



The Mediterranean has to take up three major challenges to ensure sustainable management of its endangered water resources

In the Mediterranean riparian countries, water resources are limited and unevenly distributed. The countries of the Southern rim receive a mere 10 % of the total rainfall. The Millennium Development Goals (MDGs) in matter of access to drinking water and sanitation have not been achieved yet, since twenty (20) million and forty seven (47) million Mediterranean people still do not have access to drinking water and to sanitation, respectively, especially in the Southern and Eastern Mediterranean countries. Water use outputs are-in spite of some encouraging results-far from being satisfactory; conveyance losses, leakages and wastage are estimated as about 40 % of the total water demand.

In view of demographic growth, climate change, and economic and social changes, water demand is set to inevitably increase and the risk of water shortage can no longer be discarded. The present situation is already quite tense, and it absolutely calls for a more sparing, more sustainable and more equitable water management in order to address the three major challenges with which the Mediterranean countries will henceforth be faced: to sustainably manage the limited water resources, ensure access to drinking water and sanitation by populations that are not yet serviced, and instil water-saving behaviour among the users. There is no doubt that the future Mediterranean Water Strategy, developed within the framework of the Union for the Mediterranean will contribute towards taking up these challenges.

Increased pressure on water resources

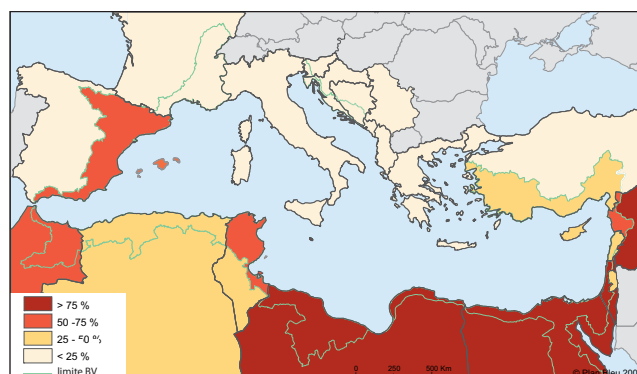
In the Mediterranean, natural renewable water resources are estimated, in average year, as 1080 km³/year, of which 118 km³, that is 11% of the total, originate in non Mediterranean countries.

The water "poor" Mediterranean population, i.e. that of countries with less than 1000 m³/inhab./year of renewable resources, now counts 180 million inhabitants and is likely to reach 250 million inhabitants by 2025. The water "scarce" population, i.e. that with less than 500 m³/inhab./year, is likely to pass, over the same period, from 60 to 80 million inhabitants.

A study of the pressure of demand on resources, expressed by the natural renewable water resources exploitation index, highlights a highly uneven-and, sometimes, alarming-"water future" geography. As of now, water abstractions, in certain countries, are close to-if not beyond-the maximum renewable resources level. These calculations at national level may conceal

significant disparities at the level of the Mediterranean basin, or locally-as it is the case in Mediterranean Spain (figure 1). Present and future situations become even more alarming when this index is calculated in relation to exploitable resources, which account for merely a half, or-perhaps-a third, of the renewable natural resources.

Figure 1: Exploitation indices of renewable water resources at country and catchment area level by 2025



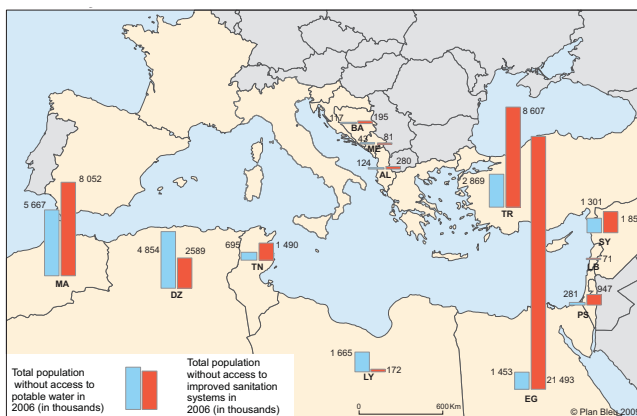
Source : Plan Bleu

In view of demographic growth and economic development, water demand-i.e., the total abstractions from the resources, including losses during transport and use, as well as non conventional production, such as desalination or treated wastewater reuse-has doubled up since 1950 to reach, in 2007, 280 km³/year for the riparian countries as a whole. Agriculture, which remains the chief water consumer, accounts for 82 % of the volumes abstracted in the Southern and Eastern rims of the basin.

An increasing portion of the demand is met via a non sustainable water production estimated as 16 km³/year, of which 66 % originate from abstraction of fossil water and 34 % from overexploitation of renewable resources.

To the quantitative pressure on the resources, there come to be added the impacts resulting from the disposal of non treated or insufficiently treated urban, industrial and agricultural wastewater, which carries excessive pesticide or nitrate contents into several aquifers or directly affects rivers. Access to an enhanced sanitation system still experiences significant delay, especially in the Southern and Eastern Mediterranean countries, since forty seven million people there are still deprived of such a system (figure 2).

Figure 2: Mediterranean people do not have access to drinking water and sanitation, 2006



Source : UN-SD Millenium Indicator, OMS-UNICEF, 2008, <http://www.wsinfo.org/en/wsresult.php>

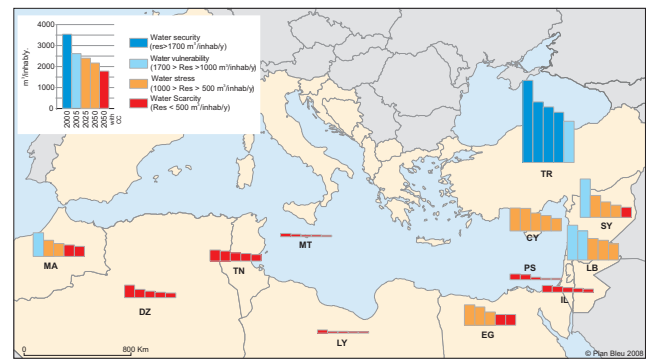
Trends and increasing problems

1-Trends and problems exacerbated by climate change impacts

The evolutions of temperature and rainfall described by the climate models will lead to an aggravation of such trends. The Mediterranean regions, which already experience a significant water stress, exacerbated by a succession of drought years, will end up being particularly exposed to a reduction of their water resources. In certain countries, this type of evolution is likely to result in situations of acute crisis.

In the Southern and Eastern Mediterranean countries, in view of demographic growth and of the immediate impacts of changes in the water cycle, it is estimated that, by 2050, about 290 million people would end up in a situation of water scarcity (figure 3).

Figure 3: Evolution of water resources per inhabitant in the Southern and Eastern Mediterranean countries between 2000 and 2050



Source : Plan Bleu

2-Increasing water demand

According to recent Blue Plan projections (baseline scenario), water demand is likely to still increase by 50 km³ into 2025 to, thus, reach 330 km³/year; the major portion of this increase would be due to the Southern and Eastern Mediterranean countries.

Agriculture is set to remain the major user, in terms of volume, of the water resource to meet irrigation needs, especially on the Southern and Eastern rims of the basin. Irrigated areas are, thus, likely to increase by 38 % in the South and by 58 % in the East to reach 9 million ha and 8 million ha, respectively, by 2030 (FAO).

Demand by the communities is also set to steadily increase in order to meet the drinking water needs of an increasingly urban population. The population of the riparian countries is likely to reach 535 million inhabitants by 2025, with a quite unevenly distributed growth: 10 million in the Northern Mediterranean countries and 82 million in the Southern and Eastern Mediterranean countries. Besides, with about 300 million tourists in the Mediterranean coastal areas-which remain the chief international tourism destinations-, an increase in drinking water demand is to be expected.

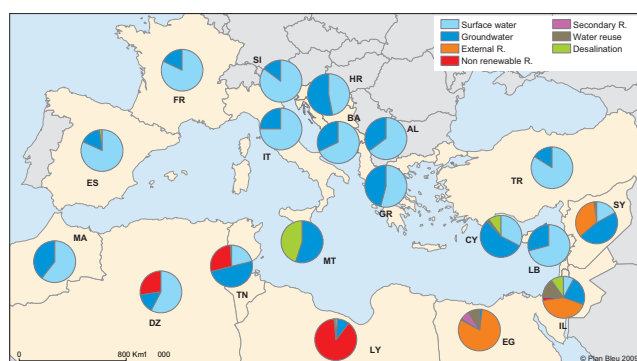
The concern to preserve the ecological functions of the natural environment water resources has begun to be mainstreamed in the water management priority objectives, and this, via the concept of "environmental water demand". The latter can be evaluated and added to the demand due to human uses (Spain), or via the "reserved flows" to be deducted from the water resources (France, Israel, Italy, Morocco, Tunisia...).

The current pattern of exploitation of the resources is partly non sustainable

In order to meet increasing water needs, the national strategies continue to grant priority order to increasing the water supply (figure 4), and this, based on the construction of large-scale water structures (over 1200 major dams in the Mediterranean catchment area alone), the development of inter-regional and international transfer structures, the exploitation of non renewable aquifers, or the use of non conventional resources, such as the use of treated wastewater (Cyprus, Egypt, Israel, Spain, Tunisia), the use of recycled agricultural drainage water (Egypt), and the desalination of seawater or brackish water, a practice now thriving in Malta, Spain, Algeria and Israel. The abovementioned strategies have, thus, reached physical limits-such as the equipment of favourable sites, the silting up of dams, the decrease of runoff, or the depletion of certain fossil resources, economic limits-cost of desalination, and environmental limits such as seawater intrusion in coastal aquifers, degradation of water systems, shrinkage of wetlands.

However, the significant decrease in costs of desalination makes the latter an increasingly competitive option. The installed capacity could be multiplied by five or six by 2030 to reach about 30 million m³/day. Indeed, desalination remains a drought and climate change adaptation alternative for drinking water supply.

Figure 4: Currently water supply sources in the Mediterranean



Source : Plan Bleu, J. Margat

Possible gains generated by a water saving effort

Blue Plan has sought to evaluate the extent of water losses and "improper use" of water in each sector, as well as to estimate, based on a set of ambitious-but achievable-scenarios, the recoverable losses as per sector and sub-region of the Mediterranean basin. The possible saving potential has, thus, been estimated as about a quarter of the current water demand, that is,

72 km³ out of a total demand of 280 km³ on the level of the Mediterranean countries as a whole (table 1).

Table 1: Recoverable losses estimation per Mediterranean basin sub-region in 2007

Mediterranean basin sub-region (countries)	Drinking water	Irrigation	Industries	Total
	Efficiencies improvement hypotheses			
	Networks efficiency raised to 85% and users efficiency raised	Networks efficiency raised to 90% and plot efficiency raised	Recycling generalized to 50%	
North	4,6	18,2	9,5	32,3
East	1,8	11,3	2,2	15,3
South	1,6	18,4	4,1	24,1
Total	8	48	16	72

Source : Plan Bleu,

This water saving potential is likely to be about 85 km³/year by 2025, where irrigated farming accounts for the major portion in terms of volume, with about 64 % of the total water saving potential identified in the Mediterranean, as against 22 % for industry and 14 % for drinking water supply.

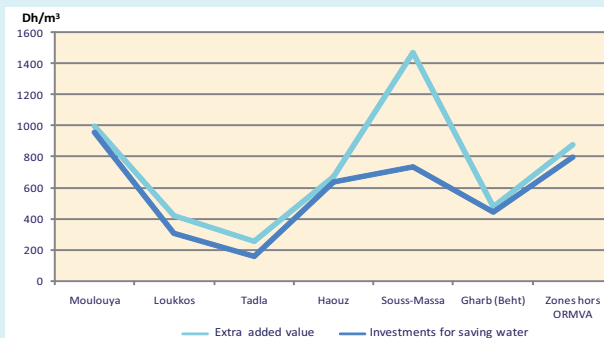
According to this optimistic prospect-assumed to be generalised to all countries-, total water demand is likely to be of 245 km³/year, distributed into 106 km³/year in the Northern Mediterranean countries and 139 km³/year in the Southern and Eastern Mediterranean countries. This would amount, on the whole, to a decrease in current total demand by some forty (40) km³/year.

These aggregate estimates, based on concrete experiments conducted in certain countries (see Box), reveal that such trend reversals are possible.

Water saving policies in Morocco and in Cyprus

In Morocco, a methodology of economic approach to agricultural water demand has been developed based on comparing the cost of one cubic metre saved with the cost of development of new water resources. It emerges from this study that the cost of one cubic metre of water saved, via adoption of spot irrigation, is lower than that of mobilised soft water; thus, the saved water volumes have been optimised through improving the yields of market gardening and tree growing. The productivity gains expected have been profitable, thus generating an extra added value (figure 5). The evaluation of the cost/benefit ratio has revealed, on the whole, a return of over 30% of the capital costs. Accordingly, the benefits of a Water Demand Management (WDM) are not only economic but also social (increase in farmers' income) and environmental (reduction of water abstraction).

Figure 5: Example of 'irrigation water saving in Morocco



Source : MAPM_ Maroc, 2008

In Cyprus, subsidies are granted to cover the costs of installation of grey water treatment systems (water generated by bathtubs, showers, sinks, washing machines, fruit and vegetable washing) and its reuse for toilets and the watering of household, school, park, swimming pool, sports hall and hotel gardens, industries, etc. The water saving expected is about 33% of domestic water demand.

Main obstacles to a concrete implementation of water demand management policies and strategies

For European Union (EU) member countries, it emerges that the Water Framework Directive (WFD) has had a particularly salutary impact in speeding up the mainstreaming of the said WDM in water policies. In both its dimension of mainstreaming catchment basin-wide management principles and of involving the various users in planning processes, the WFD has brought to the fore new "know-how" which can be a source of inspiration for EU neighbour countries.

The Southern and Eastern Mediterranean countries-in spite of some encouraging progress-still need a strengthening of international cooperation and a stepping up of development aid towards supporting Water Demand Management strategies and approaches.

Henceforth, the Mediterranean countries will have to take up new challenges: meet an increasing water demand in a context of shortage, scarcity, if not overexploitation, of the resources, as well as of deterioration of quality, a context further exacerbated by the impacts of climate change. They remain faced, as regards a concrete implementation of Water Demand Management policies and strategies, by obstacles and impediments of various orders:

- Institutional constraints: scattered responsibility, lack of coordination among the relevant ministries, lack of alignment of the various sector-based policies;
- Insufficiency or absence of a legal framework, unsuitable tariff systems;
- Lack of awareness among the population as to the need to save water, little involvement of the users in the planning and management of water resources;

- Poor qualification of the staff entrusted with water management;
- Insufficient State financial resources.

A strengthening of regional cooperation should play a significant role in the transfer of know-how and in capacity building, exchange of experience, sharing of best practices and financing of projects, especially in the Southern and Eastern Mediterranean countries.

The Mediterranean Water Strategy, developed within the framework of the Union for the Mediterranean, will no doubt foster such cooperation.

Public-Private Partnership (PPP) will also have a positive impact, with the mobilisation of economic instruments (subsidies, tariff setting . . .) and technical instruments (rehabilitation of water conveyance networks, detection of leakages...) in order to optimise the allocation of the resources available.

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Blue Plan Notes



United Nations Environment Programme
Mediterranean Action Plan
Plan Bleu - Regional Activity Centre
15 rue Beethoven - Sophia Antipolis - 06560 Valbonne - FRANCE
Tél. : +33 4 92 38 71 30 - Fax : +33 4 92 38 71 31
e-mail : planbleu@planbleu.org
www.planbleu.org

Editorial director: Henri-Luc Thibault
Editor-in-chief: Henri-Luc Thibault
Author: Mohammed Blinda
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