SoED

State of the Environment and Development in the Mediterranean

Key Messages

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Introduction

Since the late 1970s, Mediterranean countries have agreed to cooperate to put *"at the disposal of political leaders and decision-makers all information that will enable them to develop plans likely to ensure sustained optimal socio-economic development without degrading the environment"*[1]. To continue fulfilling this objective, the Mediterranean countries have asked the Secretariat of the Barcelona Convention to produce three major reports from 2016 to 2021.

The Mediterranean 2017 Quality Status Report (2017 MED QSR) was the first assessment based on the Mediterranean Action Plan Ecological Objectives and the Integrated Monitoring and Assessment Programme (IMAP) indicators adopted in 2016 by all Mediterranean riparian countries, Parties to the Barcelona Convention. Despite the limited availability of data and the fact that IMAP implementation was still in an early phase, the 2017 MED QSR provided relevant details on the status of marine and coastal Mediterranean ecosystems and the achievement of Good Environmental Status (GES), using available data to document IMAP Common Indicators[2].

The Mediterranean State of the Environment and Development Report 2020 (SoED 2020) has a wider and more systemic scope. The SoED 2020 considers a range of sustainability issues related to the environment and development in the Mediterranean region and outlines their interactions. For example, for marine ecosystems, the SoED 2020 contributes to assessing Sustainable Development Goal 14: *"Conserve and sustainably use the oceans, seas and marine resources for sustainable development"*. The SoED 2020 therefore places IMAP indicators, among others, in the context of a network of causal links and interactions. The list of pressures and impacts identified in the SoED 2020 fully coincides with the key pressures and impacts on the marine environment identified in the 2017 MED QSR. The SoED 2020 further builds on the main messages of the 2017 MED QSR, addressing the socioeconomic aspects of major drivers and pressures present in the Mediterranean marine environment.

A regional foresight exercise to 2050, MED 2050, to be developed by 2021, will use both the 2017 MED QSR and the SoED 2020 as baselines to explore scenarios and transition pathways towards a sustainable and inclusive future in the Mediterranean.

The three exercises will help Mediterranean decision makers in identifying key areas requiring further joint or coordinated action, and in drawing elements for the future Mediterranean Action Plan (MAP) Medium-Term Strategy 2022-2027.

[1] Inter-governmental Meeting, UNEP/IG.5/7, 1977
[2] Results are available on the following website: https://www.medqsr.org/fr

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Major drivers and pressures, and associated trends

Countries along the Mediterranean Sea share a common heritage, similarities in lifestyle and values, exposure to climate and environmental risks and impacts, urbanization and coastal erosion, and an increasing tourism pressure. The contrasts are also significant, with differences in demographic dynamics, access to natural resources, income, investment in environmental protection, decentralization policies, government and governance systems, the measures in place to prevent corruption, guarantee public participation and accountability and ensure political stability, and the enforcement of legal frameworks, etc. These differences lead to large gaps in countries' capacities to prevent and adapt to potential crises. Southern and Eastern Mediterranean Countries (SEMCs) are particularly exposed. At the same time, the region is connected through intense flows of people (migration and tourism), goods and energy products (especially via maritime transport), financial resources (foreign investment and cooperation), information and social interactions, as well as via environmental flows (river flows and marine currents) and policy forums. The Mediterranean Region therefore remains an extremely relevant scale to assess interactions between environment and development, but this requires the consideration of subregional heterogeneities as well as connections beyond regional boundaries with Africa, the Far East, and Northern Europe.

▶Main Fact 1

Demographic trends: the population continues to grow in coastal and urban areas of the Mediterranean region, with a younger population in SEMCs.

The population of the States bordering the Mediterranean[3] amounted to approximately 512 million people in 2018[4], representing 6.7% of the world population. While the population has been stabilizing in the North since 1980, the population in the South and East of the basin has more than doubled (from 153 million in 1980 to 314 million in 2018), **and is expected to increase by an additional 182 million people by 2050.** In 2018, 39% of the Mediterranean countries' population lived on the northern shore and 61% on the southern and eastern shores. In decreasing order, the population growth rate in the past decades has been highest in the State of Palestine, Lebanon, Israel, Egypt and Algeria. The most populated country is Egypt with 98 million people in 2018, followed by Turkey (82 million) and France (67 million). 2018 population density was highest in Monaco, Malta and the State of Palestine, and lowest in Libya (ranging from 4 to almost 26,000 people per square kilometre)[5].

The demographic transition has been completed in two thirds of Mediterranean countries and is ongoing in the remaining ones. The demographic convergence with Northern Mediterranean Countries (NMCs) is striking in Lebanon, Tunisia and Turkey. In Morocco and Libya, where fertility continues to decline, this convergence is only a few years away. This trend is coherent with an increasing urbanization, as in demographic transition, fertility rates generally decline fastest in urban areas and remain highest in the most remotely settled and rural zones. Contrary to earlier projections, the demographic transition seems to have come

[3] Including the State of Palestine.
[4] United Nations, Department of Economic and Social Affairs, Population Division (2019), World Population Prospects 2019, online edition.
[5] United Nations, Department of Economic and Social Affairs, Population Division (2019), World Population Prospects 2019, online edition.

to either a halt or a new increase in Algeria and Egypt. All Southern and Eastern Mediterranean countries (SEMCs) have a fertility rate at or above the replacement rate of 2.1, leading to population growth, except Lebanon (1.7). In Egypt, Israel and the State of Palestine, fertility rates exceed the symbolic threshold of three children per woman. Fertility is below the replacement rate in all NMCs, leading to population decrease and aging.

The population in SEMCs is 14 years younger than in the North. While the average median age in SEMCs ranges from 20 to 31, in NMCs, the average median age is between 34 and 45.

Around 70% of the Mediterranean population lives in urban areas. The urban population has continued to increase throughout the region in the past decade with more than half of the population living in urban areas in 2017 in all countries except for Egypt (57% rural population) and Bosnia and Herzegovina (52%). A new phenomenon is the decline in absolute numbers of the rural population in Albania (-2.4%), Croatia (-1%), Montenegro (-1%), Algeria (-0.4%), Slovenia (-0.5%), and Turkey (-0.5%), while Egypt still registers an annual growth of 2% of its rural population. Continuing urbanization is accompanied by an increase in the number of inhabitants in Mediterranean metropolises, which creates challenges for urban planning, including transport and environmental infrastructure.

In Mediterranean countries, one out of three people live in a Mediterranean coastal region[6]. The share of the coastal population ranges from 5% in Slovenia to 100% in island countries (Cyprus, Malta) and Monaco. Coastal urbanization is partly driven by tourism, with Mediterranean countries hosting around 360 million international tourist arrivals (ITAs) per year, representing around 27% of world tourism in 2017[7], largely concentrated in coastal zones and in the summer months.

▶ Main Fact 2

Human development: while considerable progress has been made in education and health in the South and East of the basin, large North-East/South divides remain, driven by persistent GDP gaps and aggravated by conflicts.

The economies of Mediterranean countries experienced major variations between 2007 and 2017, struck by the global financial crisis in 2008 and the European debt crisis starting in late 2009. All European Mediterranean countries witnessed a downturn of their GDP per capita between 2008 and 2009. Ten years later, Cyprus and Greece, particularly affected by the European debt crisis, have not recovered their pre-crisis GDP per capita. Southern Mediterranean countries have shown a surprising resilience to the 2008 crisis, but the added political instability and conflicts since the Arab Springs have left the region with relatively low growth rates.

In spite of demographic growth and geopolitical difficulties, human development, as measured through the Human Development Index (HDI), **has experienced an upward trend throughout the last decade, significantly increasing in almost all countries. Major gaps between the northern and southern/eastern shores of the Mediterranean persist, but have declined[8].** In 2017, the HDI was highest in Israel, France, Slovenia, Spain and Italy (in decreasing order, all ranked between world rank 22 and 28), moderate in Egypt, and lowest in the Syrian Arab Republic (world rank 155). The greatest progress was experienced in Albania, Algeria, Bosnia and Herzegovina and Turkey, with major increases in life expectancy in Algeria and Turkey, and high increases in gross national income in Albania, Bosnia and Herzegovina and Turkey. In Libya, the HDI declined as a result of the breakdown of the economy, while the HDI in the Syrian Arab Republic collapsed due to severe degradation of all three components of the HDI: life expectancy, duration of schooling and per capita national income.

[6] Plan Bleu calculations, national sources (referring to NUTS 3 or equivalent).
[7] World Tourism Organization (2019), Yearbook of Tourism Statistics, Data 2013-2017, 2019 Edition, UNWTO, Madrid.
[8] UNDP (2018), Human Development databank.

Basic education has considerably improved throughout the last decade, especially in SEMCs, with literacy rates showing drastic increases, notably in Morocco, Tunisia and Turkey. Very significant progress in primary education was observed between 2000 and 2016 in SEMCs. However, access to tertiary education remains unequal.

Girls' education has improved but the share of women in the active population is still low. The gender parity index for the enrolment rate in primary and secondary schools increased in most Mediterranean countries. Enrolment rates for women in tertiary education are higher for women than for men in almost all Mediterranean countries[9]. Nevertheless, the share of women in the labour force in NMCs and Israel was between 33 and 50% and below 33% in SEMCs in 2017, having only slightly increased in almost all countries over the past decade[10]. Barriers to more female participation in the work force include: lack of work-life balance, gender discrimination and sociocultural norms regarding female work, as well as practical issues such as lack of safe, reliable, and affordable transport to workplace. Time spent on paid and especially unpaid domestic work is much higher for women in all countries[11].

The Mediterranean region is a global hotspot for migration. This issue is inter alia linked to environmental pressures, and significantly impacts human development. Turkey hosts the highest number of refugees worldwide, estimated at 3.54 million people, and counts more than 300,000 asylum seekers. Lebanon has the highest proportion of refugees in the world (16.4% of total population)[12]. This proportion is 4.3% in Turkey, followed by Malta (1.7%). Meeting the basic human needs of incoming migrants requires a flexible and effective response in host countries. Access to water, food and sanitation services, as well as waste management, are of specific concern for operating refugee camps. The Syrian Arab Republic is the country from which the highest number of refugees originate in the world, with an estimated 34.5% of its population having left the country. There was an unprecedented peak in the number of refugees and migrants who entered Europe via the Western (Spain), Central (Italy) and Eastern (Greece) Mediterranean routes in 2015; with more than 1 million arrivals that year, compared to around 370,000 in 2016, 185,000 in 2017 and 140,000 in 2018[13]. Major places of origin include the Syrian Arab Republic, the State of Palestine, Maghreb countries and Sub-Saharan African countries. In European Mediterranean countries, immigration flows range from 8,400 new international migrants per year in Malta to 332,600 in France[14]. This inflow of migrants has led to dialogue between countries and institutional capacity challenges[15]. Among others, environmental and climate changes can be important drivers of migration, especially for water-scarce countries and in vulnerable areas (e.g. rainfed farmland, water-contaminated sites and urban slums).
Mediterranean high-income countries generate significant socioeconomic and environmental spillover effects by exporting a large amount of pollution, waste and other negative externalities, thus limiting other countries' ability to achieve sustainable development[16]. Critical issues that especially affect lower-income countries include: international demand for palm oil and other commodities which fuel tropical deforestation, tax havens leading to difficulties raising public revenue to finance the Sustainable Development Goals (SDGs), and tolerance for poor labour standards in international supply chains, etc.

▶ Main Fact 3

Macroeconomic situation: Mediterranean countries are increasingly vulnerable to external conditions and shocks, including environmental shocks.

Mediterranean countries are vulnerable to external conditions and shocks. Especially in SEMCs, non-

[9] World Bank (2019), World Development Indicators Database extraction.
[10] ILO (2019), ILOSTAT.
[11] European Committee of the Regions (2017), Women's Empowerment in the Mediterranean Region.
[12] UNHCR (2017), Migration Data Portal.
[13] UNHCR (2019), Operational Portal Refugee Situations.
[14] UN DESA (2013), Migration Data Portal.
[15] Werz & Hoffman (2017) Climate change and Migration in the Mediterranean, IEMED.
[16] Sachs *et al.* (2019), Sustainable Development Report 2019. New York: Bertelsmann Stiftung and Sustainable Development Solutions Network (SDSN).

diversified economic structures, coupled with a general trade deficit (external balance) and budget deficit, reflect and reinforce the difficulty of national economies in developing more competitive products that could enhance economic resilience[17].

Cooperation frameworks and integration schemes in Euro-Mediterranean relations have not achieved shared prosperity. Political integration in the Mediterranean region has been limited throughout the last decade and has mainly focused on thematic ministerial conferences and parliamentary meetings under the Union for the Mediterranean and the Parliamentary Assembly of the Mediterranean, as well as some cooperation on security-related matters. Economic integration has been more forthcoming with tariff dismantling under free trade agreements already in force and the signature of a number of additional trade agreements, mainly between the EU and accession candidates, remaining, however, relatively limited in comparison to other regions in the world. Little progress has been achieved in the dismantling of non-tariff barriers to trade, in particular, subsidies, which are still common across the region, including subsidies considered environmentally damaging[18]. Trade between EU and Mediterranean countries did not increase much faster than trade between EU countries and the rest of the world, with the share of intra-Mediterranean imports remaining stable and exports from the EU to other Mediterranean countries slightly increasing between 2005 and 2015, meaning that trade regionalization remained low in the Mediterranean region[19].

Youth unemployment is a critical issue in most of the basin. Total unemployment rates differ greatly, from 4% of the total labour force (Israel and Malta) to 26% (State of Palestine)[20] Youth (age 15-24) unemployment is at rates of up to three times the national unemployment level[21], with especially high proportions of youth not in education, employment or training – an indicator that excludes students from the youth unemployment rate – in Albania, Algeria, Bosnia and Herzegovina, Egypt, Lebanon, the State of Palestine, Tunisia and Turkey (> 20%), and exceeding 15% in Italy (19%) and Montenegro (16%)[22]. The creation of new jobs, especially for young people, is becoming a cross-cutting priority concern for Mediterranean policymakers. The emergence of innovative sectors within the green, blue and circular economy could contribute to the creation of these needed jobs[23], and the proposal for an environmental transition in the economic or housing sectors is examined in the light of employment concerns.

Throughout the last twenty years, agriculture and industry have lost ground while services have developed[24]. In Mediterranean countries, services generally account for close to or above half of national GDP: Albania (47%) and Algeria (46%) have the lowest service share and Malta (75%), Cyprus (74%) and Lebanon (74%) the highest. In only three Mediterranean countries, industry represents 30% or more of the national value added: Algeria (with an economy highly dependent on oil and gas), Egypt (the only Mediterranean country which has recently experienced a significant increase in the contribution of industry to its GDP) and Turkey. Israel (19%) and Lebanon (12%) have the lowest contribution of industry to their national economies. The share of agriculture in national GDP is generally below 10%, except for five countries: Albania (19%), Algeria (12%), Morocco (12%), Egypt (11%), and Tunisia (10%). Algeria is the only Mediterranean country in which the share of the agricultural sector is increasing (from 8% in 1990 to 12% in 2017). The informal sector, which has a significant weight in many Mediterranean countries, is not accounted for in the above-mentioned statistics.

Mediterranean economies increasingly rely on debt. Over the last decade, government debt, as a percentage of national GDP, has increased in most Mediterranean countries, except for Israel, Lebanon, Malta and Turkey. The government debt-to-GDP ratio is close to or above 60% in all Mediterranean countries except for

[17] Salman *et al.* (2018), External and internal imbalances in South Mediterranean countries, FEMISE Research Paper 42-13.
[18] OECD/IEA (2019), "Update on recent progress in reform of inefficient fossil-fuel subsidies that encourage wasteful consumption".
[19] Ayadi *et al.* (2017), Regional Integration in the Euro-Mediterranean, EMNES Working Paper No. 1, 2017.
[20] World Bank (2019), World Development Indicators Database extraction.
[21] ILO (2019), ILOSTAT.
[22] ILO (2018), ILOSTAT; data missing for Libya, Morocco and the Syrian Arab Republic.
[23] According to ILO, the green economy would provide jobs to 24 million people in the world, before 2030.
[24] World Bank (2019), World Development Indicators Database extraction.

Algeria, Bosnia and Herzegovina and Turkey, and is close to or above 100% in Cyprus, Egypt, France, Greece, Italy, Lebanon and Spain, with Greece reaching more than 180%[25]. High and increasing debt ratios can be a risk for the financial sustainability of Mediterranean governments, and can hinder public investments in the environmental sector.

The Mediterranean basin is unable to produce enough agricultural and food products for its own consumption and is therefore highly dependent on international trade and imports of agricultural products, and sensitive to the volatility of international prices. The agricultural production deficit is due, on the one hand, to agroclimatic conditions, and on the other hand, to the scarcity of arable land and water resources. It is also linked to low water efficiency and land productivity in some parts of the Mediterranean basin, and to a significant amount of food waste. Faced with a growing demand for food products, especially cereals, food security is increasingly threatened in countries with sustained population growth, changes in lifestyle and eating habits, and therefore demand. Mediterranean countries account for one third of world imports of cereals, especially wheat, for only 7% of the world population. Egypt and Algeria are among the largest cereal importers in the world, and the import dependency ratio for cereals (import / consumption ratio) is very high in the Mediterranean (42% in Egypt, 60% in Tunisia, 72% in Algeria, 86% in Lebanon). The only countries whose agricultural balance is in surplus are France and Spain. The contribution of smallholder family farming to food security should not be underestimated. Small-scale crop and livestock production in family farms significantly contribute to the food consumption of farmers and their families, and to the provision of food adapted to local tastes, including for urban dwellers.

▶Main Fact 4

Good Environmental Status: Mediterranean economies are dependent on environmental integrity, particularly in coastal areas.

Mediterranean countries, communities and economies are dependent on natural coastal and maritime resources to create wealth, provide jobs, and continue local development. It is therefore essential to recognize the importance of environmental sustainability in addressing key socioeconomic challenges in Mediterranean countries.

Mediterranean countries remain the world's leading tourism destination, with around 30% of international tourist arrivals, and absolute numbers having doubled in 20 years. Recently, this growth has been concentrated in northern countries, with international arrivals experiencing a decline after 2011 in most SEMCs. **The coastal and maritime tourism sector is extensively developed in NMCs and had witnessed significant growth in SEMCs, before the 2011 slowdown.** International tourist arrivals in Mediterranean countries grew from 58 million in 1970 to around 360 million in 2017[26], and are projected to reach 500 million by 2030[27]. Tourism provides around 11% of total employment in Mediterranean countries and 11% of their GDP[28], directly and indirectly.

The Mediterranean is also the second biggest cruising region in the world (16.7% of global cruise fleet deployment in 2018), after the Caribbean. In 2018, the Mediterranean recorded more than 28 million cruise passenger movements, compared to just over 8.5 million in 2000, and port infrastructure for cruising is continuously developing to accommodate this rapid growth.

Mediterranean fisheries and aquaculture play a strong role in the economy[29]. Mediterranean fishing generates 227,000 jobs and a direct and indirect economic impact of approximately USD 6.35 billion

[25] IMF (2016), Database extraction.
[26] World Tourism Organization (2019), Yearbook of Tourism Statistics, 2019 Edition, UNWTO, Madrid.
[27] World Tourism Organization (2018), UNWTO Tourism Highlights, 2018 Edition, UNWTO, Madrid.
[28] WTTC (2015), Economic impact of Travel and Tourism in the Mediterranean.
[29] Piante *et al.* (2015), Méditerranée : La croissance bleue face au défi du Bon État Écologique - Résumé. Projet MedTrends. WWF-France.

annually[30]. Aquaculture accounts for more than 50% of total fish production and plays an important role in coastal communities, contributing to socioeconomic development and employment (more than 120,000 direct jobs and 750,000 indirect jobs)[31].

Mediterranean agriculture's role in national wealth creation and employment varies across countries. Agriculture provides between 1.5% (France) and 19% (Albania) of national GDP in Mediterranean countries and between 1% (Israel) and 40% (Albania) of national employment, with a general decreasing trend in the share of GDP and employment (except for Greece, Libya and the Syrian Arab Republic, where agricultural employment has increased in relative terms in recent years).

Marine biotechnologies and bioprospecting with applications in medicine, food, materials, energy and cosmetics are innovative and growing sectors in the Mediterranean region. The high rate of endemism and quantity of species with a high potential for application (e.g. sponges and extreme microorganisms) make the Mediterranean a promising region for these activities, with a significant potential for the generation of revenue and (highly-qualified) jobs.

▶ Main Fact 5

Environmental pressures from economic sectors: despite the emergence of low-impact solutions, economic sectors are exerting increasing pressures on the environment, driven by rapid growth in polluting sectors and a diversification of economic activities in marine areas.

The Mediterranean region has one of the world's highest ecological deficits. The Mediterranean Ecological Footprint[32] per capita (3.2 gha[33] per capita) is higher than the global average (2.8 gha per capita), while the biocapacity per capita to support this footprint is lower than the global average in most Mediterranean countries (except for France, Croatia, Montenegro and Slovenia). The ecological footprint exceeds biocapacity in all Mediterranean countries, leading to an ecological deficit. From 2010 to 2014, the Ecological Footprint per capita decreased in most Mediterranean countries[34]. This is mostly due to the effects of the economic crisis, which slowed down resource consumption, a reduction of CO_2 emissions in NMCs and population growth in SEMCs, spreading the total footprint over a larger population. Variations in the ecological footprint continue to be coupled to variations in GDP, however, the ecological footprint is growing at a slower pace than GDP.

Citizens in Mediterranean EU countries seem to have a higher concern than the EU average about the impact of environmental issues on their everyday lives and of chemicals and plastics used in everyday products on their health and on the environment. In the absence of a comprehensive study on the environmental attitudes and behaviour of Mediterranean citizens, an EU-wide survey provides some information on attitudes towards the environment in Mediterranean EU countries[35].

Air pollution is considered to be the most important environmental issue, followed by climate change and the increasing amount of waste. Most citizens in Mediterranean EU countries, and more than the EU average, say that they perceive that air quality has deteriorated over the last 10 years. When asked about effective ways to tackle environmental problems, EU citizens give strong support to environmental legislation (higher

[30] Based on FAO (2018), The State of Mediterranean and Black Sea Fisheries. General Fisheries Commission for the Mediterranean. Rome. 172 pp. Licence: CC BY-NC-SA 3.0 IGO.
[31] Piante *et al.* (2015), Méditerranée : La croissance bleue face au défi du Bon État Écologique - Résumé. Projet MedTrends. WWF-France.
[32] The Ecological Footprint measures how much biocapacity humans demand, and how much is available. It does not address all aspects of sustainability, nor all environmental concerns. Biocapacity is the area of productive land available to produce resources or absorb carbon dioxide waste, given current management practices.
[33] Global hectares (gha) is a unit of world-average bioproductive area, in which the Ecological Footprint and biocapacity are expressed.
[34] Global Footprint network (2019), online database.
[35] TNS political & social at the request of the European Commission, Directorate-General for Environment (2017), Special Eurobarometer 468 - October 2017 "Attitudes of European citizens towards the environment".

fines for breaches, stronger enforcement and more stringent legislation), along with more investment in research and development for technological solutions. The majority also say that action taken to protect the environment is insufficient at all levels.

Although economically profitable in the short term, coastal mass tourism generates considerable environmental damage (habitat loss, increase in water consumption and waste production, disturbance of protected and endangered species mainly due to underwater noise, water pollution, introduction of invasive species, etc.). In addition, the profits are not necessarily invested in local development. Tourism in Mediterranean countries faces three complementary challenges to enhance the sector's resilience: First, to sustain and expand the development of an alternative offer to mass tourism, which is less seasonal, more environmentally sustainable and socially beneficial and based on rural and cultural assets (including ecotourism). Second, to reduce the footprint of mass tourism, its pressure on scarce natural resources, fragile ecosystems and costly environmental infrastructure. And third, to strengthen links between tourism and other sectors in the local economy, generating indirect benefits on local employment while potentially driving demand for sustainable products.

Transport is the highest energy-consuming sector (with 31% of total energy consumption in NMCs and 38% in SEMCs) **and, with a very strong dependency on fossil fuels, is one of the largest contributors to GHG emissions in the Mediterranean region.** GHG emissions in the region are mainly caused by terrestrial traffic, and in smaller proportions, maritime and air traffic. Road transport accounts for 70% of transport energy use in the Mediterranean basin, mainly stemming from private vehicles. Transport also leads to significant air pollution, particularly in cities, and represents a major challenge for human health.

The Mediterranean Sea is host to the world's busiest shipping lanes, accommodating large parts of the world fleet, which pass through the Suez Canal, the Bosporus, Dardanelles and Gibraltar straits, connecting Asia with Western European ports, serving the growing ports in the Mediterranean and Black Sea regions and connecting them with other continents. The Suez Canal/SUMED Pipeline and the Turkish Straits accounted for over 13% of the world's seaborne oil trade in 2015, and the Mediterranean coastal states' fleet accounted for more than 17% of the world's oil tanker capacity in 2017. Pressures from maritime transport essentially include emissions of air pollutants, with particularly high pressures on port cities; potential accidental (with a clear downward trend) and illicit discharges of oil and hazardous and noxious substances (remaining issue); marine litter; water discharge, including ballast water, and hull fouling (shipping is the primary source of the over 1,000 established non-indigenous species in the Mediterranean); air emissions from ships (gases and particulates like sulphur oxides (SOx) and nitrogen oxides (NOx), which are toxic for humans, and GHG); underwater noise; collisions with marine mammals; land take through port infrastructure; and anchoring (destructive for seafloor ecosystems).

The Mediterranean continues to rely on energy imports and fossil fuels, despite improvements in renewable energy production. Mediterranean countries accounted for 7% of the world's primary energy demand in 2015 (equivalent to its global population share), representing more than 955 million tonnes of oil equivalent (Mtoe). Primary energy demand increased by 38% between 1990 and 2015, despite a relative stagnation between 2008 and 2015. NMCs account for nearly two thirds of total Mediterranean energy demand, while Southern and Eastern Mediterranean countries consume around 19% and 18% respectively. In 2040, the energy demand of SEMCs is projected to exceed that of NMCs. Total energy production has been increasing since 1990, reaching 549 Mtoe in 2015, well below the region's energy demand. Electricity demand almost doubled between 1990 and 2015. Renewable non-hydroelectricity production increased from 1% of total production in 1990 to 11% in 2015. The 2015 electricity generation mix also included: 29% gas, 25% nuclear (of which 87% in France), 16% coal, 13% hydro, and 7% oil[36]. There is an enormous but untapped potential for a further increase in renewable energy sources (wind and solar), especially in Southern Mediterranean countries, which could contribute to ensuring a cleaner energy sector and reducing energy dependency (the region currently imports around 58% of its fossil fuel demand, with 90% in NMCs and 20% in SEMCs). There

[36] OME (2018), OME database.

is also a high potential for further energy savings and energy efficiency.

More than two hundred offshore oil and gas platforms are active in the Mediterranean. With new discoveries of large fossil fuel reserves and explorations in the region, this figure is set to increase. Ongoing offshore exploration in the Levantine Basin, in Lebanon and the Syrian Arab Republic, as well as in the Nile Delta Basin and the Aegean Basin could contain significant reserves of oil and gas that could transform Eastern Mediterranean ecosystems and economies.

The average quantities of fertilizers and pesticides used for agriculture in Mediterranean countries are above the global average. The average fertilizer consumption per hectare is 174 kg in Mediterranean countries, compared to the global average of 141 kg[37] in 2016. The average consumption of pesticides in the Mediterranean basin in 2015 was 6.7 kg per hectare, compared to the world average of 2.12 kg. France, Italy, Spain and Turkey are the Mediterranean countries that used or sold the highest amount of pesticides for the agricultural sector in 2016[38].

Large water footprints per capita are found throughout the Mediterranean, exceeding the global average[39], with especially high volumes of water contained in imported goods and services. SEMCs are more dependent on these virtual water imports (e.g. Egypt, Israel, Syrian Arab Republic). The use of water within the national consumption and production systems of Mediterranean countries shows a water deficit (higher abstracted quantities of water than available renewable water resources) in all SEMCs. Desalination is being developed in a context of water scarcity, making the Mediterranean one of the most active regions of desalination in the world. Despite technological improvement, desalination plant discharges remain an environmental concern for coastal ecosystems, as these plants are generally associated with the rejection of highly concentrated waste brine from the plant, pre-treatment units and cleaning operations. These pollutants increase seawater temperature, salinity, water current and turbidity, and cause fish migration[40].

[37] World Bank (2019), World Development Indicators Database.
[38] FAO (2016), FAOSTAT database.
[39] Mekonnen & Hoekstra (2011) National water footprint accounts: the green, blue and grey water footprint of production and consumption, Value of Water Research Report Series No. 50, UNESCO-IHE, Delft, the Netherlands.
[40] Al-Mutaz (1991), Research paper: Environmental impact of seawater desalination plants - Environ Monit Assess. 1991 Jan;16(1):75-84. doi: 10.1007 BF00399594.

3

State and impact

▶Main Fact 6

Land-cover and land-use change: ambitious objectives and disparate policy measures have not been sufficient to preserve natural land cover and agricultural land use, particularly in coastal areas.

Land cover and land use in the Mediterranean region continue to change as a result of human activities, with urban sprawl (expansion of residential, tourist, commercial and industrial areas) **and infrastructures spreading throughout the region. Landscapes are typically fragmented due to a multitude of human land uses,** and ecological continuity is a constraint for many biodiversity components.

Soil is one of the main contributors to agroecosystem function and food security. In the Mediterranean region, around 8.3 million hectares of arable land have been lost since 1960[41] and the area of arable land decreased by an average of 13% over the 1995-2015 period, ranging from a loss of 42% of arable land in the State of Palestine to an increase of 21% in Bosnia and Herzegovina. The area of arable land per capita fell by an average of 41% over the same period, more than double the average in middle-income countries globally. The Mediterranean States most affected by the decline in hectares per capita are the State of Palestine (-68%) and Lebanon (-62%). Soil degradation is mainly caused by agricultural and non-agricultural land-use intensification, resulting from the expansion of intensive farming techniques, industrial and urban areas. The main consequences are water and wind erosion, salinization, sealing and compaction, loss of organic matter and the permanent loss of vegetation cover, impacting biodiversity and ecosystem services.

Within the limit of the Mediterranean biome, the extent of forests has remained stable, with contrasts between the northern and southern shores. In NMCs, land abandonment in rural areas, associated with depopulation, has led to natural recovery and forest expansion. In SEMCs, pressures on agricultural and forest ecosystems remain significant due to strong demographic pressures on land and water resources, urban sprawl, forest overexploitation, and overgrazing[42]. Although the forest area of Mediterranean countries at a national scale increased from 68 million ha in 1990 to 82 million ha in 2015[43], forests in the Mediterranean biome cover 18% of the total area and remain stable. Mediterranean forests are subject to fragmentation due to landcover change, including urban sprawl and infrastructure expansion. The area of other wooded lands (small trees, shrubs and bushes) decreased from 36 million ha in 1990 to 32 million ha in 2015. The coverage of trees outside forests (found in agroforestry systems, urban forests and as landscape elements) increased between 2000 and 2010[44]. Longer droughts and heatwaves caused by climate change, combined with uncontrolled biomass accumulation due to land abandonment in northern countries, are leading to an increased risk of wildfires.

Coastal wetland areas continue to decline. The Mediterranean basin hosts 19-26 million hectares of wetlands[45], and according to a broad sample of 400 Mediterranean wetland sites, approximately 48% of natural wetland habitats were lost between 1970 and 2013. The surface area of natural coastal wetlands,

[41] Zdruli P. (2014), Land resources of the Mediterranean: status, pressures, trends and impacts on future regional development. Land Degrad Develop 25: 373–384.
[42] FAO & Plan Bleu (2018), State of Mediterranean Forests 2018.
[43] FFAO (2015), Global Forest Resources Assessment programme.
[44] FAO & Plan Bleu (2018), State of Mediterranean Forests 2018.
[45] Mediterranean Wetland Observatory (2018).

such as wet meadows and marshes, has decreased by more than 10% over the past decades, whereas artificial wetlands like pools, reservoirs and storage ponds have increased by more than 50%[46], with the latter designed mainly for agricultural and aquaculture purposes.

In the coastal belt, the built-up area has increased substantially in the last decades, leaving less space for natural coastal ecosystems, and increasing risks for people living in the coastal zone. Between 1975 and 2015, three out of four Mediterranean countries doubled or more than doubled the built-up area in the belt situated within 1 kilometre of the coastline. Urban expansion and industrialization around coastal cities are driven by waterfront development for economic activities, such as tourism and real estate, marinas, fishing and trading ports, industrial plants that need the proximity of seawater for cooling or for production export (energy, mineral), desalination, etc., with diverse environmental and social impacts. Article 8 of the Integrated Coastal Zone Management Protocol (ICZM) states that the Contracting Parties shall establish a zone at least 100 metres wide in coastal zones where construction is prohibited. However, the built-up area within the first 150 m wide belt along the coastline exceeded 20% in almost half of Mediterranean countries in 2015[47], although it must be stated that much of the built-up area is a legacy dating back to before the ICZM Protocol entered into force in 2011. The past and ongoing development of harbours, dykes and others coastal structures is further declining the extent of rocky shores and cliffs, which have decreased by approximately 20% over the last 50 years in EU countries, as well as beaches. Land-use change and subsequent fragmentation represent a major driver of the loss of biodiversity and ecosystem services in the Mediterranean basin to date[48].

▶ Main Fact 7

Ecosystem services and cumulated impacts: multiple human-induced pressures combine to threaten critical resources, biodiversity components and ecosystem services.

Mediterranean coastal terrestrial ecosystems offer important services to the inhabitants of the basin, but their functioning is threatened by past and current land-use mismanagement. Ecosystem services offered by wetland and coastal aquifers include water purification, flood and drought mitigation, and water provision, among others. The services offered by these ecosystems are much more significant than their relative land surface. However, the loss of natural wetland habitats and excessive groundwater abstraction limits the capacity of these ecosystems to provide services. Soft and rocky shores (e.g. beaches, cliffs), representing the majority of the Mediterranean coastline[49], offer services like natural sea defences, nutrient cycling and erosion control, and provide opportunities for tourism. Coastal infrastructure development, water and sediment flow alteration at the watershed scale, and pollution, alter the functioning of these ecosystems and their services. Agroecosystems, forests and shrublands, as well as their ecosystem services (e.g. food, fuel and fibre production), are mainly impacted by landscape fragmentation.

The region is a hotspot for marine biodiversity and endemism, which are fragile and threatened by species extinctions and habitat losses. Although the Mediterranean Sea is a low primary productivity ecosystem due to limited nutrient inputs from fluvial and Atlantic origins, and despite only covering 0.82% of the world's ocean surface, it hosts more than 17,000 marine species and contributes to an estimated 4-18% of the world´s known marine species. The Mediterranean Sea represents the highest proportion of threatened marine habitats in Europe (32%), with 21% listed as vulnerable and 11% as endangered, and seagrass ecosystems experiencing the most rapid decline. Marine ecosystems support fish stock restoration, resilience to climate change, sailing, diving and wildlife-watching activities, for example. Taking into account overfishing, bycatch and the damaging impacts on marine habitats, fishing and harvesting aquatic

[46] *Tour du Valat* & MedWet (2014), MWO LAND COVER REPORT 2014.
[47] UNEP GRID Geneva (2017), Evolution of the built-up area in coastal zones of Mediterranean countries between 1975 and 2015. PAP/RAC.
[48] IUCN (2018), The IUCN Red List of Threatened Species. Version 2018-2.
[49] Furlani *et al.* (2014), The rock coast of the Mediterranean and Black Seas, Geological Society London Memoirs 40(1):89-122.

resources is the main driver of the increasing risk of fish species extinction in the Mediterranean region[50]. Over the 1950 to 2011 period, the abundance of top predators, including a number of marine mammals, fell by 41% and fish species declined by 34%, including commercial and non-commercial species, while an increase of around 23% of the organisms at the bottom of the food web was observed[51].

Seagrass meadows occurring in the Mediterranean, including the endemic species *Posidonia oceanica*, play an important role in terms of habitat for biodiversity, water quality regulation, coastal protection and carbon fixation and storage. Localized regressions have been recorded in the region, in relation to natural and anthropogenic pressures such as mooring, seabed-disturbing fishing, and excessive sand and organic matter discharge.

Coralligenous assemblages contribute to climate change resilience and generate a remarkable natural productivity that contributes to the maintenance and development of fisheries resources. Numerous species (over 1,700 species, i.e. 15 to 20% of Mediterranean species) use coralligenous environments as feeding, breeding or nursery grounds, including species of commercial interest for fisheries and endangered or threatened species. Furthermore, coralligenous assemblages are attractive for scuba diving and support important recreational economic activities whose existence depends on the presence and the state of conservation of these assemblages.

78% of Mediterranean and Black Sea fish stocks are fished at biologically unsustainable levels[52]. Fish landings in the Mediterranean have been declining irregularly since 1994 with a subsequent decline in economic value, and represented 850,000 tonnes in 2016. The number of overexploited or collapsed fish stocks in the Mediterranean Sea increased between 1970 and 2010[53]. The pattern of exploitation and the state of different fish stocks is especially critical in the Eastern Mediterranean. Fishery overexploitation is the main driver of marine populations and has led to the bad state of most highly-commercial stocks and the scarcity of top predators.

The Mediterranean Sea, particularly the Levantine basin, are hotspots for the introduction of alien species, some of which are causing a decrease or collapse in native species populations. More than 1,000 non-indigenous marine species have been recorded in the Mediterranean, 618 of which are established[54]. The many important pathways by which human actions have introduced alien invasive species into the Mediterranean Sea include shipping (by means of ballast water and hull fouling), corridors, maritime transport and waterways, aquaculture, trade in living marine organisms (aquarium trade and fishing bait) and others (e.g. fishing activities and aquarium exhibits). Mediterranean Sea warming has led to the spread of some "warm-water" invaders and the reduction of some indigenous species. There is evidence that some invaders have already had a strong ecological impact on marine ecosystems, communities and activities, while others have become commercially exploited fishing resources.

Water scarcity is considered one of the main factors challenging sustainable development, especially in SEMCs and island states. Total renewable water resources are unevenly distributed across the basin, with 67% in the northern subregion, 23% in the eastern subregion and 10% in southern countries[55]. Around 30% of the Mediterranean population live in water-scarce countries[56], and an additional 13% in countries facing absolute water scarcity[57]. With less than 500 m^3 of total renewable water resources per capita per year, Algeria, Israel, Libya, Malta, the State of Palestine and Tunisia face important water-related challenges. On

[50] IUCN (2018), The IUCN Red List of Threatened Species. Version 2018-2.
[51] Piroddi *et al.* (2017), Historical changes of the Mediterranean Sea ecosystem: modelling the role and impact of primary productivity and fisheries changes over time, Scientific Reports 7.
[52] FAO (2018), The State of Mediterranean and Black Sea Fisheries.
[53] Tsikliras *et al.* (2015), The Mediterranean and Black Sea Fisheries at Risk from Overexploitation, doi:10.1371/journal.pone.0121188.
[54] Med QSR, UNEP/MAP, Athens (2017).
[55] FAO (2016), AQUASTAT.
[56] Total Renewable Water Resources (TRWR) per capita < 1000 m^3/inhabitant/year but > 500 m^3/inhabitant/year, Source: Plan Bleu calculations based on data from AQUASTAT, FAO, 2014.
[57] TRWR per capita < 500 m^3/inhabitant/year, Source: Plan Bleu calculations based on data from AQUASTAT, FAO, 2014.

the contrary, northern countries are in a situation of relative water security (> 1,700 m^3 per inhabitant per year). However, national averages hide significant local and seasonal disparities, and natural water scarcity in the Mediterranean region is deteriorating, even in the North, due to population growth, urbanization, growing food and energy demands, pollution and climate change.

Significant differences in the proportion of water demand exist between Mediterranean catchments, with high seasonal variations. By 2050, under a business-as-usual water-use scenario, water withdrawals are projected to double or even triple in catchments along southern and eastern shores due to population growth, the expansion of irrigated areas and increasing crop water needs resulting from warmer and drier conditions[58]. Water demand for irrigation purposes represents more than half of the total water demand across all Mediterranean catchments (for the production of cereals, vegetables and citrus), except in France and Italy where water demand for energy and industrial purposes prevails, and in Slovenia and Croatia where it is domestic water demand that prevails[59]. Water demand varies throughout the year, mainly in correlation with agriculture and tourism. Environmental requirements (environmental flows) that are necessary for sustaining ecological continuity, riparian productivity and many other services provided by fluvial systems, are often underestimated, neglected and strongly impacted by over-abstraction.

The Mediterranean's contribution to global targets for reducing CO_2 emissions remains insufficient. While the CO_2 emissions of NMCs peaked in 2005 and have decreased since then, those of most SEMCs have continued to increase, in particular due to demographic growth. Total CO_2 emissions from Mediterranean countries account for 5% of world emission estimates. Total CO_2 emissions in Mediterranean countries remained stable between 2000 and 2014[60] as the increase in emissions in SEMCs was almost compensated for by the decrease of emissions in NMCs. NMCs and SEMCs now both emit around 1 gigatonne of CO_2 per year[61]. Emissions per inhabitant stand at around 4 tonnes per capita, on average, with large variations between countries (ranging from 0.5 to 10 tonnes per capita). Mediterranean countries with the highest otal CO_2 emissions (higher than 100 kilotonnes in 2014) include Turkey, Italy, France, Spain, Greece and Algeria (in decreasing order). Total CO_2 emissions decreased between 2000 and 2014 in Croatia, Cyprus, Greece, France, Italy, Slovenia, and Spain (Northern countries) and the Syrian Arab Republic, and increased in Israel, Lebanon, Turkey (East), Algeria, Egypt, Libya, Morocco, Tunisia (South), and Bosnia and Herzegovina (North). At the global level, the Intergovernmental Panel on Climate Change (IPCC) indicates that a decline in CO_2 emissions of around 45% from 2010 levels by 2030 would be needed to comply with a 1.5°C warming scenario[62].

Nutrients, heavy metals, Persistent Organic Pollutants (POPs), pesticides, hydrocarbons, and marine litter are the main pollutants of the Mediterranean Sea and efforts have so far not succeeded in achieving GES of the waters in many places. Levels of major pollutants show a decreasing trend, even though important issues remain, especially for heavy metals in coastal sediments, as well as in known hotspots associated with urban and industrial coastal areas. A decreasing trend has been observed for aqueous effluents from specific industrial sectors, such as food and beverages, metal production and processing, and paper and wood production, while increasing trends have been observed for waste and wastewater management and the energy and chemical sectors[63]. Emerging pollutants, such as plastic additives, cosmetics, plasticizers, nanoparticles, and pharmaceuticals, represent an under-investigated threat to ecosystems and human health which deserves attention, especially because, to date, municipal treatment plants have been unable to remove them. Underwater noise is also an issue

[58] Milano *et al.* (2012), Facing climatic and anthropogenic changes in the Mediterranean basin: What will be the medium-term impact on water stress?, doi:10.1016/j.crte.2012.07.006.
[59] Margat & Treyer (2004), L'eau des Méditerranéens : situation et perspectives. No. 158 de la Série des rapports techniques du PAM, UNEP/MAP, Athens, 2004.; Milano *et al.* (2012), Facing climatic and anthropogenic changes in the Mediterranean basin: What will be the medium-term impact on water stress?, doi:10.1016/j.crte.2012.07.006.
[60] World Bank (2019), World Development Indicators Database extraction.
[61] Carbon Dioxide Information Analysis Center (2019), U.S. Department of Energy Berkeley Lab.
[62] IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways.
[63] NBB 2003, 2008 and 2013 and E-PRTR 2013.

of increasing concern due to its major impacts on cetaceans, especially in relation to identified hotspots overlapping important cetacean habitats such as the Pelagos Sanctuary and the Strait of Sicily. At the European level, considering the 16 River Basin Districts monitored in terms of surface-water pollution and habitat degradation along the Mediterranean coastline, 49% of water bodies, on average, fail to achieve Good Environmental Status, with the highest percentage found in Sicily, Italy, and the lowest in Corsica, France[64]. Eutrophication represents a major issue in coastal areas influenced by natural and anthropogenic inputs of nutrients, such as the Gulfs of Lion and Gabès, the Adriatic Sea, the Northern Aegean, and the Nile-Levantine. The exploration and exploitation of recently-discovered large offshore gas fields have increased environmental, health and safety risks, in particular in the Levantine basin.

Waste generation and management practices vary widely throughout the Mediterranean. The total amount of municipal solid waste generated is slightly greater than 184 million tonnes per year, i.e. an average of 370 kg per capita per year (about 1 kg per capita per day). In NMCs, values range from 1.0 to 1.7 kg per capita per day with a maximum of more than 3 kg in Monaco. In SEMCs, values range from 0.5 kg per capita per day in Morocco to 1.0 in Lebanon (the value for Israel is similar to EU countries). In NMCs and Israel, the percentage of food and organic waste is between 31% and 52%, while this rate is higher in SEMCs (from 53% in Lebanon to 70% in Libya). Recycling rates also vary greatly. In northern countries, the recycling rate is above 13% and exceeds 40% in Slovenia (except in Bosnia and Herzegovina with almost no recycling and Malta with 7%). On the southern shore, Egypt has the highest recycling rate (12.5%) and the rate is especially low in the State of Palestine and the Syrian Arab Republic. A relatively high share of waste is discharged on open dump sites or unaccounted for, representing potential leakage into the environment, which could eventually end up as marine litter.

The Mediterranean is one of the areas in the world most highly affected by marine litter due to an increase in plastic use, the lack of recycling, unsustainable consumption patterns, inadequate and ineffective waste management, high pressures from tourism and shipping, coupled with significant riverine inputs. Marine litter negatively impacts marine resources, including wildlife and ocean integrity. Plastics account for up to 95 to 100% of total floating marine litter and more than 50% of seabed marine litter[65]. The Mediterranean is especially affected by microplastics, with concentrations at the sea surface largely above 100,000 items per square kilometre[66] and, at most, above 64 million floating particles per square kilometre[67]. These concentrations are projected to further increase in the years to come. Marine litter impacts marine organisms mainly through entanglement and ingestion, but also through colonization and rafting. It also creates an economic burden through clean-up costs, and the potential loss of income and jobs from tourism, residential property values, recreational activities and fisheries. The effects of micro- and nanoplastics and associated Persistent Organic Pollutants (POPs) and Endocrine Disrupting Chemicals (EDCs) in the marine environment represent an additional risk to human health and marine organisms.

Although land-based sources are dominant in generating marine litter, sea-based sources actively contribute to the problem with an estimated EU average of 32% and values up to 50% for some sea basins. It is estimated that the fishing and recreational sectors are relatively large sea-based source contributors, with shares of 30% and 19% respectively (with the remainder provided by merchant shipping). Assuming an average treatment of 25%, gross waste generation would be an approximate 1.2 million tonnes per year for all shipping sectors in the EU. Fishing and recreational vessels together account for around half of the total MARPOL Annex V (garbage from ships) waste generation.

In the Mediterranean, 15% of deaths are attributed to modifiable environmental factors[68], compared to 23%

[64] European Environment Agency (2018), Dashboard, Ecological status of surface water bodies.
[65] UNEP/MAP (2015), Marine Litter Assessment in the Mediterranean, Athens.
[66] UNEP/MAP (2015), Marine Litter Assessment in the Mediterranean, Athens.
[67] Van der Hal et al. (2017), Exceptionally high abundances of microplastics in the oligotrophic Israeli Mediterranean coastal waters. Mar Pollut Bull., 116(1-2):151-155. doi: 10.1016/j.marpolbul.2016.12.052.
[68] IUCN (2018), The IUCN Red List of Threatened Species. Version 2018-2.

worldwide[69]. Among Mediterranean countries, the number of deaths attributed to modifiable environmental factors ranged between 8% and 27% in 2012[70]. The World Health Organization (WHO) estimated that, in Mediterranean countries, more than 228,000 people died prematurely in 2016 because of exposure to ambient air pollution, making it the main cause of the environmental burden of disease in the region.

▶ Main Fact 8

Human health: while health has globally improved in the region, pollutants, climate change, new lifestyles and consumption patterns are raising increasing health concerns.

Air pollution is critical and its negative impact on various health components is increasingly well-documented. Levels of urban ambient air pollution are best-documented for particulate matter (PM2.5), which in Mediterranean countries, are highest in Egypt (100.6 µg/m^3), far above the world and European averages (39.6 µg/m^3 and 14.2 µg/m^3, respectively). Other Mediterranean countries with levels >40 µg/m^3 include Bosnia and Herzegovina and Libya[71]. In 2016, almost two thirds of Mediterranean countries exceeded the WHO threshold of 25 µg/m^3 of particulate matter (PM2.5).

Contaminated drinking water affects human health. In some areas, water is still contaminated by untreated sewage that leads to an increased nitrite and bacteriological count. Drinking water sources are also affected by the leakage of nitrates from extensive fertilizer use in agricultural activities, leading to an increase in nitrate levels.

Deaths of under 5-year olds attributed to environmental causes have been reduced in SEMCs. However, progress remains possible. In 2016, the burden of disease related to diarrhoeal diseases from water, hygiene and sanitation was above 30,000 Disability-Adjusted Life Years (DALYs) in children under 5 years old in Algeria, Egypt, Morocco and the Syrian Arab Republic.

Climate change increases risks for human health. Increased and longer heatwaves are a health risk factor, especially for the elderly. The transmission of vector-, food- and water-borne diseases is facilitated by higher temperatures. The risk of personal injury increases with a higher frequency and intensity of extreme weather events. Modifications in pollen patterns favour asthma and allergies. Finally, drinking water sources are at risk of loss, decreasing quality and salinization through saltwater intrusion, potentially causing a significant rise in cardiovascular diseases.

Human-caused and natural disasters and emergencies are a reality in the Mediterranean region and have the potential to temporarily or permanently alter inhabitants' access to safe environmental infrastructure and services. The Mediterranean is an area of relatively high seismic and volcanic activity with a series of destructive earthquakes, volcanic eruptions and tsunamis on record, having displaced and killed thousands of Mediterranean inhabitants. Human-caused emergencies linked to political turbulence and war force large numbers of people to flee and find new, often improvised, housing and means of living. In such emergencies, providing healthy and safe environments for people is a particular challenge. Forced displacement can also cause environmental degradation, not only in the (destroyed) areas left behind, but also in the areas that receive mass population flows. Emergency and preparedness plans, integrating health and environment considerations are key to disaster management in order to protect health and ecosystems.

In many Mediterranean countries, a triple nutritional burden can be observed, with a combination of undernutrition, overfeeding (obesity and non-communicable diseases) and nutritional deficiencies. A worrying increase in people being overweight and obese can be noted between 2012 and 2016 in all

[69] Piroddi *et al.* (2017), Historical changes of the Mediterranean Sea ecosystem: modelling the role and impact of primary productivity and fisheries changes over time, Scientific Reports 7.
[70] FAO (2018), The State of Mediterranean and Black Sea Fisheries.
[71] Mean annual concentration of fine suspended particles of less than 2.5 microns in diameter, Global Health Observatory data repository.

Mediterranean countries[72]. The adult obesity rate exceeded 30% in 2016 in Egypt, Lebanon, Libya, Malta and Turkey. It is lower in the Balkans but above 20% everywhere (except in Bosnia and Herzegovina), leading to increased risks to public health (cardiovascular diseases, type 2 diabetes, metabolic syndrome).

The degradation of coastal and marine ecosystems is limiting their benefits for humans. Coastal and marine ecosystems provide a number of health benefits ranging from food provision, including the particularly healthy fatty acids contained in fish, to the supply of bioactive metabolites used in drugs, and the provision of leisure activities contributing to physical and mental health. The degradation of coastal and marine ecosystems negatively impacts their capacity to provide the above-mentioned ecosystem services and therefore reduces human health benefits.

Whereas environmental factors affect human health, the health sector itself influences the state of the environment, producing a magnitude of different kinds of waste, including untreated pharmaceutical residues in wastewater that travel down water basins and end up in the marine environment, and potentially in the food chain. Liquid waste from healthcare facilities can contain radioactive elements, heavy metals and hazardous substances from laboratories, bacteria and pathogens, blood, etc. leading to environmental contamination and health hazards, if not properly and fully disposed of via specific processes. If discharged directly into municipal wastewater networks, liquid medical waste is likely to remain untreated because municipal wastewater treatment facilities are not geared to treat such waste.

▶Main Fact 9

Climate change impact: Climate change is already affecting the Mediterranean, exacerbating pre-existing challenges.

The Mediterranean basin is affected by climate change at a pace well above the global average, in particular by more rapid warming of the ambient air and sea surface in all seasons. While the global mean air temperature is now about 1.1°C above pre-industrial values, the Mediterranean region is approaching a warming of 1.54°C. It is expected to warm by 2.2°C between 2030 and 2052, when the global mean is expected to reach the 1.5°C threshold highlighted in the Paris Agreement. Without additional mitigation, in some regions of the Mediterranean, the temperature increase is expected to exceed 3.8°C by 2100. In parallel, the sea surface temperature in the Mediterranean already warmed by around 0.4°C per decade during the period between 1985 and 2006, and is expected to reach between + 1.8°C and + 3.5°C by 2100, compared to the 1961 to 1990 period. Heatwaves are becoming stronger and more frequent, and are especially accentuated in urban centres due to the heat island effect. Summer precipitation is expected to decrease by 10 to 30% at a global atmospheric increase of 2°C, and heavy rainfall events are likely to intensify and become more erratic. The sea is absorbing CO_2, which causes ocean acidification at an unprecedented rate of - 0.018 to - 0.028 pH units per decade in the surface waters of the North-Western Mediterranean, with significant consequences expected on calcifying organisms, impacting marine biodiversity and aquaculture This situation is even more drastic when taking into account the whole Mediterranean basin from its surface to its deepest waters, with a decline of -0.055 and -0.156 pH units since the pre-industrial period[73]. Wildfire risks are growing with climate change-induced longer fire seasons and increasing heatwaves in combination with drought.

Climate change already exacerbates regional challenges, inducing an increase in risks of droughts, floods, erosion, and fires. In the upcoming decades, climate change is expected to further threaten food and water security, as well as human livelihoods and health. Tourism, fisheries, aquaculture and agriculture have already started to be adversely affected by changes in general climatic patterns and extreme events. The quality and quantity of freshwater resources are decreasing, while warming and decreased precipitation locally are leading to the reduction of yields (especially for winter and spring

[72] FAO (2018), State of Food Security and Nutrition in the World.
[73] Hassoun *et al.* (2015), Acidification of the Mediterranean Sea from anthropogenic carbon penetration, Deep Sea Research Part I: Oceanographic Research Papers, Volume 102, August 2015, Pages 1-15.

crops in the South) and increased irrigation requirements. Combined with a potential increase in pests, the dependency on international food imports will become stronger in SEMCs. Fish stock composition and distribution will likely change, with more warm-water species and a decrease in fish size. Unfavourable changes are likely to dominate in Mediterranean aquaculture, adversely affecting investment and growth in a sector projected to be the backbone of increasing sea food supply to meet growing demands.

Due to a limited tidal range, Mediterranean coastal infrastructure and settlements are often closer to the mean sea level than in most regions of the world[74], which makes them highly vulnerable to sea level rise, storm surges, flooding, erosion and local land subsidence. The sea is rising at an accelerating rate of 2.6 to 2.9 mm per year, implying an increase currently estimated at 0.43 m to 2.5 m by 2100[75]. Considering the high concentration of human population and activities in the Mediterranean coastal zone, exposure is high. Sea level rise also causes salinization of coastal wetlands and aquifers and, combined with a disturbed sediment balance on Mediterranean shores, leads to erosion. Sea level projections may be significantly revised in upcoming years, especially due to unprecedented rapid melting of the ice caps.

Climate change, together with a lack of regulatory and control mechanisms, has accelerated the spread of non-indigenous species, leading to a shift in species composition and the functioning of ecosystems. Mediterranean species are partly responding to climatic changes by changing their geographical distribution. However, the expected migration of species to cooler areas as the ocean warms up is limited in enclosed seas like the Mediterranean Sea. Increasing water temperature will lead to more frequent mass mortality events, especially in coralligenous assemblages, but also in sponges and molluscs, including in aquaculture sectors. Calcifying organisms are especially vulnerable to acidification. Global warming, in combination with direct anthropogenic impacts such as water extraction and pollution, largely affects water budgets in Mediterranean wetlands (salinity, continuity, depth, inundation), and thereby the structure of the communities which inhabit them, e.g. birds[76].

Considering the particular intensity of climate forcing (increased temperature, precipitation decrease, acidification, extreme events increase), non-climate forcing (population growth, including tourist arrivals), the vulnerability and exposure of issues of major importance (land cover, population density, economic activities, heritage sites), the Mediterranean basin is considered a climate change hotspot. A multi-scale risk assessment shows that areas in three out of four Mediterranean countries are at "extremely high risk", especially in SEMCs and Italy[77].

[74] Becker *et al.* (2012), Climate change impacts on international seaports: knowledge, perceptions, and planning efforts among port administrators. Climatic Change, 110(1), 5-29

[75] Under a scenario with sharp emission cuts that limits warming to well below 2°C, the IPCC suggests a rise of 0.43 m by 2100 compared to 1986-2005 (IPCC Special Report on the Ocean and Cryosphere in a Changing Climate [H.-O. Pörtner, D.C. Roberts, V. Masson-Delmotte, P. Zhai, M. Tignor, E. Poloczanska, K. Mintenbeck, M. Nicolai, A. Okem, J. Petzold, B. Rama, N. Weyer (eds.)]. In press.) and a rise of up to 1.1 m under a less ambitious emissions reduction scenario. Other studies suggest sea level rise of up to 1.9 m above present levels (Vermeer, M. & Rahmstorf, S. Global sea level linked to global temperature. Proc. Natl Acad. Sci. USA 106, 21527–21532 (2009)), exceeding 2 m (Bamber L, Oppenheimer M, Kopp R, Aspinall W, Cooke R. (2019) Ice sheet contributions to future sea-level rise from structured expert judgment, PNAS June 4, 2019), and even potentially reaching up to 2.5 m (Garner A, Weiss J, Parris A, Kopp R, Horton R, Overpeck J, Horton B (2018) Evolution of 21st Century Sea-level rise Projections. Earth's Future Vol.6 Issue 11 Nov 2018), all by 2100.

[76] Ramírez, et al. (2018), Spatial congruence between multiple stressors in the Mediterranean Sea may reduce its resilience to climate impacts. Sci. Rep. 8, 14871. https://doi.org/10.1038/s41598-018-33237-w.

[77] Satta et al. (2015), Towards a multi-scale coastal risk index for the Mediterranean.

4

Responses – Major progress in addressing regional issues

▶ Main Fact 10

Progress on policy challenges: cooperation on environmental matters remained active despite unfavourable geopolitical circumstances.

Previous reports on the state and outlook of the environment and development interactions in the Mediterranean published by Plan Bleu in 1989 and 2005 had identified three main policy challenges: (i) strengthening regional cooperation; (ii) integrating the environment into sectoral policies, and (iii) promoting sustainable local and territory-specific development.

- **Regional cooperation on environmental matters has remained active in the Mediterranean despite unfavourable geopolitical circumstances.** Countries have adopted common objectives, commitments and monitoring frameworks. Stakeholder networks have also expanded and diversified. With the multiplication of relevant information sources and pilot experiences, cooperation will remain a key condition for progress on the environment and development in the upcoming decades, with permanent cooperation frameworks across different institutions and types of stakeholders a key priority.
- **Progress has been made on integrating the environment into sectoral policies thanks to the Barcelona Convention and the establishment of integrated tools, including the ICZM Protocol, the Ecosystem Approach (EcAp), the Mediterranean Strategy for Sustainable Development, and the Sustainable Consumption and Production (SCP) Action Plan.** However, much remains to be done, as ambitious regional and international environmental agreements are rarely fully implemented on the ground, and important gaps persist in enforcing them. Environment ministries remain underappreciated and underfunded. With the rapid development of sectors impacting the environment, ensuring a transition towards more environmentally-sustainable and socially-inclusive sectors remains a critical target, as demonstrated by the mobilization on the blue, green and circular economy. Depending on the policy area, regulation, funding, urban planning, or reforming the incentive structure are priority instruments. More complex or diffuse issues require the implementation of a set of instruments through a coherent policy mix.
- **Territorial approaches have been successfully strengthened with decentralization moving forward in some countries, and advocacy for local decision-making progressing through various forums.** For example, local authorities play a crucial role in planning and implementing concrete climate change mitigation and adaptation measures. However, much remains to be done in empowering local governments, as applicable.

While progress is notable on some common pollution issues, other environmental areas are of remaining concern, including urban sprawl and ecosystem fragmentation, air pollution, waste management, marine litter, etc., with significant impacts on human health and well-being, as well as on critical economic sectors for the region. Climate change is already aggravating existing vulnerabilities with limited integration to date in the relevant policy instruments. The three above-mentioned policy challenges remain insufficiently

addressed. Regulations and enforcement, and the upscaling of pilot initiatives to foster efficient transitions are, in particular, critical bottlenecks.

▶ Main Fact 11

Regional cooperation for common objectives: Mediterranean countries have adopted common objectives and cooperation frameworks, setting a shared path towards sustainable development.

The environment and sustainable development remain major areas of regional cooperation:

- **Over a period of more than 40 years, the Barcelona Convention has led to the adoption of 7 legally-binding protocol, a network of marine protected areas, and numerous strategies and action plans,** including, in recent years, the ICZM Protocol (2008), the 2016 Regional Climate Change Adaptation Framework for the Mediterranean Marine and Coastal Areas, the 2016 Regional Action Plan on Sustainable Consumption and Production, and the Mediterranean Strategy for Sustainable Development (MSSD) 2016-2025[78]. The adoption of the 2018 Regional Plan of Action for Small-Scale Fisheries in the Mediterranean and the Black Sea under the auspices of the General Fisheries Commission for the Mediterranean (GFCM), and the List of Specially Protected Areas of Mediterranean Importance (SPAMI's List) established by the Contracting Parties to the Barcelona Convention also testify to this appetite for cooperation on sustainability challenges in the Mediterranean region.

- **Mediterranean countries have enhanced their legal and institutional capacity to protect coastal zones.** The ICZM Protocol encourages the development of national coastal regulations, legislation and the creation of coastal agencies. Half of the Mediterranean countries have ratified the ICZM Protocol and another six have signed it. For the 2014-2015 period, twelve countries submitted their national reports on the implementation of the ICZM Protocol[79]. Seven countries have a legal framework in place for the protection of the coast[80], and seven others have launched its preparation. Seven countries have a national ICZM strategy[81], and five others are preparing one. Coastal protection agencies or local bodies to protect the coast have been established in six countries[82]. In four additional countries, dedicated funds, land acquisition mechanisms or development plans for coastal zone management are in place. The Common Regional Framework for ICZM has been adopted by the Barcelona Convention 21st Conference of the Parties (COP 21) in December 2019, with the main aim of introducing maritime spatial planning as an important tool/process for the implementation of ICZM in the marine part of the coastal zone. This framework should help countries plan and manage human activities according to an ecosystem-based approach.

- **Addressing marine litter is a recognized priority policy area of common concern and action.** Acknowledging the importance of prevention and the application of sustainable circular economy principles, the Regional Plan on Marine Litter Management in the Mediterranean (2013) provides for a set of policy, legal, institutional, regulatory, economic, and technical measures, addressing different aspects of marine litter prevention and management from land- and sea-based sources. At the national level, important prevention measures have been adopted in the majority of Mediterranean countries. National legislation and policies are in place for recycling (8 countries) and for reducing the use of single-use plastic bags (17 countries), tackling the major marine litter items found in the Mediterranean. A Regional Cooperation Platform on Marine Litter was established in 2016 to exchange best practices, share information and seek solutions together.

[78] The MSSD is also built around a vision which consists in *"A prosperous and peaceful Mediterranean region in which people enjoy a high quality of life and where sustainable development takes place within the carrying capacity of healthy ecosystems".*

[79] The latest report on the General Status of the Progress in the Implementation of the Barcelona Convention and its Protocols (UNEP (DEPI)/MED IG.23/Inf.14).

[80] Algeria, Egypt, France, Israel, Morocco, Spain, Turkey.

[81] Algeria, Croatia, France, Israel, Malta, Montenegro, Spain.

[82] Spain, France, Italy, Algeria, Israel, Tunisia.

Mediterranean countries are committed to global environmental and sustainable development agreements:

- **The ratification of international conventions is usually high.** The Convention Concerning the Protection of World Cultural and Natural Heritage, Basel Convention, Convention on Biological Diversity, United Nations Framework Convention on Climate Change (UNFCCC) and United Nations Convention to Combat Desertification (UNCCD) have been ratified by all 21 Mediterranean countries and the European Union. Other conventions and agreements on biodiversity conservation and pollution reduction are strongly supported in the region, such as CITES (international trade in endangered species), CMS (migratory species), AEWA (African-Eurasian migratory waterbirds), ACCOBAMS (cetaceans) and Stockholm Convention (persistent organic pollutants). However, the Nagoya Protocol[83], Minamata Convention[84], Aarhus Convention[85] and Espoo Convention[86] have been ratified by less than 50% of the Mediterranean countries.

- **The 2030 Agenda and Sustainable Development Goals (SDGs) are a common reference framework for policy design and evaluation.** Numerous Mediterranean countries have revised or are revising their National Strategy on Sustainable Development to transpose the 2030 Agenda and SDGs to the national level. The MSSD, its monitoring dashboard and the Simplified Peer Review Mechanism (SIMPEER) have contributed to the regional and national implementation of the 2030 Agenda, taking into account regional, national and local specificities.

- **Most Mediterranean countries are committed to the Paris Agreement on Climate Change.** 85% of Mediterranean countries have ratified the Paris Agreement and 80% have submitted their first Nationally Determined Contributions (NDCs). Some Mediterranean countries have demonstrated an important mobilization on the international scene, by hosting international or regional climate change events (e.g. Morocco, France). In addition, a 15% increase in renewable energy consumption (2005-2015) regionally[87] indicates an effort to shift from carbon-intensive energy sources to alternatives. However, some renewable energy developments raise debates on potential environmental trade-offs associated with the impacts on biodiversity, resource consumption, recycling, etc. that deserve further assessment.

Integrated ecosystem-based approaches replace and supplement sectoral approaches. In 2000, Parties to the Convention on Biological Diversity globally adopted the Ecosystem Approach (EcAp), defined as *"a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. It is based on the application of appropriate scientific methodologies focused on levels of biological organization which encompass the essential processes, functions and interactions among organisms and their environment."* EcAp *"recognizes that humans, with their cultural diversity, are an integral component of ecosystems"*[88]. Since 2008, the Contracting Parties to the Barcelona Convention have agreed to gradually apply the Ecosystem Approach to manage human activities in the Mediterranean, with the ultimate aim of achieving Good Environmental Status (GES)[89].

[83] Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (linked to the Convention on Biological Diversity) (2014).
[84] Minamata Convention on Mercury (2017).
[85] UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (2001), and its Protocol on Pollutant Release and Transfer Registers (PRTRs) (2009). The Aarhus Convention and its Protocol on PRTRs are the only legally-binding global instruments on environmental democracy, empowering people with the rights to access information, participate in decision-making in environmental matters and to seek justice.
[86] Convention on Environmental Impact Assessment in a Transboundary Context (1997). The Espoo Convention sets out the obligations of Parties to assess the environmental impact of certain activities at an early stage of planning. It also lays down the general obligation of States to notify and consult each other on all major projects under consideration that are likely to have a significant adverse environmental impact across boundaries.
[87] World Bank (2019), World Development Indicators Database extraction.
[88] Convention on Biological Diversity COP 5, CBD 20.
[89] Decision IG.17/6; 2008.

▶ Main Fact 12

EcAp, ICZM, and MSP: Integration and system-based approaches are increasingly recognized as the most efficient way to address systemic factors, combined pressures and cumulated impacts.

Hydrological basins (watersheds draining into the Mediterranean Sea) **are recognized as a coherent scale for the management of anthropogenic activities and natural resources.** Water runoff throughout the Mediterranean basin into the sea (with specific flow quantity, quality, timing and duration) supports nutrient, sediment and carbon flows, which are essential for the functioning of coastal and marine ecosystems. The increase in the number and capacity of dams in Mediterranean countrie[90], as well as changing land cover, water abstraction and pollution caused by direct and diffuse sources, have notable impacts on downstream (coastal and marine ecosystems and the services they provide, thus calling for management at the level of the hydrologic basin, as highlighted in the Land-Based Sources (LBS) Protocol, and taking into due consideration trends and potential policy measures in sustainable land management, including agriculture, forestry, soils, etc.

The emergence, consolidation and implementation of systemic approaches remain key to addressing dysfunctions and bottlenecks within the Mediterranean socioecological/socioeconomic system, accounting for multiple drivers, pressures, actions and stakeholders and their interactions, rather than specific and isolated factors. In SEMCs, in particular, increasingly scarce water resources impose integrated water management that considers the **water, food, energy and ecosystem nexus** when developing a sectoral policy. Systemic approaches also facilitate the reconciliation of conflicting timescales between policies and ecosystem dynamics, giving due consideration to the long term. From the top of the water basin to the boundaries of the Exclusive Economic Zone, Ecosystem Approach (EcAp), Integrated Coastal Zone Management (ICZM), Maritime Spatial Planning (MSP), and Large Marine Ecosystems (LMEs) are increasingly regarded as complementary and coordinated approaches.

▶ Main Fact 13

Pollution sources: investments and collaborations have addressed some major pollution sources and health hazards.

Most Mediterranean people used safely-managed drinking water services[91] in 2015, demonstrating continued progress in access to water despite population growth.However, more than 26 million people have yet to receive this service[92]. Six of the 22 Mediterranean States (Algeria, Egypt, Libya, State of Palestine, Syrian Arab Republic and Turkey) do not yet have monitoring data on the use of safely-managed drinking water services[93], indicating a difficulty in monitoring the achievement of SDG Target 6.1. Nevertheless, the available data shows significant progress between 2005 and 2015 (increase from 83% to 90% of the population using safely-managed drinking water services in monitored countries[94]). However, in Albania, Lebanon and Morocco, more than 30% of the population still do not use safely-managed drinking water services.

The proportion of the Mediterranean population using safely-managed sanitation services has increased in most countries, but objectives are still far from being reached. In the past decade, access to adequate and equitable sanitation and hygiene has increased from 58% (2005) to 65% (2015) of the population using safely-managed sanitation services[95]. Progress has been recorded, particularly in Albania, Egypt, Israel,

[90] NASA's Earth Observing System Data and Information System, Global Reservoirs and Dams Database, hosted by Columbia University.
[91] Safely-managed = improved water source, located/accessible on premises, available when needed, and free from contamination (Source: WHO/UNICEF JMP for Water Supply, Sanitation and Hygiene, WDI).
[92] WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (2017).
[93] UNSTATS and WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (2017).
[94] Mediterranean States excluding Turkey, the Syrian Arab Republic, the State of Palestine, Egypt, Libya and Algeria.
[95] Mediterranean States except Monaco, Montenegro and the Syrian Arab Republic.

Lebanon, Morocco, Tunisia and Turkey, and the gap between NMCs and SEMCs decreased. However, more than 160 million people do not use safely-managed sanitation services. Access to adequate and equitable sanitation and hygiene still represents a tremendous challenge, in particular in Egypt, Morocco and Turkey (with over 100 million people lacking safely-managed sanitation services in these three countries combined).

Considerable improvement in the treatment of wastewater has led to a significant improvement in bathing water quality; but localized problems subsist and may even be widespread when strong rainfall events occur due to stormwater overflow. In 2017, most NMCs reported over 75% of excellent bathing water quality and over 90% of good or excellent bathing water quality, with the exception of Albania with around 12% of poor bathing water quality sampled[96]. In part of the Mediterranean, bathing water quality remains a permanent or occasional barrier to tourism and a health hazard, in particular due to the difficulty managing heavy rainfall events and seasonal activities (tourism), which is putting limited infrastructure under stress.

Despite a steady increase in oil and other cargo volumes moved by ship, accidental spillages of oil and other harmful substances from ships into the Mediterranean have decreased. Between 1994 and 2013, approximately 32,000 tonnes of oil were released into the Mediterranean Sea as a result of incidents. The proportion of incidents involving oil spills dropped from 56% for the 1977 - 1993 period to 40% for the 1994 - 2013 period. 61% of these incidents resulted in a spillage of less than 1 tonne[97]. In the Mediterranean, the quantities of harmful and noxious substances (HNS) accidentally spilled considerably decreased during the 1994 - 2013 period and have become insignificant since 2003. The impact of the international regulatory framework adopted through the International Maritime Organization (IMO) and technical cooperation at the regional level have contributed to this favourable outcome, especially in the prevention of accidental pollution. The support of the Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea (REMPEC) has been available to Mediterranean coastal states since 1976 and has contributed to this positive trend. However, risks associated with the maritime transport of oil and HNS with possible harmful consequences on biota and ecosystems cannot be completely eliminated, especially in vulnerable areas such as the Mediterranean Sea.

The capacity to generate knowledge has tremendously increased and new cost-effective sources of information have emerged. Big and open data, the widespread use of remote sensing and Geographic Information Systems (GIS), aerial and underwater drones, etc. have considerably increased the capacity to generate and process new data. Internet access and open-source software have allowed citizen science projects to emerge as a virtual and physical place where citizens, researchers and decision makers can cooperate to monitor the state of the environment in the Mediterranean, especially in relation to conservation biology or ecology (e.g. COMBER[98], CIGESMED[99]). The information collected in this way can provide a strong basis for short- and long-term planning and decision-making in the region, while educating the public and enhancing public participation.

▶ Main Fact 14

Adaptive policies: capacity to generate knowledge is increasing based on common assessment frameworks and data for decision-making.

At the same time, Mediterranean countries have adopted common monitoring and assessment frameworks to improve information-based decision-making:

- **An Integrated Monitoring and Assessment Programme (IMAP)** is being developed in the context of the MAP system to assess progress towards the Good Environmental Status. IMAP is based on

[96] EEA (2017), Quality of European bathing water in 2017.
[97] REMPEC (2014), REMPEC Statistical Analysis – Alerts and Accidents Database.
[98] Citizens' Network for the Observation of Marine Biodiversity.
[99] Coralligenous based indicators to evaluate and monitor the "Good Environmental Status" of the Mediterranean coastal waters.

eleven Ecological Objectives (EO), corresponding to 28 operational objectives and their related 61 indicators (27 common and 34 candidate indicators), covering four clusters (a) pollution and marine litter, (b) contaminants and eutrophication, (c) marine biodiversity and fisheries and (iv) coast and hydrography. The initial implementation phase of the IMAP (2016-2019) resulted in the development of the first 2017 Mediterranean Quality Status Report.

- **A shared environmental information system.** Mediterranean countries work together to improve data availability and access to environmental information. A regional information system to support data collection, reporting and assessment for IMAP is being built under the framework of the MAP/ Barcelona Convention. Moreover, the EU-supported Shared Environmental Information System (SEIS) for reducing marine pollution fosters the regular production and sharing of quality-assessed environmental data, indicators and information in Algeria, Egypt, Israel, Jordan, Lebanon, Libya, Morocco, the State of Palestine, and Tunisia.

- **Sustainable development indicators.** Under the 2030 Agenda, countries committed to a global indicator framework,[100] with 232 indicators to monitor 17 SDGs and 169 targets. At the Mediterranean level, support is provided by the MAP through the Mediterranean Sustainability Dashboard, largely based on SDG indicators. **Awareness and reporting on the link between environmental conditions and human health has improved.** Since 2012, the World Health Organization has reported on the "environmental burden of disease" globally and at a national level.

[100] Last amended in March 2019.

5

Responses: Persisting and emerging challenges

Despite notable progress, Mediterranean countries are not on track to achieve and fully implement the agreed upon goals, including the Sustainable Development Goals (SDGs) and Ecological Objectives for Good Environmental Status of the Mediterranean Sea and Coast. The majority of observed trends show developments that are either progressing towards the set targets, but at an insufficient rate or unequally across the countries, or moving away from the target. Nine out of the 21 Mediterranean countries had achieved none of the SDG 2030 targets in 2019 and the maximum number of SDGs achieved by a country is two (out of 17)[101]. Eleven SDGs remain unachieved in all Mediterranean countries, including SDG 13 "climate action", SDG 14 "life below water" and SDG 15 "life on land". Concerning SDG 2 "zero hunger", SDG 5 "gender equality", SDG 11 "sustainable cities and communities" and SDG 14 "life below water", none of the Mediterranean countries show a trend that is in line with achievement of the objectives by 2030. **Major changes in production and consumption patterns are urgently needed to progress decisively towards inclusive sustainable development, with a focus on climate change concerns, biodiversity protection and ecosystem restoration, pollution prevention and the circular economy. Transition towards the blue/green economy is a key challenge in the region that requires the funding of polluting activities to be reoriented towards sustainable activities.** The following key messages are consistent with the UN 2030 Sustainable Development Agenda and its SDGs, as well as the MSSD.

Key Message 1

Enforcement: ensuring the effective enforcement of common, agreed objectives and commitments.

While Mediterranean countries have adopted ambitious objectives and sometimes legally-binding agreements (including Protocols under the Barcelona Convention), **critical gaps remain in implementing and enforcing them.**

The Barcelona Convention provides a twofold mechanism to ensure enforcement of its provisions, which have yet to be fully enacted: (i) the Compliance Committee and (ii) reports by the Contracting Parties on the measures implemented and their effectiveness (Article 26), reviewed by the Conference of the Parties to recommend potential corrective measures (Article 27). The Compliance Committee of the Barcelona Convention and its Protocols was created in 2008 to help identify implementation and compliance difficulties as early as possible. The Compliance Committee can be triggered by the Contracting Parties, the Secretariat and the Committee itself; however, it has never been triggered to date. National reporting of the measures taken and the evaluation of their effectiveness is insufficient, with a significant number of unsubmitted or incomplete reports. The Barcelona Convention does not provide for a sanctioning mechanism in the event of non-compliance. Strengthening the fulfilment of Articles 26 and 27 presents an opportunity to complete the adaptive policy cycle from planning to implementation, enforcement, monitoring and evaluation, based on commonly agreed measures.

[101] Sachs *et al.* (2019), Sustainable Development Report 2019, New York: Bertelsmann Stiftung and Sustainable Development Solutions Network (SDSN).

Enforcement also remains limited at the national level. Human resources, training and budgets in this area are often insufficient to provide effective solutions, and sanctioning mechanisms are often inexistent or ineffective. The systematic inclusion of operational implementation and enforcement instruments in environmental policies remains a key gap and calls for increased efforts and capacity building.

Critical areas for increased enforcement include: illegal waste disposal and dumping, as well as the trafficking of waste and protected species (including criminal activities), **illegal mining** (including illegal sand extraction and smuggling[102]), **illegal fishing** (including in Marine Protected Areas, with enforcement needed along the value chain), **illegal construction in coastal zones and protected coastal areas,** etc. Recent enforcement measures (e.g. on air pollution by ships) and subregional collaborations (e.g. on illegal discharge at sea) can serve as examples for upscaling surveillance and legal action on environmental regulations.

Leads for strengthening enforcement include:

- **developing and testing a set of criteria and associated indicators to assess compliance** (including with the Barcelona Convention and its Protocols);
- **adopting necessary provisions in national legislation to allow for legal action; including the notions of precautionary principle, environmental prejudice, non-regression** on environmental regulations, environmental **prevention,** etc.; and adopting effective legal and administrative mechanisms to implement these principles;
- **strengthening cooperation between judiciary and administrative bodies;**
- **providing capacity building for judiciary and administrative resources along the enforcement chain,** on environmental legal frameworks, jurisprudence, environmental and economic stakes; with both a general awareness-raising programme and specialized training;
- **developing cooperation and synergies with the Compliance Committees under other Multilateral Environmental Agreements (MEAs)** in areas of common concern, including joint activities to promote and facilitate compliance; and
- **developing judicial cooperation at the Mediterranean level. In the framework of the Barcelona Convention, promising leads for judicial cooperation have been developed with regard to detecting and sanctioning intentional pollution from maritime transport.** The Mediterranean Network of Law Enforcement Officials relating to the International Convention for the Prevention of Pollution from Ships (MARPOL) within the framework of the Barcelona Convention (MENELAS) has been exploring the possible development of regional jurisdictional and judicial cooperation in the Mediterranean, along with a common report that would enable the courts of the Contracting Parties to the Barcelona Convention to prosecute all individuals, irrespective of the place of pollution. MENELAS has also been considering the possibility of accompanying this judicial cooperation with the establishment of a regional "Blue Fund", to which a proportion of the financial sanctions would be transferred. Stakeholders have mentioned aligning the level of sanctions or the nature of acceptable proof as potential areas for future progress. Administrative and judicial cooperation could be further extended to other policy areas of common interest.

Several cases of judicial litigation have been recorded in European Mediterranean countries[103]. One of the trends in climate change litigation is related to holding governments to their legislative and policy commitments, thereby enforcing climate commitments via legal action.

[102] UNEP (2019), Sand and sustainability: Finding new solutions for environmental governance of global sand resources. GRID-Geneva, United Nations Environment Programme, Geneva, Switzerland.
[103] UNEP (2017), The Status of climate change litigation: A global review.

Key Message 2

Institutional capacity: raising the profile of environmental institutions and stakes.

Policymaking continues to encounter barriers hindering long-term considerations in decisions, whereas ecosystem adaptation and restoration generally require timescales exceeding the duration of a human life. Raising the profile of environmental institutions and stakes requires more decisive actions on areas that are generally well known, but addressed at a pace inconsistent with the magnitude of current challenges. Such areas include:

- **Expanding stakeholders' awareness and involvement.**

Improving public access to information and public involvement, as well as education for sustainable development, are key to inclusive action for transitions and raising the political profile of environmental issues.

Effective policymaking for a transition towards sustainability requires an inclusive and integrated approach that guides behavioural changes at all levels, and actively involves not only policymakers, but also dialogues with civil society and the private sector at all stages of the policy cycle. Inclusive development must pay attention to inequalities and involve civil society in decision and action. Achieving gender equality and empowerment of women and girls as agents of change is critical on the way towards transformative change for sustainability where women can play a major role: (i) in promoting sustainable household consumption and investment (e.g. in food/agriculture, energy) for food security and biodiversity conservation, and (ii) in entrepreneurship and economic development. Mediterranean policies increasingly integrate participatory and multi-stakeholder tools, for example via legislation on the Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA), which include mandatory public consultation processes. The young generations and their demands and potential for action are central to short-term and longer-term progress, including in countries with strong demographic trends today and tomorrow.

Since the 2000s, the strong increase in mobile phone subscriptions and people using the Internet has opened new opportunities for access to information and public participation in the environmental debate, including through social media. However, only 12 of the 22 Contracting Parties to the Barcelona Convention are already Parties to the Aarhus Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters, which links environmental protection and human rights. Extending accession to the Convention and fulfilling its commitments are key levers for inclusive transitions.

Environmental impact assessments are a key source of stakeholder information. All Mediterranean countries have adopted frameworks for ex ante environmental impact assessment (EIA), in line with Article 4.3c and 4.3d of the Barcelona Convention (in 100% of Mediterranean countries, EIA is a legal requirement, whereas 72% have enacted a legal framework for Strategic Environmental Assessment (SEA)). **Further efforts are required to extend the use of Strategic Environmental Assessment (SEA) and to include social assessment, as well as rigorous application and enforcement.**

- **Understanding and addressing non-environmental stakes associated with environmental decisions.**

Food security, youth employment, access to water in the required quality and quantity and health are critical policy issues of widespread concern in Mediterranean countries. Assessing and sharing the expected co-benefits and trade-offs of environmental decisions on these policy priorities, and discussing them with the relevant stakeholders, is critical to further integrate environmental objectives in development policies.

In this regard, strategic stakeholder information includes assessments that demonstrate the **economic**

and social (including health) co-benefits of environmental action, including the cost of inaction. **Natural capital, ecosystem and ecosystem services accounting** could be further developed as a component of national accounts. **Nutritional information and labelling** appear equally critical, in particular in the eastern part of the Basin.

- **Raising the profile of administrations in charge.**

Administrations in charge of the environment often lack the institutional strength to enforce environmental policy integration. Legal and institutional mechanisms to ensure policy integration, including explicit deadlines and reporting mechanisms (e.g. through coordination mechanisms at the highest level of government, and reports to Parliament) need to be implemented more widely.

- **Removing harmful incentives.**

Mainstreaming the environment into sectoral policies also requires phasing out unsustainable practices and removing barriers to change, including environmentally-harmful subsidies. Priorities include **continuing to remove subsidies on non-renewable energies** (showing an upward trend at the global level after a period of significant decrease), **and groundwater extraction. Adequately targeting direct consumption support mechanisms to the poorest and most vulnerable groups** would help improve the efficiency of environmental measures, in particular in the water and energy sectors, which are of critical importance in the Mediterranean.

- **Upgrading the ambition of specific regulations.**

Strengthening adoption. While six out of seven Protocols of the Barcelona Convention are in force in 2019, three of them have only been ratified by half or less than half of the Contracting Parties and still require particular attention to ensure full regional coverage. These include the Integrated Coastal Zone Management Protocol (11 ratifications), Offshore Protocol (8 ratifications) and Hazardous Wastes Protocol (7 ratifications).

Preparing the designation of the Mediterranean Sea as an Emission Control Area (ECA). Recent feasibility studies (2019)[104] examining the possibility of designating the Mediterranean Sea, or parts thereof, as sulphur oxides (SOx) Emission Control Areas (ECAs) under MARPOL Annex VI, indicate that a Mediterranean ECA would result in significant health and environmental benefits, fewer cases of respiratory and cardiovascular diseases and premature deaths avoided annually, with health benefits much larger than the expected costs. One of the studies also highlights the benefit of reducing nitrogen oxides (NOx) emissions through a NECA.

Regulating emerging activities at sea and emerging pollutants. Current practices in the use of substances of emerging concern, for which environmental and human health impact studies have not been sufficiently carried out, are not in line with the precautionary principle and require further regulation. The study of the multitude of emerging pollutants, their interactions with the environment and human health and their treatment is extremely complex and costly. It has not been sufficiently carried out for a number of substances and does not currently keep up with the pace at which new substances are being created, researched and are entering the market. To date, the European Chemicals Agency has registered more than 22,000 substances[105] under the REACH regulation, whereas, worldwide, more than 142 million exist[106]. Accordingly, regulation has difficulty keeping pace with the emergence of new activities at sea, including in areas outside of national jurisdictions.

Integrating the mitigation hierarchy in regulations and programme design. Environmentally- or socially-harmful activities can be regulated in such a way as to respect the mitigation hierarchy, based on the four steps of avoidance, minimization, restoration and then offsets/compensation of the impacts, thus leading to more positive environmental and/or social outcomes. While applying the mitigation hierarchy in the

[104] Prepared by REMPEC and two other studies commissioned by the European Commission and France.
[105] European Chemicals Agency (2019), https://echa.europa.eu/fr/registration-statistics-infograph#
[106] American Chemical Society (2019), Base Chemical Abstract Service Database.

marine environment is particularly challenging, recent research and pilot studies across the world provide encouraging results and ground for sharing best practices and strengthening regulations.

Key Message 3

Local action: translating national and international commitments into local action, adapted to the territorial context.

The gap between the ambition of international agreements and their implementation at the local level needs to be closed while taking into account local specificities. Many sustainable development strategies and commitments are designed and adopted at the national or international level, but it is at the local scale that concrete action can be taken for conservation and the management of natural resources for human well-being. This is particularly true for adaptation to environmental and climate change. Clear mechanisms to mainstream international commitments into local planning often lack effective tools that need to be catered to the differing stages of decentralization in Mediterranean countries. Coordination between local administrations and central and decentralized sectoral technical services, as appropriate, requires further capacity building and implementation support to become more fluid and effective.

Managing local risks and sometimes scarce resources will be a particular challenge for local communities or governments, as appropriate, in a context of climate change. The resilience and adaptive capacity of local communities vary greatly around the Mediterranean basin. Local planning approaches can reflect these specificities by integrating locally-held knowledge about specific local contexts.

Territory-specific actions include the preservation or restoration of ecosystems providing key services, which are expected to become increasingly critical in a changing climate, such as wetlands, peri-urban forests and forested ecosystems, healthy agricultural soils, shallow seashore habitats including Posidonia beds and coralligenous assemblages. Reducing fragmentation through corridors is another important territorial priority in both land-use planning and investment in restoration. In addition, fire prevention and fighting, flood prevention, heat island effect prevention and management are expected to be critical in a number of locations, with local responsibilities.

Mediterranean islands. While the issues of sustainable management of resources, limitation of destruction of natural habitats, control of invasive alien species and mitigation and adaptation to climate change are not specific to islands, they are particularly exacerbated in these isolated territories where resources are scarce, space is limited and technologies are restricted. Nevertheless, islands should not be reduced to vulnerable territories, as they represent resilience laboratories for innovation on biodiversity conservation, sustainable development and transition objectives. Networking between these territories needs to be encouraged in the Mediterranean and beyond, and policies recognizing the unique contribution and value of these territories should continue to be implemented (in line with the efforts made under the Rio+20 declaration, the Aichi Targets and the working group on insular biodiversity, Resolution XII.14 of the Ramsar Convention and the ICZM Protocol).

Promote innovative local-level systems and governance models around emerging (or re-emerging) value chains. Collective organization and citizen-led innovations in the sustainable agriculture, aquaculture, fisheries and ecotourism sectors, creating jobs and diversifying the economy, should be further strengthened and supported. The value chain approach encourages the participation of local producers, who are "vulnerable" individually, by grouping together to act collectively to overcome market barriers and increase revenue. The value chain approach can also help identify opportunities for achieving a more circular economy. The attractiveness and preservation of rural territories is compromised by the urban migration of young professionals who lack skills, capital, access to loans and land to develop sustainable businesses in the agriculture, aquaculture, fisheries and ecotourism sectors. Mechanisms to promote local products, i.e. labelling, should be further implemented to promote sustainable practices and protect consumer health. In regions where traditional rural activities - including pastoralism and other activities using forests or

forested areas – still make major economic contributions (in particular in SEMCs), sustainably managing them is critical.

Key Message 4

Fostering transitions towards sustainability: upgrading and diversifying the policy mix.

Efficient environmental policies require adjusted policy mixes[107] as systemic issues can rarely be solved by regulatory measures alone. Environmental challenges associated with multiple pressures and activities, including strong economic interests, can be tackled only by a combination of coordinated instruments through policy mixes, associating regulatory measures with: (i) Economic instruments, fiscal measures, extended producer responsibility in application of the "polluter pays" principle, diverse funding mechanisms and partnerships; (ii) Awareness-raising, education, labelling and voluntary agreements; and (iii) Instruments supporting environmentally-friendly land tenure, land use and land-use planning in areas under significant pressures.

In addition to the national and local levels, policy mixes can be strengthened at the regional level, for example through the implementation of the seventh step of the EcAp roadmap that aims at developing action plans and programmes of measures for achieving GES in the Mediterranean.

- **Supplementing regulations and plans with appropriate funding mechanisms.**

Many regional strategies, programmes and plans for sustainability are designed without adequate funding plans and mechanisms. Investments in infrastructure development, including water supply, sanitation, wastewater treatment, waste management, and more recently renewable energy, have been key to progress on sustainability indicators, in particular in SEMCs. Continuous needs for investment are expected in these areas as populations continue to grow. However, emerging challenges are also expected to require considerable public and private investment, with early action required to prevent major future costs. On other environmental policies, including biodiversity conservation, ensuring funding to cover recurring costs is a prerequisite of effectiveness.

Climate change adaptation in agricultural, urban and coastal areas is expected to require major investment. Anticipating adaptation, choosing no-regret solutions, including Nature-based Solutions, and effectively involving the private sector (including banks and insurance) can minimize funding needs.

Water demand management, improvements in water efficiency, reduction oflosses and non-conventional resource mobilization, including reuse, as a prelude to increasing available water resources through technological solutions, will require investments and pricing. Losses and leakages in water supply systems, efficiency defects and waste in irrigation and domestic use are estimated at around 100 billion cubic metres in the whole Mediterranean region, which is equivalent to approximately 45% of total water demand for both sectors, a significant proportion of which could be avoided. Positive experiences in the region show that wastewater can be safely recycled for irrigation or aquifer recharge. Israel is a leader in SEMCs, with a reuse rate of over 85% on all wastewater collected. In Europe, Cyprus and Malta are the most advanced countries, with 90% and 60% of their treated wastewater being reused respectively, far exceeding the European average (2.4%)[108]. To sustain necessary investments and foster demand prioritization, a water pricing policy becomes increasingly relevant, in particular in agriculture.

Marine Protected Areas critically lack permanent funding for operating costs. The marine area covered by

[107] Definition from OECD: *"The 'policy mix' could be understood as the set of policy rationales, arrangements and instruments implemented to deliver public action in specific policy domains as well as their interactions. The 'policy mix' concept refers therefore to: 1) the composition of the 'policy mix', i.e. the relative balance between its components, and 2) the interactions between its components"*, in OECD Science, Technology and Innovation Outlook 2016.

[108] European Commission, in IPEMED (2019), Reuse of treated wastewater in the Mediterranean.

conservation measures (Marine Protected Areas and Other Effective Area-Based Conservation Measures) reached 226,665 square kilometres in January 2019, representing just over 9% of the Mediterranean Sea surface, close to the 2020 Aichi target of 10%. However, it is estimated that only about 10% of the sites declared have proper implementation of their management plans, which is a determining factor for the effectiveness of protected areas. The setting up and implementation of such management plans requires adequate permanent financial and human capacity, which are generally lacking in the Mediterranean. For the management of protected coastal and marine areas in the Mediterranean, a private-public donor trust fund - the MedFund - was created in 2019, as a sustainable financing mechanism. The MedFund has raised around one fourth of its 3-year financial endowment for supporting the management of 20 Mediterranean MPAs. The fund needs to be further endowed to cover its objectives and expand to additional MPAs in the Mediterranean. The development of innovative funding mechanisms, including public-private partnerships, is also key to sustained funding.

- **Transitioning towards a green, blue and circular economy.**

In recent decades, the Mediterranean has seen the emergence of an encouraging number of promising innovations either restoring the environment or offering alternatives to environmentally-damaging solutions (e.g. through EU innovation funding programmes such as BlueMed and Interreg MED). Innovative sectors include: sustainable and ecotourism, waste reuse in a circular economy, toxic substance substitution, agroforestry, agroecology, sustainable fisheries, sustainable aquaculture and local agrifood systems, non-fossil sources of energy/renewables (including energy recovery from waste), etc. Efforts to scale up these innovations remain critical for a significant impact on environmental quality and job creation. To move decisively towards a blue, green and circular economy, governments and businesses in the Mediterranean region should build on: (i) **a mix of regulatory and economic instruments,** paying attention to proper prices, taxes and subsidies; (ii) **technological and social innovations development** and dissemination / scaling-up through capitalization and mainstreaming; (iii) multiple financing sources (in line with the 2015 Addis Ababa agreement): national and international, public and private, conventional and non-conventional, microcredit, etc.; (iv) **information, awareness-raising and training programmes,** including specialized university modules, and (v) **monitoring** factual progress with indicators and data.

Efficiently addressing the transition also requires a precise understanding of non-environmental issues and challenges, including economic and employment benefits and impacts, as well as operational, social, cultural and behavioural aspects, associated with the sectors or issues addressed. This most likely requires working with the private sector and local community representatives in the targeted subregions, and may require further development of **sectoral and behavioural knowledge,** including in the MAP - Barcelona Convention system.

- **Protecting the coastal zone from urban sprawl and economic pressures.**

As highlighted in the Common Regional Framework for ICZM adopted by the Barcelona Convention 21st Conference of the Parties (COP 21) in December 2019, protecting the coastal zone from cumulated pressures on both the land and marine sides of the land-sea interface requires an integrated set of complementary and coordinated policy instruments. Besides a legal framework, critical instruments include monitoring and assessment, coordinated planning processes and governance mechanisms, dedicated funding mechanisms (e.g. economic or fiscal instruments), land policy instruments (e.g. land acquisition, concession, separation between ownership and right of use, land stewardship, etc.), training, communication and information, and efficient enforcement systems.

Key Message 5

Networking and co-construction: developing permanent collaboration frameworks.

Developing long-term interlinkages bridging stakeholder networks and governance forums. Since Rio 1992

and the 2015 Paris Agreement, stakeholder mobilization on sustainable development goals has bloomed, with the emergence of numerous stakeholder networks and governance forums. In the Mediterranean, networks often bring together stakeholders of a similar profile, and governance forums often focus on a specialized theme. Interrelations between different types of stakeholders and across governance forums are generally limited in time and dependent on externally-funded projects. The few exceptions include the Egyptian Sustainable Development Forum at the national level, the *Parlement de la Mer* in the French Region of *Occitanie* at the local level, and, at the regional level, the Mediterranean Commission on Sustainable Development, which recommended the creation of a Mediterranean Forum on Sustainable Development. Efforts are required to develop long-term or permanent interlinkages.

Investing in policy platforms can promote understanding and share experience on suitable combinations of policy instruments. Policy platforms can also provide a context in which synergies and trade-offs between measures can be best dealt with and improve policy learning between countries. On issues specifically associated with economic sectors, countries should build **active alliances of governments, businesses, scientists and opinion leaders** to implement international agreements and related commitments at the global level (e.g. Convention on Climate Change, Convention on Biological Diversity, Law of the Sea), Mediterranean level (e.g. Barcelona Convention, MSSD) and among neighbouring countries.
The sustainability of cooperation mechanisms should be a key concern from the design stage. As most cooperation mechanisms are currently dependent on project funding, innovation may be required to design **light, agile and mutually-beneficial institutional set-ups.** This would apply particularly to necessary long-term science-policy interfaces.

Key Message 6

Foresight: anticipating the transformation of coastal and marine areas, activities and landscapes.

Clean-up and curative measures will not be sufficient. Measures that prevent degradation from happening are generally less costly and lead to better environmental and social outcomes. Preventive action to counter environmental degradation can only be sufficiently achieved through transformative change in resource-use patterns.

With an expected increase in sea level rise, coastal erosion and coastal extreme events, adaptive strategies will be required for organizing strategic retreat, where needed, and ensuring a sustainable transition in economic activities and human settlements, when appropriate. These transformations are forecast to become game-changers and need to be mainstreamed into new and existing policies.

The "maritimization" of human activities is an emerging trend, which adds to the impact of continued intensive development of the coastal zone. This phenomenon requires extending the approach and practices of integrated coastal zone management towards more offshore waters through maritime spatial planning. Human activities are increasingly moving towards the sea, with both the continued growth of existing maritime activities and the emergence of new activities rendered possible by technological development at sea. The coastal zone, already subject to continued pressure from land-based activities and urban development, and saturated by built-up areas in some parts, is an unavoidable base for these new maritime activities, which are expected to generate additional pressures on fragile ecosystems, in particular in shallow coastal areas. Avoiding, reducing or offsetting these impacts is expected to be a major challenge in the upcoming decades.

Monitoring and regulating marine biotechnology industries and underwater extraction of minerals. Marine biotechnology industries and underwater extraction of minerals, including in the deep sea, are still very little developed in Mediterranean countries. However, due to the uncertainty of their impacts on ecosystems and the potential environmental damages, these activities need to be further studied and their expansion will require the adjustment and expansion of current monitoring systems and regulations.

6

Knowledge for action

Given the diffuse nature of information sources and data collection processes, the promising trends described previously risk remaining largely disjointed, which significantly reduces their relevance for policymaking.

Decisive action is required to ensure that the new capacity to generate knowledge directly benefits common and agreed monitoring frameworks at the regional and/or national levels (including through their expansion to new indicators), and sustainable observation processes and institutions. Such principles could be stated as conditions in programmes funding data collection or processing (with obvious exceptions for fundamental/theoretical research).

Key Message 7

Useful knowledge: putting existing knowledge to use.

Critical knowledge is generated in knowledge hubs, universities, institutions, local assessment or research programmes, or is held by local communities and practitioners, but is insufficiently or ineffectively transmitted to decision makers. Despite the development of various instruments for scientific cooperation (in research and innovation), with strong support from the European Union, significant disparities remain in the level of support for monitoring and innovation between NMCs and SEMCs. When science-policy-practice collaboration and information sharing exist, they are often project-dependent and thus short-lived with significant entry costs and limited capitalization over time. Recent initiatives such as the MedECC scientific network on climate and environmental change pave the way towards further consolidated and "user-ready" knowledge resources. Efforts could also be further streamlined through efficient data and output sharing platforms.

Key Message 8

Monitoring: implementing, sustaining and expanding common monitoring frameworks.

Building on existing common frameworks is a condition to efficiently follow up on recent efforts. In the context of the Barcelona Convention, priorities include:

- **Implementing national monitoring programmes in line with IMAP to fill priority knowledge gaps identified in the 2017 MED QSR.** The 2017 MED QSR identified a vast array of knowledge gaps for implementing IMAP and developing the 2023 MED QSR. On coastal and marine biodiversity, for example, data on marine habitats is still scarce, fragmented and discounted in time and would benefit from a complete mapping of the most significant marine habitats;
- **Establishing data exchange protocols;**
- **Covering issues of emerging concern.** Mineral extraction and other emerging activities at sea, as well as the proliferation of pollutants of emerging concern are currently not adequately monitored;
- **Expanding monitoring to also cover drivers, pressures, impacts and responses,** to provide integrat-

Key Message 9

Transparency: documenting and communicating the stakes of environmental degradation and socioeconomic inequalities.

Further integrating sustainable development in public, private and citizen decisions requires documenting and communicating the stakes associated with environmental degradations and increasing inequalities, in particular **stakes associated with SDGs, including health, food security and poverty reduction through employment.** On environmental aspects in particular, this would involve evaluating key ecosystem services and socioeconomic impacts in relation to (i) potential threats like sea level rise, coastal erosion and extreme events and (ii) environmental targets, such as ecosystem preservation, restoration or creation.

Key Message 10

Learning by doing: learning from experience sharing and peer review mechanisms for adaptive policies.

Multiple technical, social and governance innovations have been developed in the last decade and many more are ongoing, with a multitude of stakeholders involved, and often short-term funding windows. **Well-structured capitalization efforts are required to ensure that future policy development and private action benefit from the lessons learned and tools piloted.** Rather than an afterthought, capitalization should be built into project and programme processes. Practitioners and experts should be involved in identifying key conditions and instruments needed for replicating and scaling up promising innovations as a condition for funding.

Closing the policy cycle by conducting ex post evaluation is key for coherent, transparent and effective policies. Evidence from *ex post* appraisal informed via shared evaluation processes, can significantly contribute to better informed and more effective policies, a more interdisciplinary approach and accountability, and can potentially reduce the regulatory burden. Rather than general processes and statistics alone, *ex post* evaluation should consider some practical applications on the ground, and include discussions with practitioners to identify the lessons learned, adaptations implemented during the project lifetime, and recurrent bottlenecks, including behavioural aspects.

The Barcelona Convention provides for a comprehensive policy evaluation mechanism for measures taken by Contracting Parties in application of the Convention, but it is partially implemented and does not currently allow conclusions to be drawn on the effectiveness of the Contracting Parties' actions. By virtue of Article 26 of the Barcelona Convention, the Contracting Parties commit to report *ex post* on the measures taken for the implementation of the Convention, its Protocols and the recommendations from the Conference of Parties, as well as on the effectiveness of these measures. Article 27 further stipulates that, on the basis of these elements, the Conference of Parties shall evaluate compliance with the Barcelona Convention and its Protocols and recommend potential corrective measures. This policy evaluation mechanism is crucial for the effective implementation of the Convention and its tools, and requires further support for Contracting Parties for full application of the provisions of the Convention.

Data gaps are likely to remain a reality in the future and should not prevent decision makers from taking action. In application of the precautionary principle stipulated in the Barcelona Convention, stakeholders are invited to take evidence-based action, embracing the different available data sources, without delaying the implementation of critical measures when data is incomplete.

7

Conclusion

The sections above have shown that the overarching objective of the Barcelona Convention - *"the preservation and sustainable development of a common heritage, in the interest of present and future generations"* cannot be reached by pursuing current trajectories and requires transformative change. Systemic behaviour modification calls for an inclusive approach with the active participation of all stakeholders in the different steps of the policy cycle. Urgent action is needed to integrate the environmental, economic and social spheres on realistic yet desirable transition pathways.

Summary of Main Facts and Key Messages

MAIN FACTS:
the region is not on track to achieve commonly agreed sustainability goals.

MAIN FACT 1

Demographic trends: on the rise and increasingly meridional and urban, with younger population in SEMCs.

MAIN FACT 2

Human development: considerable progress in SEMCs while large North-East/South divides remain.

MAIN FACT 3

Macroeconomic situation: increased vulnerabilities linked to dependency on international markets and global trends.

MAIN FACT 4

Good Environmental Status: the development of human activities depends on the quality of the environment.

MAIN FACT 5

Pressures from economic sectors: on the rise due to continued and rapid growth in polluting and resource-consuming sectors and diversification of activities in marine areas.

MAIN FACT 6

Land-cover and land-use changes: continued loss of natural land cover and agricultural land use, particularly in coastal areas.

MAIN FACT 7

Ecosystem services provision threatened by cumulated impacts: multiple human-induced pressures generate cumulative impacts threatening biodiversity and ecosystem services, including the provision of critical resources.

MAIN FACT 8

Human health: improved but climate change, ecosystem degradation, pollution of air and water, including through waste, and consumption and production patterns are raising increasing health concerns.

MAIN FACT 9

Climate change impacts: already affecting the Mediterranean, exacerbating existing challenges.

MAIN FACT 10

Progress on policy challenges: despite difficult geopolitical circumstances, cooperation has remained active on a number of environmental matters.

MAIN FACT 11

Regional cooperation for common objectives: regional cooperation has been a means to collectively define and agree on common objectives and targets for sustainability.

MAIN FACT 12

EcAp, ICZM, and MSP approaches: increasingly recognized as effective tools to address systemic factors, combined pressures and cumulated impacts.

MAIN FACT 13

Pollution sources: investments and collaborations have addressed some major pollution sources and health hazards, but major challenges remain.

MAIN FACT 14

Adaptive policies: capacity to generate coherent, collectively usable and comparable knowledge is increasing based on common assessment frameworks and technology

KEY MESSAGES:
informed, transformative action for sustainable development.

Enforcement: enforce common and agreed objectives and commitments.

At regional level:

- Develop and test a set of criteria and associated indicators to assess compliance, including with the Barcelona Convention and its Protocols.
- Develop jurisdictional cooperation at the Mediterranean and subregional levels, including with regard to detecting and sanctioning intentional pollution from maritime transport through the Mediterranean Network of Law Enforcement Officials (MENELAS) relating to MARPOL.

At national level:

- Adopt the necessary provisions in national legislation to allow legal action.
- Strengthen cooperation between the judiciary and administrative bodies.
- Provide capacity building for the judiciary and administrative individuals and institutions.

At local level:

- Encourage existing management initiatives (e.g. Water Resources Management) and strategies (e.g. Integrated Coastal Zone Management) and networking.

Institutional capacity: raise the profile of environmental institutions and stakes.

At regional level:

- Strengthen ratification of the Barcelona Convention Protocols, particularly the Hazardous Wastes Protocol (7 ratifications), the Offshore Protocol (8 ratifications), and the ICZM Protocol (11 ratifications).
- Prepare the designation of the Mediterranean Sea as an Emission Control Area (ECA).
- Regulate emerging activities at sea and emerging pollutants.
- Integrate the mitigation hierarchy in regulations and programme design by sharing best practices and strengthening regulations.

At national level:

- Strengthen institutions towards the integration of environmental concerns within sectoral policies.
- Remove subsidies on non-renewable energies and groundwater extraction, targeting direct consumption support to the poorest and most vulnerable groups.

At local level:

- Expand stakeholder awareness and involvement through:
  - Public access to information and participation;
  - Education on sustainable development;
  - Gender parity: sustainable consumption and investment, livelihoods and economic development;
  - Full use of technological opportunities provided by the Internet through mobile devices and social networks;
  - Enforcement of the Environmental Impact Assessment (EIA) and its extension to the Strategic Environmental Assessment (SEA), including social assessment;
  - Economic assessments demonstrating the economic and social co-benefits of environmental actions, including nutritional information and labelling.
  - Strengthen the management capacities of local governments (municipalities) and technical agencies and their collaboration.

Local action: translate national and international commitments into local action adapted to the territorial context.

At national level:

- Set up appropriate mechanisms to mainstream international commitments into local planning through coordination between local administrations and central and decentralized sectoral technical services.

At local level:

- In the context of climate change, enhance the preservation and restoration of specific ecosystems, such as wetlands, peri-urban forests, healthy agricultural soils, and shallow seashore habitats such as Posidonia beds.
- Encourage networking between small Mediterranean islands, recognizing the unique features and value of these territories.
- Promote innovative local-level forms of governance with collective organization and citizen-led innovations in sustainable agriculture, aquaculture, fisheries, and ecotourism sectors, creating jobs and diversifying the economy.
- Promote the value chain approach (including the circular economy) to promote local products, i.e. labelling, and sustainable practices, and protect consumer health.

Transition towards a sustainable future: upgrade and diversify the policy mix.

At regional level:

- Identify plausible scenarios for a sustainable future following a participatory approach.
- Map out necessary measures and investments in the short, medium and long term to ensure a sustainable transition.
- During the implementation of the EcAp roadmap for achievement of GES in the Mediterranean, enforce the Common Regional Framework for ICZM, recommending the use of an integrated set of complementary and coordinated policy instruments, including monitoring and assessment, coordinated planning processes and governance mechanisms, dedicated funding mechanisms, land policy instruments, training, communication and information, and efficient enforcement systems.

At national level:

- Develop coordinated instruments through policy mixes, associating regulatory measures with economic instruments (fiscal measures, producer social responsibility, polluter-pays principle, public-private partnerships, etc.), awareness-raising and voluntary agreements, and sustainable land-use planning.
- Complete regulations and plans with appropriate funding mechanisms involving the private sector, including banks and insurance companies.
- Encourage investments and pricing for improving water-use efficiency, including wastewater recycling for irrigation or aquifer recharge while fostering demand prioritization through pricing policy, in particular in the agriculture sector.

At local level:

- Generate permanent funding for MPA operating costs, in particular encouraging private-public trust donor funds like the recently-created MedFund at a regional level.
- Promote innovative practices, more particularly for ecotourism development, waste reuse in a circular economy, toxic substance substitution, agroforestry, agroecology, sustainable fisheries and aquaculture, non-fossil sources of energy, etc.

Networking and co-construction: develop permanent collaborative frameworks.

At regional level:

- Promote the status and influence of the Mediterranean Commission on Sustainable Development (MCSD) and the creation of the Mediterranean Forum on Sustainable Development.
- Promote collaboration between stakeholder networks and regional institutions that have a complementary mandate.

At national level:

- Promote the establishment of national multi-stakeholder sustainable development committees, and national thematic science-policy interfaces.

At local level:

- Promote local and permanent partnerships between local authorities, the private sector, and civil society.

Foresight: anticipating the transformation of coastal and marine areas.

At regional level:

- Set up a robust and operational framework for managing international waters in the Mediterranean.
- Promote the development of large MPAs in international waters alongside the identification of Ecologically or Biologically Significant Areas (EBSAs).

At national level:

- To tackle the development of human activities at sea, including future biotechnology industries and underwater energy and minerals extraction, extend the approach and practices of ICZM to offshore waters through maritime spatial planning, including offshore MPAs.

At national/local levels:

- With regard to climate change impacts, design adaptive strategies to current and forthcoming sea level rise, coastal erosion, and coastal extreme events, including through the widespread use of Nature-based Solutions.

Useful knowledge: put existing knowledge to use.

At regional level:

- Promote science-policy interface (SPI) platforms like the MedECC scientific network on climate and environmental change to promote better-consolidated and user-ready knowledge resources.

At national level:

- Promote national observatories through the development of efficient data and output sharing platforms (e.g. coastal and sea national observatory).

At local level:

uPromote the combined use of scientific and local knowledge to solve local issues.

Monitoring: implement, sustain and expand common monitoring frameworks.

At regional level:

- Develop the IMAP common indicators system with appropriate data exchange protocols.
- Expand common indicator frameworks to cover the SDGs, as well as major environmental pressures and socioeconomic drivers.

At national level:

- Implement national monitoring programmes in line with IMAP, to fill priority knowledge gaps identified in the 2017 MED QSR.
- Further develop data collection and exchange at the watershed and local levels to ensure that data covers the entire Mediterranean basin.

At local level:

- Build up the means and capacity to collect and share data in support of local initiatives.

Transparency: document and communicate the stakes of environmental degradation and socioeconomic inequalities.

At regional level:

- Develop a guide to SDG interactions and peer review mechanisms in the Mediterranean context.

At national level:

- Evaluate key ecosystem services and socioeconomic impacts in relation to current and potential threats and environmental targets such as ecosystem preservation and restoration.

At local level:

- Through existing local platforms, co-document and communicate the stakes associated with degradation or increasing inequalities on environmental, social, and economic components.

Learning by doing: learning from experience sharing and peer review mechanisms for adaptive policies.

At regional level:

- Fully apply the Barcelona Convention comprehensive policy evaluation mechanism where the Contracting Parties commit to report ex post on measures taken for implementation of the Barcelona Convention and its Protocols (Article 26), and the Conference of the Parties evaluates compliance and recommends potential corrective measures (Article 27).

At national level:

- Invite all stakeholders and institutions to take evidence-based action embracing the different available data sources without delaying the implementation of critical measures when data is incomplete (precautionary principle).

At local level:

- Build up capitalization as part of project and programme processes, identifying key conditions and instruments needed for replicating and scaling up promising innovations.
- Conduct ex post evaluation considering practical achievements on the ground with practitioners to identify the lessons learned and policy adaptations needed during the project lifetime.

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