

4 Mediterranean Sea

Overview

The Mediterranean Sea is an intercontinental body of seawater enclosed between the 3 continents of Europe, Africa and Asia and bordered by 21 countries. It is one of the most popular tourist destinations in the world due to its beautiful landscape, mild climate and numerous beach resorts.

Location

Basic information^{1,7}

Surface area : 2,536,000 km²

Volume : 3,750,000 km³

Maximum depth : 5,150 m

Nature

< Background >

The Mediterranean is approximately 3,800 km wide from west to east and has a maximum north to south distance between France and Algeria of 900 km. Its only connection to the open (Atlantic) Ocean is through the narrow and relatively shallow Strait of Gibraltar, located between Spain and Morocco, which imposes a severe limitation on water exchange.

The Mediterranean Sea is also connected to the Black Sea via the Dardanelles Strait and the Sea of Marmara, and since the late 19th century, to the Red Sea by the Suez Canal.²

Mountain ranges (e.g. the Pyrenees, the Alps, the Dinaric Alps) are distributed along the northern side of the Mediterranean. Since these mountains slope steeply into the sea, the drainage basin of the north side is relatively small. Furthermore, since the southern side is mainly covered by desert and only a few large rivers (the Nile, Rhone, Po and Ebro) flow into the Mediterranean, these combined factors tend to limit freshwater input.³

Climate

The Mediterranean region forms a distinct climatic unit. The prevailing winds in this region are westerly, but during the winter the sea itself causes the formation of bands of low barometric pressure, making the winters warm and humid. During the summer, the region comes under the influence of the tropical high-pressure belt and the weather is very stable being hot and dry. The temperature in the Mediterranean region varies greatly, with annual means ranging from 14 °C to 25 °C. The Atlantic influence limits the average annual temperature to about 10 °C to 12 °C in the west, while it can reach 36 °C to 40 °C in the east.¹

Topography

The western basin is separated from the eastern by a bank crossing the strait between Sicily and Cape Bon, where water is no deeper than 366 m. Mean depth of the western basin is estimated to be 1,612 m, and the deepest sounding ever recorded is 3,733 m. In the eastern Mediterranean the maximum depth is 5,150 m, off the southern coast of Greece. The steepest slope observed is situated close to the island of Sapienza, near Navarino, where a depth of 4,978 m is reached only 10 miles from land. The mean Sicilian-Ionian sub-basin depth is 1,620 m, while the Levant sub-basin has a mean depth of 1,451 m.¹



Area of Mediterranean Sea by depth zone¹

Depth zone (m)	Area (km ²)
0–200	578,000
200–1,000	720,000
1,000–2,000	230,000
2,000–3,500	951,000
Over 3,500	57,000
Total	2,536,000

Basin volume and mean depth of sub-basins in the Mediterranean¹

	Basin Volume (km ³)	Mean Depth (m)
Western Mediterranean	1,357,000	1,612
Sicilian-Ionian basin	1,243,000	1,620
Levantine	1,117,000	1,451
Adriatic Sea	33,000	243
Total	3,750,000	

Hydrology

The water deficit, caused by greater evaporation than precipitation and river run-off, is mainly compensated for by the inflow of Atlantic water through the Straits of Gibraltar and by the water contribution from the Black Sea through the Straits of the Dardanelles. In winter, cold and dry air masses induce marked evaporation and direct cooling of incoming Atlantic water in the surface layer, resulting in a dramatic increase in its density, which makes it sink.²

< Surrounding environment >

Habitat

The Mediterranean coastline is approximately 46,000 km long. 54% of the coastline is rocky and 46% is sandy coast that includes important and fragile habitats and ecosystems such as beaches, dunes, reefs, lagoons, swamps, estuaries and deltas. Low-lying sedimentary coasts are more dynamic than rocky coasts. The balance between sea-level rise, sediment supply and wave and coastal current regimes will determine whether the coastline advances, remains stable, or retreats.

CORINE (COoRdinate INformation on the Environment) coastal data showed that, by the last years of the 20th century, 1,500 km of the EU Mediterranean coast had been transformed to "artificial coast" (mostly concentrated in the Balearic Islands, Gulf of Lion, Sardinia, and the Adriatic, Ionian, and Aegean seas). European harbors accounted for 1,237 km of this total (EC 1998).²

The Mediterranean coast has a variety of habitats such as seaweed floor, rock coast, estuaries, underwater canyons, deep-sea coral communities and seamounts.

One of the most important and productive habitats in the Mediterranean is large-scale seagrass meadows (*Posidonia oceanica*) which occur in depths less than 40 m of the western and eastern basins. These meadows serve as spawning and nursing grounds for many commercial species.²

Biota

Mediterranean coastal and marine biodiversity is high by all measures. The basin supports some of the richest fauna and flora in the world and the habitat-level diversity is extraordinary. It is recognized as one of the world's 25 top biodiversity hotspots, defined as areas with rich biodiversity, a large number of endemic species - species unique to the region - and critical levels of habitat loss. There are an estimated 10,000 to 12,000 marine species in the Mediterranean, comprising approximately 8,500 species of macroscopic fauna, over 1,300 plant species, and 2,500 species from other taxonomic groups.²

History and Culture

< History >

Some of the most ancient civilizations flourished around the Mediterranean. It was opened as a highway for commerce by merchants trading from Phoenicia (present-day Lebanon). Carthage, Greece, Sicily and Rome were rivals for dominance of its shores and trade; under the Roman Empire it became virtually a Roman lake. After the Romans, the Byzantine Empire and the Arabs dominated the Mediterranean. Between the 11th and 14th centuries, Italian city trading states, such as Genoa, Venice, and Barcelona, dominated the region. They struggled with the Ottomans for naval supremacy, particularly in the eastern Mediterranean. Products from Asia passed to Europe over Mediterranean trade routes until the establishment of a route around the Cape of Good Hope in the late 15th century.

With the opening of the Suez Canal in 1869, the Mediterranean resumed its importance as a link with the East. The development of the northern regions of Africa and the oil fields in the Middle East has increased trade in the Mediterranean. Its importance as a trade link and as a route for attacks on Europe resulted in European rivalry for control of its coasts and islands and led to campaigns in the region during both world wars. Since World War II the Mediterranean region has been of strategic importance to the United States and, until its dissolution, the Soviet Union.⁴

Social Environment

< Population >

The total population of the Mediterranean countries grew from 276 million in 1970 to 412 million in 2000 (a 1.35% increase per year) and to 466 million in 2010. The population is predicted to reach 529 million by 2025. Four countries account for about 60% of the total population: Turkey (81 million), Egypt (72 million), France (62 million), and Italy (60 million). Overall, more than half the population lives in countries on the southern shores of the Mediterranean, and this proportion is expected to grow to three quarters by 2025.

The Mediterranean region's population is concentrated near the coasts. The population of the coastal regions was 143 million in 2000, and it could reach 174 million by 2025. The concentration of population in coastal zones is heaviest in the western Mediterranean, the western shore of the Adriatic Sea, the eastern shore of the Aegean- Levantine region, and the Nile Delta.²

< Land use >

Almost 90% of the urbanized lands in the Mediterranean are located along the coasts of Spain, France, Greece, Italy and

the former states of Yugoslavia. Between large cities are tourist facilities, secondary residences for the citizens and recreation facilities. Consequently, few undeveloped areas remain along the northern side of the Mediterranean. Agricultural land is mainly concentrated in the coastal plains or former wetlands.^{3,5}

< Industry >

The major industries in the Mediterranean region are tourism, fisheries, agriculture, the oil industry and manufacturing.

Tourism

The Mediterranean basin, if considered as a single area, is by far the largest global tourism destination, attracting almost a third of the world's international tourists and generating more than a quarter of international tourism receipts. The bulk of the tourists are of European origin (81.1% in 2010) followed by Middle East tourists (6.4%) and those coming from the Americas (5.7%). Domestic tourism is also significant in the region. Of a total of 450 million visitors each year, including both domestic and international tourists, 100 million stay on the Mediterranean coast of their own host country. It is forecasted that the Mediterranean region will reach 500 million international tourist arrivals by 2030.²

Industry

Industry is frequently located along the region's coasts in areas with high population density, sometimes within urban centers, and often in close proximity to other economic activities like agriculture and tourism. However, the geographical distribution of industrial activities in the Mediterranean Basin is uneven, with most industry concentrated in the northwest, particularly in Italy, France, and Spain.²

Environmental Problems

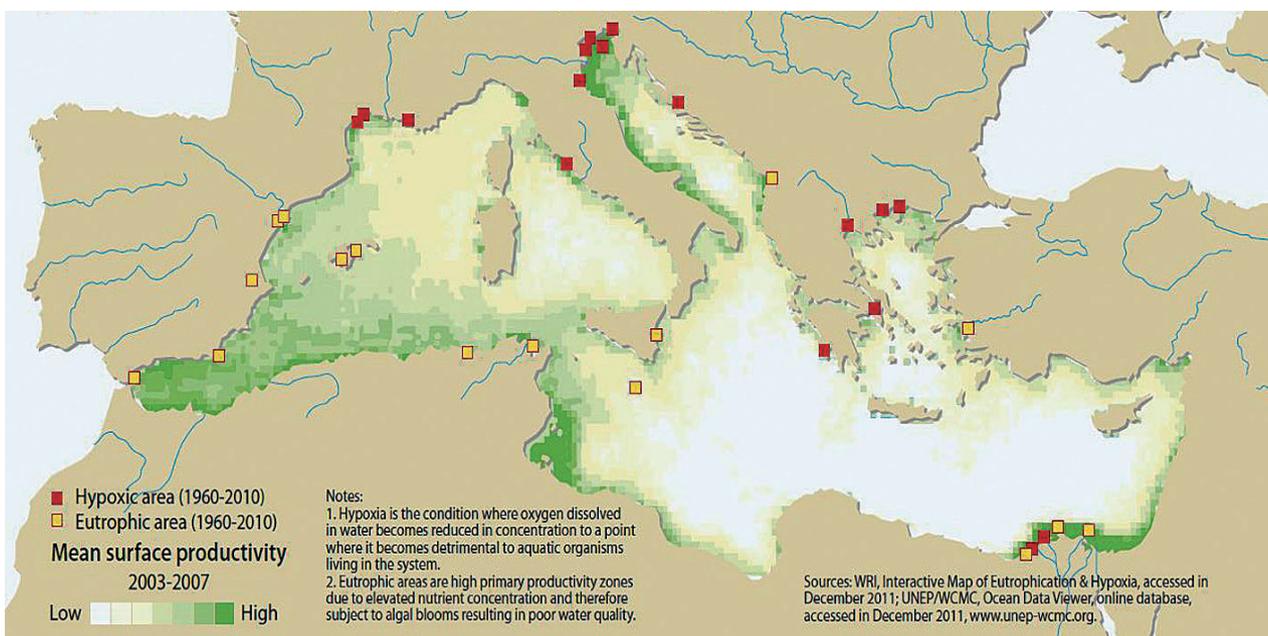
< Water and sediment quality >

The state of the Mediterranean's open water is generally good but the coastal areas are subject to various environmental problems, including eutrophication and, heavy metals, organic and microbial pollution. Land-based activities (urbanization, industry and agriculture) are considered to be the main sources of pollution.⁵

Eutrophication

Many Mediterranean nearshore areas are threatened by nutrient over enrichment due to coastal and watershed development. Municipal sewage is the main cause, followed by fertilizer run-off from agricultural areas, lawns and golf courses. The problem is particularly acute in shallow sub-basins with limited flushing, common features in parts of the Adriatic and along the Mediterranean's southern shore.

Agriculture is the largest non-point source of pollutants in the Mediterranean. Agriculture-related nutrients enter the sea through groundwater, lakes, wetlands, and rivers. Nitrogen consumption per surface unit of arable land is highest in countries of the northern watershed, with the exception of Bosnia-Herzegovina and Albania. In contrast, point-source release is highest on the eastern coast of the Adriatic. Other point sources of nitrogen are concentrated in the Ebro watershed, the eastern coast of the Levantine Basin and the western coast of Tunisia.



Mean surface productivity and eutrophic and hypoxic hot spots in the Mediterranean²

The most eutrophic areas of the Mediterranean are linked to the mixing of nutrients from deeper waters through intense mesoscale circulation, local tidal mixing, or the input and alongshore redistribution of nutrients from large rivers. In addition, high chlorophyll and productivity levels have been found near large urban areas.²

Heavy metals

In the Mediterranean countries, atmospheric emissions of metals are mostly related to the cement industry (mercury, copper), production of energy (arsenic, cadmium, nickel) and the metal industry (lead, zinc). Water pollution appears to be mostly related to the fertilizer industry (mercury, arsenic, lead), metal industry (nickel, zinc) and wastewater treatment plants (cadmium, copper), with important contributions also from the energy sector and the chemical industry.

Aside from direct discharges from urban and industrial sources, rivers and streams are the major contributors of metals of anthropogenic and natural origin to coastal areas,²

Persistent Organic Pollutants (POPs)

POPs include certain chlorinated pesticides and industrial chemicals such as polychlorinated biphenyls (PCBs), most of which have already been prohibited in Mediterranean countries. However, POPs can also be unintentionally released, mainly as a result of combustion processes or as by-products in some industrial processes. Some examples are dioxins and furans, hexachlorobenzene (HCB), PCBs, or polycyclic aromatic hydrocarbons (PAHs).²

< Other Environmental Problems >

Marine Litter

A large proportion of marine litter is plastics. More attention is now being given to the impact of microplastics from such primary sources as feedstock in the plastics industry and from the breakdown of larger plastic items.

Around the world, marine litter kills more than a million seabirds and 100,000 marine mammals and turtles every year. The most significant effects come from entanglement in or ingestion of marine litter, especially plastics. Sea turtles in the Mediterranean, already seriously endangered through habitat loss and by catch, are further threatened by plastic marine litter which they mistake for their main prey, jellyfish, and swallow. The plastic can become lodged in the turtle's gastrointestinal tracts, resulting in injury or death.²

Marine Noise

Underwater noise is a growing concern in the Mediterranean due to increasing maritime activity, particularly in the Western Mediterranean. Underwater noise affects the communication and behavior of marine mammals and certain fishes. Noise from human activities can drown out the sounds that the animals rely on for communication and orientation, sometimes with serious effects, even death. There is growing evidence that fish may also be negatively affected by noise. Possible impacts include impaired communication, stress, habitat abandonment, hearing loss, and damage to eggs.²

< Environmental Protection Measures >

Barcelona Convention

The main regulatory instrument aimed at the protection of the Mediterranean marine and coastal environment is the "Barcelona Convention" which entered into force in 2004 replacing the 1976 "Convention for the Protection of the Mediterranean Sea Against Pollution".

The Barcelona Convention's main objectives are "to prevent, abate, combat and to the fullest extent possible eliminate pollution of the Mediterranean Sea Area" and "to protect and enhance the marine environment in that Area so as to contribute towards its sustainable development." Under the Barcelona Convention, protection of the marine environment is pursued "as an integral part of the development process, meeting the needs of present and future generations in an equitable manner." Today all 21 countries surrounding the Mediterranean Sea, as well as the European Union, are Contracting Parties to the Barcelona Convention.²

Mediterranean Strategy for Sustainable Development (MSSD)

The Contracting Parties to the Barcelona Convention also adopted in 2005 the Mediterranean Strategy for Sustainable Development (MSSD), which results from a consultation process that mobilized most Mediterranean stakeholders including governments and civil society such as NGOs and key experts. The purposes of the Strategy are to: contribute to economic development while building on Mediterranean assets; reduce social disparities and fulfill MDGs while strengthening diversity; ensure sustainable management of natural resources and change consumption and production patterns; and improve governance at local, national and regional levels.²

Related organizations and NGO

- MEDCOAST <<http://www.medcoast.org.tr/>>
- MEDASSET <<http://www.euroturtle.org/medasset/>>
- UNEP Mediterranean Action Plan <<http://www.unepmap.org/index.php>>

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