0	1	1	0.1	0.6
Israel	33	29	65	35	0	34	0	0	0	0	3.0	2.1
Palestinian Territories	0	0	71	39	0	55	0	0	0	0	11.6	5.7
Egypt	2	1	59	50	36	46	0	0	3	2	0.0	1.3
Libya	0	0	74	41	26	59	0	0	0	0	0.0	0.1
Tunisia	1	1	58	41	41	56	0	0	0	0	0.0	2.2
Algeria	2	1	29	30	69	68	0	0	0	0	0.0	0.4
Morocco	26	21	70	51	0	23	0	0	1	2	0.1	2.3
NMC	**12**	**10**	**45**	**43**	**19**	**27**	**21**	**16**	**3**	**3**	**1**	**2**
SEMC	**15**	**20**	**54**	**37**	**27**	**40**	**0**	**0**	**2**	**2**	**1**	**1**
TOTAL	**13**	**14**	**48**	**40**	**21**	**33**	**15**	**9**	**2**	**2**	**1**	**2**
Alternative scenario												
NMC	**12**	**8**	**45**	**35**	**19**	**24**	**21**	**16**	**3**	**3**	**1**	**14**
SEMC	**15**	**18**	**54**	**32**	**27**	**41**	**0**	**0**	**2**	**3**	**1**	**5**
TOTAL	**13**	**12**	**48**	**34**	**21**	**30**	**15**	**10**	**2**	**3**	**1**	**11**

Source: OME from the International Energy Agency from 1971 to 2000, Energy balances of the OECD and non-OECD countries.

Notes:
Hydro: energy from hydro power plants. It includes large as well as small hydro.
REn: Geothermal energy, solar energy and wind energy.

Table A20 Primary commercial energy demand, baseline and alternative scenarios, 1971–2025

	Total consumption of primary energy (Mtoe)					AAGR (%)		Primary energy consumption per capita (koe/capita)			AAGR (%)	
Baseline scenario	1971	1980	1992	2000	2025	1971 –2000	2000 –2025	1971	2000	2025	1971 –2000	2000 –2025
Spain	43	69	93	121	157	3.6	1.1	1267	3031	3857	3.1	0.8
France	155	190	223	246	317	1.6	1.0	3058	4146	4941	1.1	0.6
Italy	115	140	157	169	214	1.3	1.0	2147	2940	3974	1.1	1.0
Greece	9	16	22	27	50	3.8	2.5	1050	2549	4809	3.1	2.2
Malta	0	0	1	1	3	3.8	5.2	860	2095	6734	3.1	4.1
Cyprus	1	1	2	2	5	4.6	2.9	1036	3010	5379	3.7	2.0
Slovenia	—	—	—	6	8	—	1.0	—	3102	3835	—	0.7
Croatia	—	—	—	7	15	—	2.9	—	1656	3605	—	2.7
Bosnia-Herzegovina	—	—	—	4	4	—	0.1	—	1053	1002	—	–0.2
Serbia-Montenegro	—	—	—	13	28	—	3.0	—	1239	2289	—	2.1
Yugoslavia SFR	*21*	*33*	*30*					*1119*				
Albania	—	—	—	2	4		3.7	0	506	1029	—	2.5
Turkey	13	26	48	71	251	6.0	5.2	364	1076	2879	3.8	3.5
Syria	3	5	11	18	39	6.8	3.1	431	1147	1623	3.4	1.2
Lebanon	2	3	3	5	12	3.4	3.7	866	1538	2935	2.0	2.3
Israel	6	9	13	20	37	4.1	2.4	2165	3451	4647	1.6	1.0
Palestinian Territories	—	0	0	1	3	—	3.9	—	356	477	—	1.0
Egypt	7	15	34	45	83	6.5	2.5	222	684	879	4.0	0.9
Libya	2	7	11	16	29	8.4	2.3	787	3081	3288	4.8	0.2
Tunisia	1	3	5	7	16	5.6	3.6	266	692	1255	3.3	2.1
Algeria	4	12	27	29	69	7.4	3.5	266	956	1627	4.5	1.9
Morocco	2	5	8	10	20	4.9	3.0	162	346	537	2.7	1.5
NMC	**344**	**450**	**528**	**599**	**806**	**1.9**	**1.2**	**2039**	**3105**	**4084**	**1.5**	**0.9**
SEMC	**40**	**84**	**158**	**222**	**560**	**6.1**	**3.8**	**345**	**951**	**1715**	**3.6**	**2.1**
TOTAL	**384**	**534**	**686**	**821**	**1365**	**2.7**	**2.1**	**1347**	**1925**	**2607**	**1.2**	**1.1**
Alternative scenario												
NMC	**344**	**450**	**528**	**599**	**724**	**1.9**	**0.8**	**2039**	**3105**	**3673**	**1.5**	**0.6**
SEMC	**40**	**84**	**158**	**222**	**433**	**6.1**	**2.7**	**345**	**951**	**1326**	**3.6**	**1.2**
TOTAL	**384**	**534**	**686**	**821**	**1157**	**2.7**	**1.4**	**1347**	**1925**	**2210**	**1.2**	**0.5**

Source: OME from the International Energy Agency from 1971 to 2000, Energy balances of OECD and non-OECD countries

Table A21 Electricity production by source, per country, baseline and alternative scenarios, 2000–2025

Baseline scenario

	Electricity production (TWh)		Electricity sources (%)											
			Coal		Oil		N. Gas		Nucl.		Hydro.		REn	
	2000	2025	2000	2025	2000	2025	2000	2025	2000	2025	2000	2025	2000	2025
Spain	**222**	**363**	36	28	10	7	9	28	28	14	13	10	3	12
France	**535**	**669**	3	0	2	1	4	8	78	67	13	13	1	10
Italy	**270**	**381**	11	4	32	9	38	61	0	0	16	15	3	11
Greece	**53**	**102**	64	43	17	11	11	18	0	0	7	9	1	20
Malta	**2**	**5**	0	34	100	60	0	0	0	0	0	0	0	6
Cyprus	**3**	**9**	0	0	100	97	0	0	0	0	0	0	0	3
Slovenia	**14**	**18**	34	33	1	3	2	11	35	27	28	23	1	3
Croatia	**11**	**22**	14	5	16	27	15	25	0	0	55	42	0	2
Bosnia-Herzegovina	**10**	**12**	51	44	0	4	0	0	0	0	49	50	0	2
Serbia-Montenegro	**32**	**75**	56	56	3	3	3	11	0	0	38	29	0	2
Albania	**5**	**11**	0	0	1	5	0	15	0	0	99	75	0	5
Turkey	**125**	**538**	31	33	8	7	36	39	0	0	25	19	0	2
Syria	**23**	**65**	0	0	22	22	36	62	0	0	41	15	0	2
Lebanon	**8**	**18**	0	0	94	8	0	82	0	0	6	5	0	4
Israel	**43**	**72**	69	56	31	0	0	42	0	0	0	0	0	3
Palestinian Territories	**0**	**9**	—	0	—	2	—	93	—	0	—	0	—	4
Egypt	**76**	**197**	0	0	16	7	65	79	0	0	19	8	0	7
Libya	**15**	**44**	0	0	78	2	22	97	0	0	0	0	0	1
Tunisia	**11**	**40**	0	0	12	10	87	79	0	0	1	1	0	11
Algeria	**25**	**72**	0	0	3	6	97	90	0	0	0	0	0	4
Morocco	**14**	**49**	58	41	36	0	0	37	0	0	5	10	1	11
NMC	**1157**	**1664**	**16**	**13**	**12**	**6**	**13**	**26**	**42**	**30**	**15**	**14**	**2**	**11**
SEMC	**340**	**1104**	**22**	**22**	**20**	**7**	**41**	**56**	**0**	**0**	**16**	**12**	**0**	**4**
TOTAL	**1497**	**2768**	**18**	**16**	**14**	**6**	**20**	**38**	**32**	**18**	**15**	**13**	**1**	**8**

Alternative scenario

NMC	**1157**	**1524**	**16**	**7**	**12**	**1**	**13**	**17**	**42**	**31**	**15**	**16**	**2**	**29**
SEMC	**340**	**736**	**22**	**15**	**20**	**2**	**41**	**51**	**0**	**0**	**16**	**18**	**0**	**14**
TOTAL	**1497**	**2260**	**18**	**9**	**14**	**1**	**20**	**28**	**32**	**21**	**15**	**16**	**1**	**24**

Source: OME (2002)

Notes:
Hydro: energy from hydro power plants. It includes large as well as small hydro.
REn: geothermal energy, solar energy and wind energy, excluding bio-masse.

Trend scenarios built by the countries on the basis of different assumptions may lead to other projections. For example, Syria projects a total electricity production of 76.6TWh in 2025 (figure from the Ministry of Local Administration and Environment).

Table A22 Electricity demand, baseline and alternative scenarios, 1971–2025

Baseline scenario

	Total electricity consumption							Electricity consumption per capita				
	TWh					AAGR (%)		kWh/capita			AAGR (%)	
	1971	1980	1992	2000	2025	1971 –2000	2000 –2025	1971	2000	2025	1971 –2000	2000 –2025
Spain	62	110	156	222	363	4.5	2.0	1810	5568	8892	4.0	1.6
France	156	258	458	535	669	4.3	0.9	3082	9006	10,424	3.8	0.5
Italy	121	186	223	270	381	2.8	1.4	2256	4698	7060	2.6	1.4
Greece	12	23	37	53	102	5.4	2.6	1327	5060	9834	4.7	2.3
Malta	0	0	1	2	5	6.5	3.9	958	4928	11,628	5.8	3.0
Cyprus	1	1	2	3	9	5.8	3.8	1081	4293	9556	4.9	2.8
Slovenia	—	—	—	14	18	—	1.0	0	6933	8674	—	0.8
Croatia	—	—	—	11	22	—	2.8	0	2399	5128	—	2.7
Bosnia-Herzegovina	—	—	—	10	12	—	0.6	0	2626	2775	—	0.2
Serbia-Montenegro	—	—	—	32	75	—	3.5	0	2938	6114	—	2.6
Yugoslavia SFR	*30*	*60*	*83*					*1610*				
Albania	—	—	—	5	11	—	3.1	0	1587	2775	—	1.9
Turkey	9	23	67	125	538	9.7	6.0	242	1904	6162	7.4	4.1
Syria	1	4	12	23	65	10.2	4.3	214	1420	2708	6.7	2.3
Lebanon	1	3	4	8	18	6.2	3.4	631	2445	4389	4.8	2.0
Israel	8	13	24	43	72	6.1	2.1	2603	7339	9159	3.6	0.8
Palestinian Territories	—	—	—	0	9	—	—	0	0	1482	—	—
Egypt	8	19	46	76	197	8.1	3.9	247	1151	2076	5.4	2.1
Libya	1	5	11	15	44	11.4	4.2	340	2911	4925	7.7	1.8
Tunisia	1	3	6	11	40	8.8	5.5	181	1101	3103	6.4	3.6
Algeria	2	7	18	25	72	8.8	4.3	164	838	1708	5.8	2.5
Morocco	2	5	10	14	49	6.5	5.0	152	497	1270	4.2	3.3
NMC	**381**	**638**	**961**	**1157**	**1664**	**3.9**	**1.5**	**2259**	**6000**	**8439**	**3.4**	**1.2**
SEMC	**33**	**81**	**199**	**340**	**1104**	**8.4**	**4.8**	**284**	**1455**	**3380**	**5.8**	**2.9**
TOTAL	**414**	**719**	**1160**	**1497**	**2768**	**4.5**	**2.5**	**1452**	**3511**	**5285**	**3.1**	**1.4**

Alternative scenario

NMC	**381**	**638**	**961**	**1157**	**1524**	**3.9**	**1.1**	**2259**	**6000**	**7712**	**3.4**	**0.9**
SEMC	**33**	**81**	**199**	**340**	**736**	**8.4**	**3.1**	**284**	**1455**	**2696**	**5.8**	**2.1**
TOTAL	**414**	**719**	**1160**	**1497**	**2260**	**4.5**	**1.7**	**1452**	**3511**	**4802**	**3.1**	**1.1**

Source: OME, *Plan Bleu*, 2002

Table A23 Electricity production potential from renewable energies in the SEMC in 2020

	Potential (MW)	Electricity produced (TWh/yr)
Wind energy	10,000	20
Photovoltaic	2500	5
Solar thermal	6000	15
Biomass	8000	48
Geothermal	2900	17
Total	**29,400**	**105**

Source: OME (2002)

Table A24 The fluctuation of low-tension electricity prices (residential sector) in a number of SEMC

Country	Date Available price	1st block kWh per month	Price in 1/100 Euro	2nd Block kWh per month	Price in 1/100 Euro	3rd block kWh per month	Price in 1/100 Euro	4th block kWh per month	Price in 1/100 Euro	5th block kWh per month	Price in 1/100 Euro
Malta	11/93	<33	5.56	<67	5.44	>67	6.92				
Turkey	2000		3.64								
Syria	1996	<50	0.60	<100	0.84	<200	1.20	<300	1.81	>300	3.61
Lebanon	1993	<100	2.84	<300	4.46	<400	6.49	<500	9.73	>500	16.22
Palestinian Territories	2001	Const.	11.06								
Egypt	1/5/94	<50	1.42	<200	2.36	<350	3.13	<650	4.26	<1000	5.97
Tunisia	1996	<50	5.25	>50	7.14						
Algeria	1997	<41.7	2.18	>41.7	4.73						
Morocco	5-2001	<100	8.61	<200	9.26	<500	10.08	>500	13.77		

Source: Cornut, Ademe, 2001

Note: Prices have been converted into euros by using the exchange rates of May 2001 (infoeuro site: http://europa.eu.int/comm/budget/inforeuro):

Country	1 EURO =
Malta	0.40440 MTL
Turkey	1 050 000 TRL
Syria	41.5058 SYP
Lebanon	1356.6 LBP
Palestinian Territories	3.75041 ILS
Egypt	3.5184 EGP
Tunisia	1.27 9 TND
Algeria	66.8524 DZD
Morocco	9.7754 MAD

Table A25 Motorization rate (Number of vehicles per 1000 inhabitants)

	1985	1990	1995	2000	2003
Spain	337	424	485	573	611
France	506	541	584	646	652
Italy	477	555	597	642	679
Greece	222	289	340	366	513
Monaco	645	694	764	830	—
Malta	316	407	513	705	750
Cyprus	291	414	527	631	615
Slovenia	—	372	429	528	500
Croatia	—	196	175	246	324
Bosnia-Herzegovina	—	142	19	37	299
Serbia-Montenegro	—	166	210	277	170
Albania	8	17	36	52	84
Turkey	43	59	92	133	134
Syria	43	39	53	60	76
Lebanon	269	513	544	587	519
Israel	293	333	420	463	482
Palestinian Territories	—	84	103	156	—
Egypt	41	44	49	58	64
Libya	385	388	464	414	367
Tunisia	70	75	95	127	109
Algeria	75	99	94	107	140
Morocco	57	63	78	77	84
NMC	**386**	**463**	**503**	**562**	**592**
SEMC	**65**	**81**	**100**	**120**	**124**
MED	**260**	**307**	**330**	**362**	**373**

Source: Plan Bleu estimates 2004, from IRF, World Road Statistics (www.irfnet.org/wrs.asp) and SMMT (www.smmt.co.uk), CCFA (www.ccfa.fr), ACEA (www.acea.be)

Coastal regions

Table A26 Population of Mediterranean coastal regions, trends and baseline scenario to 2025

Country	1970	2000	2025	AAGR 1970–2000	AAGR 2000–2025
	(1000 inhabitants)			(%)	
Spain	12,245	15,560	16,464	0.8	0.2
France	4770	6265	7151	0.9	0.5
Italy	30,339	32,837	30,291	0.3	–0.3
Greece	7703	9482	9412	0.7	0.0
Monaco	24	34	41	1.2	0.8
Malta	319	389	430	0.7	0.4
Cyprus	615	785	900	0.8	0.5
Slovenia	90	101	106	0.4	0.2
Croatia	1434	1529	1480	0.2	–0.1
Bosnia-Herzegovina	203	226	246	0.4	0.3
Serbia-Montenegro	215	266	289	0.7	0.3
Albania	844	1193	1468	1.2	0.8
Turkey	6606	13,691	19,514	2.5	1.4
Syria	692	1533	2040	2.7	1.1
Lebanon	1884	2906	3766	1.5	1.0
Israel	2623	5045	6585	2.2	1.1
Palestinian Territories	442	1119	1996	3.1	2.3
Egypt	11,262	22,929	32,633	2.4	1.4
Libya	1694	5179	7784	3.8	1.6
Tunisia	3545	6762	9154	2.2	1.2
Algeria	5794	12,271	17,669	2.5	1.5
Morocco	1678	3233	4586	2.2	1.4
Total NMC	**58,801**	**68,667**	**68,278**	**0.5**	**0.0**
Total east	**12,247**	**24,294**	**33,901**	**2.3**	**1.3**
Total south	**23,973**	**50,374**	**71,826**	**2.5**	**1.4**
Total SEMC	**36,220**	**74,668**	**105,727**	**2.4**	**1.4**
Total Med	**95,021**	**143,335**	**174,005**	**1.4**	**0.8**

Source: Plan Bleu, Attané and Courbage, 2001

Table A27 Density of the Mediterranean coastal regions compared with the density of the country, trends and baseline scenario to 2025 (inhabitants/km²)

	1970		2000		2025	
	Country	Med coastal regions	Country	Med coastal regions	Country	Med coastal regions
Spain	67	128	79	163	81	172
France	93	103	109	135	118	155
Italy	178	183	191	198	179	183
Greece	66	76	80	94	79	93
Monaco	12,000	12,000	17,000	17,000	20,500	20,500
Malta	1009	1009	1231	1231	1361	1361
Cyprus	66	66	85	85	97	97
Slovenia	82	86	97	97	100	102
Croatia	78	55	79	58	74	57
Bosnia-Herzegovina	70	46	78	51	85	56
Serbia-Montenegro	85	33	106	41	120	44
Albania	76	108	108	152	133	187
Turkey	44	54	81	112	107	159
Syria	34	165	86	366	130	487
Lebanon	208	385	307	594	397	770
Israel	133	132	264	254	355	331
Palestinian Territories	188	1218	523	3083	1009	5499
Egypt	32	98	66	200	95	284
Libya	1	6	3	19	5	28
Tunisia	31	78	59	148	79	200
Algeria	6	123	13	261	18	376
Morocco	22	83	40	159	54	226
Total NMC	**97**	**127**	**110**	**148**	**113**	**147**
Total SEMC	**17**	**55**	**33**	**114**	**46**	**162**
Total Med	**33**	**85**	**49**	**128**	**59**	**156**

Source: Plan Bleu, Attané and Courbage, 2001

Table A28 Urban population in Mediterranean coastal regions, trends and baseline scenario to 2025

	1970	2000	2025	AAGR 1970–2000	AAGR 2000–2025
Country		(1000 inhabitants)			(%)
Spain	9743	13,162	14,399	1.0	0.4
France	3447	4490	5153	0.9	0.6
Italy	22,259	25,399	24,543	0.4	–0.1
Greece	4266	6022	6434	1.2	0.3
Monaco	24	34	41	1.2	0.8
Malta	235	292	333	0.7	0.5
Cyprus	238	501	699	2.5	1.3
Slovenia	17	36	42	2.6	0.6
Croatia	519	794	929	1.4	0.6
Bosnia-Herzegovina	55	121	174	2.7	1.5
Serbia-Montenegro	109	276	365	3.2	1.1
Albania	209	480	809	2.8	2.1
Turkey	2631	9,181	14,399	4.3	1.8
Syria	186	634	1167	4.2	2.5
Lebanon	1086	2355	3176	2.6	1.2
Israel	2036	4215	5600	2.5	1.1
Palestinian Territories	416	1049	1890	3.1	2.4
Egypt	6702	14,748	26,954	2.7	2.4
Libya	796	4172	6451	5.7	1.8
Tunisia	1636	4582	7075	3.5	1.8
Algeria	2749	6744	10,138	3.0	1.6
Morocco	450	1582	2620	4.3	2.0
Total NMC	**41,118**	**51,607**	**53,920**	**0.8**	**0.2**
Total east	**6355**	**17,434**	**26,232**	**3.4**	**1.6**
Total south	**12,332**	**31,828**	**53,238**	**3.2**	**2.1**
Total SEMC	**18,687**	**49,262**	**79,470**	**3.3**	**1.9**
Total Med	**59,805**	**100,869**	**133,390**	**1.8**	**1.1**

Source: Plan Bleu, Attané and Courbage, 2001

Note: Urban population understood as the population living in urban areas with more than 10,000 inhabitants.

Table A29 Number of tourists in the Mediterranean coastal regions, trends and baseline scenario to 2025 (in thousands)

	International tourism			National tourism			TOTAL		
Country	1990	2000	2025	1990	2000	2025	1990	2000	2025
Spain	26,209	33,529	56,531	7167	8282	11,415	33,375	41,810	67,946
France	10,499	15,119	23,267	6013	7700	8664	16,512	22,819	31,931
Italy	17,341	26,768	40,141	20,556	22,121	26,801	37,898	48,888	66,942
Greece	8429	11,875	17,772	3665	4276	6080	12,094	16,151	23,852
Monaco	245	300	594	—	—	—	245	300	594
Malta	872	1216	2022	125	156	249	997	1372	2271
Cyprus	1561	2686	4405	143	314	540	1704	3000	4945
Slovenia	—	273	1397	160	197	350	160	469	1747
Croatia	—	5423	10,608	825	805	1667	825	6228	12,275
Bosnia-Herzegovina	—	11	89	87	20	138	87	31	227
Serbia-Montenegro	—	24	672	780	163	1466	780	187	2138
Yugoslavia SFR	*5122*	—	—	—	—	—	*5122*	—	—
Albania	15	16	107	49	62	439	64	78	547
Turkey	2879	6231	23,794	4518	6563	16,413	7398	12,794	40207
Syria	225	142	870	363	478	2784	588	620	3654
Lebanon	—	482	3809	—	769	1659	—	1252	5468
Israel	532	1692	3096	1862	2434	4088	2393	4126	7184
Palestinian Territories	—	33	—	—	13	401	—	46	401
Egypt	482	512	2398	2380	2310	7639	2862	2822	10,037
Libya	91	165	1651	270	513	3003	362	679	4654
Tunisia	3044	4804	10,072	1440	1904	4525	4484	6708	14,598
Algeria	227	260	593	2238	3033	5503	2465	3293	6096
Morocco	604	617	1644	1153	1368	2863	1756	1985	4507
NMC	**70,294**	**97,238**	**157,605**	**39,569**	**44,094**	**57,810**	**109,863**	**141,333**	**215,415**
SEMC	**8084**	**14,938**	**47,928**	**14,224**	**19,386**	**48,877**	**22,308**	**34,323**	**96,806**
MED	**78,378**	**112,176**	**205,533**	**53,794**	**63,480**	**106,688**	**132,171**	**175,656**	**312,221**

Source: Plan Bleu and WTO, 2001

Notes:
The number of international tourist arrivals is assessed by border surveys (WTO).
The number of national tourists is estimated by the *Plan Bleu* from assumptions on the rate of holiday departure.

Table A30 Human pressures on coastal regions and on the coastline, trends and baseline scenario to 2025

Country	International and national tourists in coastal regions during the peak month (1000)			Population and tourists density in coastal regions during the peak month (inhabitants/km²)		Population of urban areas located along the coastline (1000)		
	1990	2000	2025	2000	2025	1990	2000	2025
Spain	6675	8362	13,589	250	315	9357	9747	10,663
France	3302	4564	6386	234	293	3288	3492	4007
Italy	7580	9778	13,388	257	263	17,992	18,009	17,402
Greece	2419	3230	4770	126	140	5078	5345	5710
Monaco	49	60	119	47,000	79,853	30	34	41
Malta	199	274	454	2099	2798	227	253	288
Cyprus	341	600	989	150	204	246	297	414
Slovenia	32	94	349	187	436	35	36	42
Croatia	165	1246	2455	106	150	727	741	867
Bosnia-Herzegovina	17	6	45	53	66	—	—	—
Serbia-Montenegro	156	37	428	47	110	52	60	80
Albania	13	16	109	154	201	212	245	414
Turkey	1480	2559	8041	133	225	3801	5221	8188
Syria	118	124	731	396	661	428	616	1134
Lebanon	—	250	1094	645	993	1721	2151	2901
Israel	479	825	1437	296	404	2462	3264	4337
Palestinian Territories	—	9	80	3108	5719	524	1049	1890
Egypt	572	564	2007	205	302	4994	5927	10,833
Libya	72	136	931	19	32	2395	3514	5433
Tunisia	897	1342	2920	177	264	2982	3859	5958
Algeria	493	659	1219	275	402	4017	4979	7485
Morocco	351	397	901	117	173	872	1204	1994
NMC	**21,973**	**28,267**	**43,083**	**209**	**240**	**37,244**	**38,259**	**39,928**
SEMC	**4462**	**6865**	**19,361**	**122**	**188**	**24,197**	**31,785**	**50,153**
MED	**26,434**	**35,131**	**62,444**	**158**	**209**	**61,441**	**70,043**	**90,082**

Source: WTO; *Plan Bleu*, 2003; Attané and Courbage, 2001; Géopolis

Table A30 Human pressures on coastal regions and on the coastline, trends and baseline scenario to 2025 (continuation)

Country	Number of inhabitants of urban areas located along the coastline per kilometre of coast (inhabitant/km of coast)			Number of tourists per kilometre of coast during the peak month (persons/km of coast)[1]		
	1990	2000	2025	1990	2000	2025
Spain	3627	3778	4133	2587	3241	5267
France	1931	2050	2353	1939	2680	3750
Italy	2440	2442	2360	1028	1326	1815
Greece	338	356	380	161	215	318
Monaco	7475	8500	10,250	12,250	15,000	29,676
Malta	1263	1404	1601	1107	1524	2523
Cyprus	314	380	530	436	767	1265
Slovenia	745	773	901	—	2013	7500
Croatia	125	127	149	—	213	421
Bosnia-Herzegovina	—	—	—	—	268	1978
Serbia-Montenegro	178	205	271	—	127	1455
Albania	507	587	990	31	37	262
Turkey	732	1006	1577	285	493	1549
Syria	2338	3367	6197	643	677	3994
Lebanon	7651	9559	12,892	—	1113	4861
Israel	13,756	18,237	24,229	2674	4610	8027
Palestinian Territories	9530	19,073	34,364	—	166	1457
Egypt	5229	6206	11,343	599	591	2102
Libya	1353	1985	3070	41	77	526
Tunisia	2298	2973	4590	691	1034	2249
Algeria	3347	4150	6238	411	549	1016
Morocco	1704	2352	3895	686	775	1761
NMC	**1087**	**1094**	**1160**	**641**	**825**	**1257**
SEMC	**2092**	**2407**	**3400**	**386**	**593**	**1674**
MED	**1341**	**1528**	**1966**	**577**	**767**	**1363**

Source: WTO; *Plan Bleu*, 2003; Attané and Courbage, 2001; Géopolis

Note:

1 Calculated as the number of tourists in the coastal regions divided by the length of the coast.

Table A31 Human settlements and infrastructures along the coast

Country	Urban areas of more than 10,000 inhabitants located along the coastline						Airports in coastal urban areas and small islands	Commercial ports	Desalination plants	Yachting		Part of the coast under artificial land cover[1] (%)
	1950	1960	1970	1980	1990	1995				Port	Berths	
Spain	43	45	51	63	68	71	9	30	37	157	65,637	75
France	14	14	16	17	21	21	9	18		147	80,195	63
Italy	154	162	173	184	196	196	23	76	61	334	87,995	71
Greece	27	28	28	33	36	37	32	48	13	15	6300	26
Monaco	1	1	1	1	1	1	1	1		2	860	100
Malta	2	2	2	2	3	3	2	2	15			98
Cyprus	3	3	3	4	4	4	2	8	9	2	680	34
Slovenia	0	1	1	1	2	2		3		5	1436	100
Croatia	6	6	6	9	10	10	4	13		60	12,863	58
Bosnia-Herzegovina												41
Serbia-Montenegro	0	0	0	2	4	4		2				52
Albania	3	3	3	4	5	6		4				8
Turkey	12	17	25	30	46	49	7	19		15	10,000	73
Syria	3	3	4	4	4	4	1	3				69
Lebanon	4	4	5	5	11	11	1	6	5			88
Israel	5	7	8	8	9	10	1	4	1	5	2730	100
Palestinian Territories	4	4	4	4	4	4	1					100
Egypt	14	17	31	44	74	76	4	8	5			45
Libya	3	6	10	14	17	21	2	14	59			32
Tunisia	9	14	19	23	25	25	5	10	1	6	2200	42
Algeria	7	12	14	16	23	23	4	15	32			35
Morocco	4	4	4	4	6	6	4	2		2		20
NMC	**253**	**265**	**284**	**320**	**350**	**355**	**82**	**205**	**135**	**722**	**255,966**	
SEMC	**65**	**88**	**124**	**152**	**219**	**229**	**30**	**81**	**103**	**28**	**14,930**	
MED	**318**	**353**	**408**	**472**	**569**	**584**	**112**	**286**	**238**	**750**	**270,896**	**42**

Source: Géopolis, UNEP/MAP/MEDPOL, 2001; Lloyds' lists – Ports of the World 2003, various national sources

Note:

1 Estimates of coast under artificial land cover derived from night-time light radiation surveys (NOAA).

Table A32 Type and treatment of industrial sewage (in m³ per year)

	Process wastewater		Cooling water		Domestic water (industry)		Total		
	Not processed	Processed	Not processed	Processed	Not processed	Processed	Not processed	Processed	Total
Total industrial discharge	71,995,300	77,802,400	529,302,954	4,929,900	38,041,159	3,385,145	639,339,413	86,117,445	725,456,858
		52%		1%		8%		12%	
of which in the Med. Sea	13,728,600	6,280,500	512,815,380	1,999,500	22,074,000	49,500	548,617,980	8,329,500	556,947,480
		31%		<1%		<1%		>1%	
of which in the river	13,582,800	6,458,900	6,996,300	2,930,400	1,286,932	554,375	21,866,032	9,948,675	31,814,707
		32%		30%		30%		31%	

Source: UNEP/MAP/MEDPOL, 2002

Water

Table A33 Water resources per country, 2000–2025

Countries and territories in the Mediterranean basin	Average yearly flows (surface and ground water) in km³/year			Average natural renewable resources (surface and ground water) in km³/year		
	Internal inflow (effective precipitations) (1)	External inflow (from neighbouring countries (2)	Of which non- Med countries	Yearly average (1)+(2)	Regular[1] resources (from surface and underground	Annual inflow in decennial dry year[2]
Spain	28	0.35	0.1	28.35	10	10
France	64	8.5	8.5	72.5	35	53
Italy	182.5	8.8	2	191.3	30	
Greece	58	16.25	10.2	74.25	10	
Malta	0.05			0.05		0.03
Cyprus	0.78			0.78	0.3	
Slovenia	4.21			4.21		
Croatia	18	13.65		31.65		
Bosnia-Herzegovina	14			14		
Serbia-Montenegro	16			16		
Albania	26.9	14.8	2	41.7	5	13 to 30
Turkey	66	3.45	2.8	69.45	20	
Syria	5	0.96		5.96	2.5	
Lebanon	4.8			4.8	2.5	1.4
Israel	0.63	0.38		1.01	1	1
Palestinian Territories	0.616	0.01		0.626		
Egypt	0.8	55.5	55.5	56.3	23	65
Libya	0.7			0.7	0.6	
Tunisia	3.7	0.32		4.02	1.0	0.97
Algeria	11.97	0.03		12	2.3	5
Morocco	5			5	1.4	1.5
Total Mediterranean (Without double counting)	**511.656**	**123**	**81.1**	**592.756**	**144.3**	**136.9**

Source: Plan Bleu, Margat, 2004

Notes:
1 Annual inflow, in an average year, which means ensured for 11 months out of 12 (in practice, low-water discharge of rivers being equivalent to ground flow).
2 Which means ensured for nine years out of ten.

Table A34 Water demand by country, baseline and alternative scenarios, 2000–2025

Baseline scenario (km^3)	Total demand		Sectors							
			Domestic water		Irrigation		Industries		Energy	
	2000	2025	2000	2025	2000	2025	2000	2025	2000	2025
Spain	18.2	21.9	2.07	2.90	11.86	13.00	0.85	1.00	3.39	5.00
France	16.7	12.6	1.71	1.50	1.78	2.00	1.09	1.10	12.10	8.00
Italy	42.0	37.0	8.00	7.00	20.00	21.00	8.00	4.00	6.00	5.00
Greece	8.7	8.3	0.87	1.00	7.60	6.90	0.11	0.20	0.12	0.20
Malta	0.0	0.0	0.04	0.04	0.01	0.01	0.00	0.00	0.00	0.00
Cyprus	0.3	0.3	0.10	0.10	0.24	0.19	0.00	0.00	0.00	0.00
Slovenia	0.0	0.0	0.03	0.04	0.00	0.00	0.00	0.00	0.00	0.00
Croatia	0.2	0.5	0.18	0.45	0.00	0.00	0.00	0.02	0.00	0.00
Bosnia-Herzegovina	0.1	0.1	0.03	0.04	0.06	0.06	0.00	0.00	0.00	0.00
Serbia-Montenegro	0.8	0.8	0.50	0.70	0.20	0.00	0.10	0.10	0.00	0.00
Albania	1.4	2.8	0.40	0.80	1.00	1.70	0.00	0.30	0.00	0.00
Turkey	11.7	18.6	3.37	4.50	7.60	13.00	0.70	1.10	0.00	0.00
Syria	3.9	4.2	0.35	0.50	3.19	3.50	0.31	0.15	0.00	0.00
Lebanon	1.3	1.8	0.35	0.52	0.90	1.10	0.07	0.14	0.00	0.00
Israel	1.8	2.2	0.50	1.00	1.20	1.00	0.10	0.20	0.00	0.00
Palestinian Territories	0.3	0.8	0.10	0.47	0.16	0.30	0.00	0.04	0.00	0.00
Egypt	72.8	85.0	4.54	6.00	60.73	65.00	7.53	14.00	0.00	0.00
Libya	2.2	3.7	0.51	1.00	1.63	2.50	0.10	0.20	0.00	0.00
Tunisia	2.3	2.2	0.34	0.47	1.88	1.60	0.06	0.17	0.00	0.00
Algeria	2.9	4.3	1.25	2.00	1.05	1.40	0.40	0.92	0.20	0.00
Morocco	1.9	2.7	0.20	0.40	1.70	2.30	0.00	0.00	0.00	0.00
NMC	**88**	**84.3**	**13.93**	**14.57**	**42.75**	**44.86**	**10.15**	**6.72**	**21.61**	**18.20**
SEMC	**101**	**125.5**	**11.50**	**16.86**	**80.04**	**91.70**	**9.27**	**16.92**	**0.20**	**0.00**
MED	**189**	**209.8**	**25.44**	**31.43**	**122.79**	**136.56**	**19.42**	**23.64**	**21.81**	**18.20**
Alternative scenario										
NMC	**88**	**65**	**13.9**	**11.3**	**42.7**	**32.0**	**10.2**	**3.6**	**21.6**	**18.2**
SEMC	**101**	**92**	**11.5**	**12.1**	**80.0**	**70.7**	**9.3**	**8.7**	**0.2**	**0.0**
MED	**189**	**157**	**25.4**	**23.4**	**122.8**	**102.8**	**19.4**	**12.3**	**21.8**	**18.2**

Source: Plan Bleu, Margat, 2004

Emissions in the atmosphere

Table A35 CO_2 emissions related to energy activities per country, baseline and alternative scenarios

	CO_2 emissions (Mt CO_2)							Emission of CO_2 (kg per capita)		Emission of CO_2 (kg GWP per 1000 $ constants 95)	
				Baseline scenario			Alt. S	Base. S	Alt. S	Base. S	Alt. S
	1971	1990	1998	2000	2010	2025	2025	2025	2025	2025	2025
Spain	121	212	254	298	364	382	287	9367	7049	260	195
France	441	364	372	384	446	531	401	8272	6251	170	129
Italy	304	397	420	429	474	531	404	9841	7494	262	199
Greece	25	69	81	83	128	145	107	13,986	10,278	506	372
Monaco	—	—	—	—	—	—	—	—	—	—	—
Malta	1	2	2	2	5	8	5	18,653	11205	755	453
Cyprus	2	4	6	7	10	14	10	15,089	11211	479	356
Slovenia		13	15	14	16	19	14	9280	6881	265	197
Croatia	—	—	19	18	26	37	28	8757	6710	477	365
Bosnia-Herzegovina	—	—	5	14	7	11	8	2514	1,896	596	449
Serbia-Montenegro		60	55	41	58	84	61	6854	4989	2382	1734
Yugoslavia SFR	*65*	*137*									
Albania	4	7	2	3	6	8	6	2058	1609	786	615
Turkey	44	138	185	208	454	743	520	8512	5952	1152	805
Syria	8	32	46	47	72	98	75	4099	3138	1999	1530
Lebanon	5	6	15	13	24	31	22	7477	5252	732	514
Israel	17	35	56	63	76	106	75	13,431	9557	486	346
Palestinian Territories	—	0	0	2	—	7	5	1127	892	689	546
Egypt	21	83	106	115	159	209	156	2203	1642	908	677
Libya	4	27	41	44	54	73	56	8231	6372	799	618
Tunisia	4	13	17	17	30	40	33	3087	2562	517	429
Algeria	10	57	65	72	116	169	125	3998	2954	1398	1033
Morocco	6	19	26	30	48	57	44	1500	1148	573	439
NMC	**963**	**1191**	**1231**	**1292**	**1540**	**1768**	**1332**	**8967**	**6753**	**247**	**186**
SEMC	**118**	**410**	**557**	**611**	**1033**	**1533**	**1111**	**4695**	**3404**	**968**	**702**
MED	**1081**	**1601**	**1788**	**1900**	**2573**	**3302**	**2443**	**6304**	**4665**	**378**	**280**
World	14,753	22,984	22,982		30,083	36,680	36,680				
Mediterranean	7.3%	7.0%	7.8%		8.6%	9.0%	6.7%				

Source: IEA, 2001 for 1971–1999; OME, 2002 estimates for 2000–2025

Biodiversity

Table A36 Biosphere reserves in the Mediterranean in 2003

Morocco
1 Arganeraie
2 South Moroccos Oasis

Algeria
3 Chrea
4 Djurdjura
5 Tassili N'Ajjer
6 El Kala

Tunisia
7 Djebel Chambi
8 Djebel Bou-Hedma
9 Ichkeul
10 Zembra and Zembretta Islands

Egypt
11 Omayed
12 Wadi Allaqi

Israel
13 Carmel Mount

Greece
14 Gorge of Samaria
15 Mount Olympus

Serbia and Montenegro
16 Golija-Studenica
17 Tara River Basin

Croatia
18 Velebit Mountain

Slovenia
19 Julian Alps

Italy
20 Miramare
21 Collemeluccio-Montedimezzo
22 Cilento and Vallo di Diano
23 Somma-Vesuvio and Miglio d'Oro
24 Circeo
25 Tuscan Islands
26 Valle del Ticino

France
27 Fango Valle
28 Luberon
29 Mount Ventoux
30 Camargue
31 Cevennes

Spain
32 Menorca
33 Montseny
34 Ordesa Viñamala
35 Bardenas Reales
36 Valles del Jubera, Leza, Cidacos y Alhama
37 Urdaibai
38 Picos de Europa
39 Redes
40 Somiedo
41Terras do Miño
42 Muniellos
43 Valle de Laciana
44 Cuenca Alta del Rio Manzanares
45 Mancha Humeda
46 Las Sierras de Cazorta y Segura
47 Cabo de Gata-Nijar
48 Sierra Nevada
49 Sierra de las Nieves y su Entorno
50 Grazzalema
51 Doñana
52 Marismas del Odiel
53 Las Desehas de Sierra Morena
54 Monfragüe

Source: UNESCO MAB, 2004 (www.unesco.org/mab/)

Table A37 Protected areas in Mediterranean countries

	Protected areas 1970–2004 (1000 hectares)						Protected area as percentage of the national (marine and terrestrial) territory 2004	
	According to the IUCN categories (Ia–VI)					All categories (IUCN & national)		
Country	1970	1980	1990	2000	2004	2004	IUCN	Total
Spain	904	1567	3657	4240	4240	4807	6.8	7.7
France	1815	4288	5532	7226	7226	7319	11.6	11.7
Italy	271	480	1442	1878	1878	5724	4.1	12.5
Greece	37	167	232	491	491	688	2.0	2.8
Monaco	0	0.05	0.05	0.05	0.05	0.05	25.5	25.5
Malta	0.01	0.01	1.32	4.90	5.86	5.85	1.4	1.4
Cyprus	67	67	69	78	78	92	3.4	4.0
Slovenia	87	89	128	150	150	150	7.3	7.3
Croatia	50	91	450	572	572	572	6.5	6.5
Bosnia-Herzegovina	27	27	27	27	27	27	0.5	0.5
Serbia-Montenegro	96	188	323	338	338	387	3.3	3.8
Albania	58	58	60	103	103	103	2.9	2.9
Turkey	291	474	1039	1256	1256	3353	1.5	3.9
Syria	0	0	0	0	0	357	0.0	1.9
Lebanon	0	0	4	4	4	8	0.3	0.5
Israel	33	53	263	295	295	408	11.7	16.2
Egypt	48	48	253	9744	11,812	12,767	11.2	12.1
Libya	0	157	157	173	173	221	0.1	0.1
Tunisia	0	41	46	46	46	258	0.2	1.3
Algeria	13	32	11,949	11,957	11,957	11,970	5.0	5.0
Morocco	330	340	340	373	373	567	0.8	1.2
NMC	**3411**	**7022**	**11,920**	**15,108**	**15,109**	**19,876**	**6.6**	**8.7**
SEMC	**715**	**1146**	**14,050**	**23,848**	**25,916**	**29,909**	**3.7**	**4.3**
MED	**4126**	**8168**	**25,970**	**38,956**	**41,025**	**49,785**	**4.4**	**5.3**
Med. France[1]					1519	1533	22.2	22.5
NMC revised[2]					9402	14,090	5.5	8.2
Mediterranean[3]					**35,318**	**43,999**	**4.0**	**5.0**

Source: UNEP-WCMC/WDBPA v2.03 (World Database on Protected Areas (sea.unep-wcmc.org/wdbpa)), *Plan Bleu*, 2005

Notes:
1 Med. France = Mediterranean regions of France (Languedoc-Roussillon, PACA and Corse).
2 NMC revised = NMC excluding non Mediterranean part of France.
3 Mediterranean = NMC revised + SEMC.

This table includes the Marine and Coastal Protected Areas.

Table A37 Protected areas in Mediterranean countries (continuation)

	Number of protected areas in 2004			Protected areas distribution by IUCN categories (in percentage of total country area) in 2004							
				Strict Nature Reserve	Wilderness Area	National Park	Natural Monument	Habitat/Species Management Area	Protected Landscape/sea scape	Managed Resources Protected area	Non Classified
Country	IUCN	Total	Of which Marine	Ia	Ib	II	III	IV	V	VI	NC
Spain	327	602	72	0.0	0.1	4.6	0.0	35.9	47.6	0.0	11.8
France	1262	1327	103	0.0	0.0	3.6	0.0	4.8	90.4	0.0	1.3
Italy	324	752	79	0.0	3.9	7.3	0.0	5.8	15.8	0.0	67.2
Greece	123	147	25	0.0	0.1	44.9	2.3	18.8	5.2	0.0	28.7
Monaco	2	2	2	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
Malta	93	93	5	0.1	63.3	0.5	5.5	3.5	4.7	22.3	0.0
Cyprus	10	19	5	0.0	0.0	9.9	0.0	74.1	1.1	0.0	14.9
Slovenia	45	46	1	0.0	0.0	55.9	0.5	0.0	43.6	0.0	0.0
Croatia	200	200	19	5.8	0.0	16.5	0.1	1.9	75.7	0.0	0.0
Bosnia-Herzegovina	21	31	1	0.0	0.1	63.7	0.0	11.0	24.3	0.0	1.0
Serbia-Montenegro	103	178	7	0.2	0.6	36.7	0.5	22.7	26.7	0.0	12.6
Albania	52	52	11	14.1	0.0	20.2	3.4	42.1	2.4	17.7	0.0
Turkey	85	474	61	0.8	0.0	11.8	0.0	14.4	4.1	6.3	62.5
Syria	0	28	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
Lebanon	2	24	8	0.0	0.0	44.8	0.0	6.4	0.0	0.0	48.8
Israel	185	288	41	0.0	0.0	0.8	0.5	68.9	2.4	0.0	27.5
Egypt	34	49	28	2.7	0.0	26.1	0.0	26.5	30.0	5.4	9.3
Libya	8	12	6	0.0	0.0	23.1	0.0	55.2	0.0	0.0	21.7
Tunisia	7	42	5	0.0	0.0	17.6	0.0	0.0	0.0	0.0	82.3
Algeria	18	25	9	0.3	0.0	98.5	0.0	0.4	0.7	0.0	0.1
Morocco	13	34	13	1.1	0.5	0.0	42.0	22.2	34.2	0.0	0.0
NMC	**2562**	**3447**	**330**	**0.3**	**1.2**	**7.9**	**0.1**	**13.8**	**52.6**	**0.1**	**24.0**
SEMC	**352**	**976**	**173**	**1.5**	**0.0**	**51.1**	**0.8**	**15.4**	**14.9**	**3.1**	**13.3**
MED	**2914**	**4423**	**503**	**1.0**	**0.5**	**34.3**	**0.5**	**14.8**	**29.6**	**1.9**	**17.5**
Med. France[1]	225	232	50	0.0	0.0	7.6	0.1	5.4	57.6	0.0	29.4
NMC revised[2]	1525	2352	277	0.3	1.6	10.0	0.2	17.1	34.5	0.1	36.1
Mediterranean[3]	**1877**	**3328**	**450**	**1.1**	**0.5**	**38.0**	**0.6**	**15.9**	**21.2**	**2.1**	**20.6**

Source: UNEP-WCMC/WDBPA v2.03 (World Database on Protected Areas, http://sea.unep-wcmc.org/wdbpa), *Plan Bleu*, 2005

Notes:
1 Med. France = Mediterranean regions of France (Languedoc-Roussillon, PACA and Corse).
2 NMC revised = NMC excluding non Mediterranean part of France.
3 Mediterranean = NMC revised + SEMC.

This table includes the Marine and Coastal Protected Areas.

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Michel Batisse † (President of the Blue Plan and President of the Committee), Lucien Chabason (former Coordinator of the Mediterranean Action Plan, Athens), Serge Antoine (Comité 21, France), Georges Corm (Economist and historian of the contemporary Mediterranean, Lebanon), Maria Dalla Costa (Agenzia per la Protezione dell'Ambiente et per i Servizi Tecnici, Italy), Djamel Echirk (Inspection générale de l'environnement, Algeria), Mohamed Ennabli (Hydrologist, Tunisia), Emilio Fontela (University of Madrid, Spain), Magdi Ibrahim (ENDA Maghreb, Morocco), Thierry Lavoux (Institut français de l'environnement, France), Jacques Lesourne (President of Futuribles International, France), Ronan Uhel (European Environment Agency, Denmark), with contributions from Arab Hoballah (Deputy Coordinator of the Mediterranean Action Plan, Athens), Anne Burrill (European Commission), George Abu Jawdeh (former UNDP resident Coordinator, Lebanon), Azzam Mahjoub (Economist, Tunisia)

Other components of the Mediterranean Action Plan

Programme for the assessment and control of pollution in the Mediterranean region (MEDPOL, Greece), Specially Protected Areas Regional Activity Centre (SPA RAC, Tunisia), Regional Marine Pollution Emergency Response Centre for the Mediterranean (REMPEC, Malta), Regional Activity Centre for Cleaner Production (CP RAC, Spain), Priority Actions Programme Regional Activity Centre (PAP RAC, Croatia), Programme for the protection of coastal historic sites (France), Environment Remote Sensing Regional Activity Centre (ERS RAC, Italy).

Expert's contributions

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Blue Plan Focal Points

The Blue Plan Focal Points in Albania, Algeria, Bosnia-Herzegovina, Croatia, Cyprus, Egypt, France, Greece, Israel, Italy, Lebanon, Libya, Malta, Monaco, Morocco, Serbia and Montenegro, Slovenia, Spain, Syria, Tunisia, Turkey and the European Commission were consulted on the draft report.

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