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POST-2020 SAP BIO

CONSERVATION OF MARINE AND COASTAL BIODIVERSITY IN THE WESTERN MEDITERRANEAN SUB-REGION BY 2030 AND BEYOND

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CONSERVATION OF MARINE AND COASTAL BIODIVERSITY IN THE WESTERN MEDITERRANEAN SUB-REGION BY 2030 AND BEYOND

SUB-REGIONAL REPORT OF THE POST-2020 SAPBIO

POST-2020
SAP BIO

Strategic Action Programme
for the **Conservation** of **Biodiversity**
and **Sustainable Management**
of **Natural Resources**
in the **Mediterranean Region**

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List of Acronyms

ACCOBAMS	Agreement on the Conservation of Cetaceans of the Black Sea, the Mediterranean and the adjacent Atlantic area
AEWA	Agreement on the Conservation of African-Eurasian Migratory Waterbirds
OECM	Other Effective Conservation Measures by Areas
PA	Protected Area
SPA	Specially Protected Areas
BD	Biodiversity
MCBD	Marine and Coastal Biodiversity
BC	Barcelona Convention
CC	Climate Change
UNFCCC	United Nations Framework Convention on Climate Change
CBD	Convention on Biological Diversity
GFCM	General Fisheries Commission for the Mediterranean
CMS	Conservation on Migratory Species
IOC	Unesco Intergovernmental Oceanographic Commission
COP	Conference of the Parties
MSFD	Marine Strategy Framework Directive
EBSAs	Ecologically or Biologically Significant marine Areas
ECAP	Ecosystem Approach
RSL	Rise of the Sea Level
FAO	Food and Agriculture Organization
GEF	Global Environment Facility GEF
IBA	Important Bird and Biodiversity Area
ICCAT	International Commission for the Conservation of Atlantic Tunas
IMAP	Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast
IUU	Illegal, Unreported and Unregulated Fishing
MSP	Marine Spatial Planning
MSFD	Marine Strategy Framework Directive
SDGs	Sustainable Development Goals
OEACM	Other effective area- based conservation Measures
MDGs	Millennium Development Goals
NGO	Non-Governmental organization.
UN	United Nations
RFMO	Regional Fisheries Management Organizations
MAP	Mediterranean Action Plan.
SAPBIO	Strategic Action Programme for the conservation of biological diversity in the Mediterranean region
MSP	Marina Spatial Planning
NCP	National Climate Plan 2020-2030
FP	Focal Point
MFP /GEF	Micro-Financing Programme of the Global Environment Facility
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
SEIS	Shared Environmental Information System
SPA/RAC	Specially Protected Areas Regional Activity Centre
WWF	World Wide Fund for Nature
EBSA	Marine Area of Ecological or Biological importance

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Executive Summary

The development of the Post-2020 SAPBIO follows a bottom-up and participatory approach. National SAPBIO reports, drawn up on the basis of available data and information, served as a basis for the preparation of the sub-regional SAPBIO reports. The Post 2020 SAPBIO will be developed through the compilation of the results of national processes and sub-regional consultations.

This sub-regional report concerns the Western Mediterranean, bringing together Algeria, Spain, France, Italy, Morocco, Monaco and Tunisia. Its main objective is to (1) summarize the situation of marine and coastal biodiversity in the sub-region as well as existing or potential threats, including interaction with fishing, (2) identify priorities for the sub-region, in terms of conservation and sustainable use of marine and coastal biodiversity and (3) promote complementarity and harmonization of priority actions identified at the national level, in particular for cross-border issues.

The Western Mediterranean, with the influence of the Atlantic and its wide range of physico-chemical conditions, is considered to be the richest part of the Mediterranean with 87% of life forms known in the Mediterranean. Likewise, endemic species are more abundant. Knowledge of the marine and coastal species and ecosystems of the Western Mediterranean varies from country to country, and between neritic and deep waters. The continental shelf (0 to 200 m depth) is better known than the deeper areas.

In general, national reports note a great disparity between the northern shore and the southern shore of the Western Mediterranean in terms of inventories, mapping and ecological monitoring. There is a better knowledge of marine and coastal biodiversity in the European countries of this basin. However, in the southern countries (Algeria, Morocco and Tunisia), many inventories and maps have been carried out in recent years as part of regional projects such as the MedKeyHabitats project. The significant efforts in terms of ecological monitoring in European countries are linked to the obligations of these countries vis-à-vis several European Directives, in particular the MSFD, Habitats and Birds directives. These countries all have monitoring programmes for the evaluation of GES. This is also the case for countries of the southern shore that have prepared in recent years, within the framework of the ecosystem approach, their national IMAP programmes.

At the level of the Western Mediterranean countries, the level and quality of national activities can be summarized as follows:

- In **Algeria**, the knowledge of the marine ecosystem is heterogeneous. The country joined the main regional (e.g., Barcelona Convention) and international (CBD, Ramsar, etc.)

conventions and treaties. The country also developed its national IMAP programme under the ecosystem approach, but the state of progress is insufficient. The country declared MPAs and SPAMIs whose management needs improvement. Knowledge of marine and coastal biodiversity has improved markedly in recent years but remains limited;

- **Spain** made enormous progress in knowledge of marine and coastal biodiversity during the decade 2010-2020. MPAs are now covering 28.8% of Mediterranean waters in the country which is committed to protecting 30% of marine waters by 2030. The legal and institutional framework for marine conservation in Spanish Mediterranean waters is reasonably comprehensive and in accordance with the provisions of the Barcelona Convention. However, many needs have been identified;

- In **France**, the French Mediterranean seafront offers immense potential which must be preserved and developed. The coastal strip concentrates 90% of the permanent and seasonal population there. There are currently many threats to its natural heritage, mainly fishing, pollution, urbanization, etc. The institutional and legislative frameworks are satisfactory. France has extensive experience in monitoring the marine environment and assessing its ecological state. Many MPAs and SPAMIs have been declared by the country but management is not always satisfactory;

- **Italy** has a long experience in marine and coastal biodiversity. It has developed an efficient and comprehensive surveillance system. Also, the legislative framework and policies comply with EU requirements. The measures implemented by Italy are generally appropriate and effective, but enforcement, especially at the local level, is not always effective. The MPA system is well defined at the regulatory level and covers more than 10% of the country's marine surface, meeting Aichi Target 11. The implementation of MSP and ICZM is well advanced. Cross-border cooperation already exists in the Western sub-basin. However, many shortcomings have been identified and many challenges remain to be faced in the years to come in terms of knowledge and management of marine and coastal biodiversity.

- **Morocco** joined all regional and international initiatives in the field of biodiversity conservation and sustainable development and its institutional and legislative framework is continuously improving. Knowledge of the marine and coastal biodiversity (species and habitats) of the Mediterranean coast of the country has been significantly improved in recent years within the framework of regional projects. The country has only one officially declared MPA in the Mediterranean and other potential ones are identified. Morocco has drawn up its national IMAP plan, the implementation of which needs financial support. Management remains ineffective and national funding is insufficient.

- **Monaco** has the shortest coast in the Western Mediterranean. The country has developed a national strategy for biodiversity which is currently being validated. The Principality's policy for the sustainable management of coastal resources is based on the creation of two marine protected areas, listed as Marine Protected Areas, and all of the country's marine space is covered by the Pelagos Sanctuary. Finally, because environmental protection may prove insufficient, the Principality has also implemented actions aimed at restoring and repopulating the maritime coast.

- **Tunisia** has many MCPAs and SPAMIs. The legal system is weak with delays in the implementation of the provisions of the Law on MCPAs. Knowledge of marine and coastal biodiversity is satisfactory in areas classified as MCPA and lacking in other sectors of the country. The country has developed its national biodiversity conservation strategies and action plan, but their marine components need to be further developed. Many needs have been identified as part of the Post 2020 SAPBIO national report. The involvement of NGOs in the co-management of Tunisia's MCPAs is relatively advanced.

The main threats and pressures identified in the Western Mediterranean relate to:

- Biological disturbances linked to invasive non-native species, harmful pathogens and phytoplankton blooms;

- urbanization and extension of the territory, particularly important in the western Mediterranean, especially on the north shore and more localized on the south shore;

- the impacts of fishing manifested by habitat destruction, bycatches, over-exploitation of resources and discharges;

- maritime traffic, the pressures of which mainly include potential accidental and illicit discharges of oil and noxious and potentially dangerous substances (HNS), marine litter, water discharges and hull fouling, atmospheric emissions from ships, underwater noise, collisions with marine mammals, grounded connections by port facilities and anchoring.

- pollution in various forms: chemical contamination, noise pollution, light pollution and marine litter;

- climate change which has three main consequences for the marine and coastal environment: (1) the increase in the sea surface (rise in sea level), (2) the increase in the concentration of seawater in carbon dioxide and (3) the rise in seawater temperature.

- However, the cumulative effects of these threats remain poorly studied in the region.

Spatial protection measures in the Western Mediterranean are responses to national, regional (Mediterranean-wide) and international conservation instruments. They take different names, such as Ramsar sites (Ramsar Convention), Natura 2000 sites (Habitat Directive), vulnerable marine ecosystems (CBD's VME), Particularly Sensitive Sea Areas or Biosphere Reserves and World Heritage Sites (UNESCO RB and WHS); or regional, such as the GFCM's Restricted Fishing Areas.

Marine Protected Areas (MPAs) are recognized worldwide as tools for the conservation of marine and coastal biodiversity. All countries of the western basin have officially declared MPAs within the framework of the Barcelona Convention. In the European countries of the Western Mediterranean (Spain, France, Monaco and Italy), the area of protected areas (including Natura 2000 sites) is more than 10% of their maritime area while it is less than 3% in the countries of the southern shore (Algeria, Morocco and Tunisia). Furthermore, not all potential OECM are officially characterized or included in national reports to international or

regional instruments. National and international sources of funding remain insufficient and do not meet the real needs in terms of monitoring and conservation of marine biodiversity in the countries of this basin. Cross-border cooperation on various aspects (monitoring, non-native and invasive species, adaptation to climate change, etc.) is strongly encouraged by all the countries of the Western Mediterranean.

Biodiversity and the sustainable use of natural resources are a major issue for all the countries of the Western Mediterranean. This is clearly reflected in all their national strategies and initiatives. All the countries of the Western Mediterranean have expressed, in their Post-2020 SAPBIO national reports, their needs and have proposed priority actions.

This holistic diagnosis revealed inadequacies at several levels in national and sub-regional achievements. The priority needs identified in this report are multiple and take the form of recommendations that can are a framework for Post-2020 priority actions beyond 2030.

Priority actions for the Western Mediterranean are organized into nine strategic axes:

- **Improving knowledge on biodiversity (7 actions):** Improving knowledge on marine species and habitats (distribution, trends, responses to impacts, etc.) is fundamental to establish a reliable diagnosis of marine and coastal biodiversity in the western basin and riparian countries.

- Spatial protection measures (9 actions): The spatial protection measures (MPAs and OECMs) must be representative, well managed and a coherent network in the Western Mediterranean;

- IMAP programme and assessment of Good Ecological Status (6 actions): The IMAP programme, developed within the framework of the ecosystem approach, should allow an adequate assessment of good ecological status based on solid scientific data and aligned monitoring programmes and therefore comparable from one country to another;

- **Spatial planning (2 actions):** ICZM and MPS can be seen as a strategic planning process, implemented through a coherent and agreed framework that allows integrated, forward-looking and coherent decision-making on the spatial use of the sea.

- **Mitigation of current pressures and threats (21 actions):** Achieving GES necessarily involves actions to mitigate the pressures reported in the Western Mediterranean.

- **Capacity building (2 actions**): national capacity building is important for effective management of MPAs;

- **Cross-border needs (6 actions):** cross-border actions are able to improve knowledge and strengthen the management and conservation of marine biodiversity at the sub-regional level;

- **Integration of biodiversity into other sectors (3 actions):** The participatory approach is a priority axis in national strategies and action plans in the area of biodiversity and

sustainable development. The involvement and support of civil society in the objectives of MPAs requires awareness-raising, information, communication and education. Citizen science has proven to be a good example of civil society involvement in ecological observation and monitoring in many MPAs around the world.

- **Sustainable funding (3 actions):** All conservation-related activities must be supported by sufficient funding, which implies better use of the already available funds, but also the search for new funding mechanisms, such as public-private partnership.

All these actions could be linked to regional (EU biodiversity strategy for 2030, EcAp, PEM, ACCOBAMS, CGPM, etc.) and global (post-2020 CBD global biodiversity framework).

1. Introduction

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Considering the conclusions and recommendations of the evaluation of the SAPBIO 2003 programme, on the one hand, and the developments in the Mediterranean Action Plan (MAP) - Barcelona Convention (BC) since the adoption of this programme, on the other hand, the contracting parties to the BC requested the Secretariat to prepare the "Post-2020 Strategic Action Programme for the conservation of biodiversity and sustainable management of natural resources in the Mediterranean region" (SAPBIO post-2020). The elaboration process is expected to be carried out during the 2020-2021 bi-annual exercise to submit the post-2020 SAPBIO for consideration by the Contracting Parties at their 22nd meeting (COP 22).

The post-2020 SAPBIO should allow Mediterranean countries to respond to national challenges, and to the objectives of regional strategies, for European countries (Strategy Framework Directive for the Marine Environment (MSFD), Habitat Directive, etc.), and international ones for all countries, the 2030 agenda for sustainable development and the sustainable development goals (SDGs) and the post-global biodiversity framework 2020 of the CBD.

The development of the post-2020 SAPBIO follows a bottom-up and participatory approach, starting with the preparation of national reports which are developed on the basis of the available data and information and using, if possible, any recent analysis carried out in relevant frameworks such as those relating to national biodiversity strategies or the Ecosystem Approach (EcAp) process. For member countries of the European Union, the analyses and evaluations carried out in the framework of the implementation of the MSFD were also very useful in this regard. National SAPBIO reports, reviewed and validated as part within theframework of national workshops bringing together stakeholders playing an active role in the planning and/or implementation of measures relating to the conservation and the sustainable use of marine environment and the components of marine and coastal biodiversity, served as a basis for the preparation of the sub-regional SAPBIO reports. post-2020 SAPBIO will be developed through the compilation of the results of national processes and sub-regional consultations. It will indicate the objectives to be achieved at the regional level and will integrate the priority actions identified at the national and sub-regional levels. In addition, it will propose the necessary actions at the regional level to support and coordinate the implementation of the priority actions to be implemented by the countries at the national level.

This sub-regional report relates to the Western Mediterranean, bringing together Algeria, Spain, France, Italy, Morocco, Monaco and Tunisia. Its main objective is to (i) summarize the situation of marine and coastal biodiversity in the sub-region as well as existing or potential threats, including interaction with fisheries and (ii) identify priorities for the sub-region in terms of conservation and sustainable use of marine and coastal biodiversity and (iii) promote complementarity and harmonization of priority actions identified at the national level, particularly for cross-border issues.

2. Methodology

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This sub-regional report relates to the Western Mediterranean. Its key objective is to identify the priorities and the orientations of marine and coastal biodiversity conservation in the sub-region from diagnoses made at the national level in the countries of the sub-region.

The preparation of this document is based mainly on a documentary base. The most relevant documents used for the preparation of this sub-regional report are mainly the national reports drafted in 2020 within the framework of the post-2020 SAPBIO under the leadership of SPA/RAC by each of the seven countries of the Western Mediterranean: Algeria, Spain, France, Italy, Morocco, Monaco and Tunisia. The national reports contain, among other things, an analysis of the current state, pressures, responses and needs identified as well as future priorities. These reports, drafted by national experts, were finalized and validated after national workshops with the relevant stakeholders.

In addition to national reports, other documents of regional scope were consulted.

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Key biodiversity values and their current state

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3.1. Main physical characteristics of the sub-region

The current Mediterranean is mainly subdivided into two basins. The eastern basin, the most extensive with an area of approximately 1.65 million km², and the Western basin, with only an area of 0.85 million km² (Coll *et al*., 2011).

The Western Mediterranean, separated from the Eastern part by the Strait of Sicily (about 400 m deep), is delimited by the European coasts of Spain, France, Monaco and Italy, and by the North African coast of Morocco, Algeria and Tunisia. One distinguishes a set of sub-basins: the Sea of Alboran (with an area of about 70,000 km^2) between Spain and Morocco, the Algerian-Provençal sub-basin also called the Balearic sub-basin (an area of approximately 700,000 km²) and the Tyrrhenian Sea (an area of approximately 250,000 km²).

The Mediterranean has a narrow continental shelf and a large area of high seas. Therefore, a large part of the Mediterranean basin can be classified as a deep sea. In the Western Mediterranean, the maximum depths are around 2,200 m in the Alboran Sea, 2,900 m in the Algerian- Provençal sub-basin and 3,500 m in the Tyrrhenian Sea. The continental shelf width is not homogeneous across countries, which obviously has an impact on the natural productivity and types of fishing practiced in coastal areas.

The western Mediterranean sub-region is characterized by exchanges with the North Atlantic via the strait of Gibraltar, 15 to 30 km wide for an average depth of 300 m. In terms of hydrology and general circulation in the Western basin, there are mainly four water masses: Modified Atlantic Water (MAW) with a salinity of around 38, Intermediate Water Winter (*WIW*) with cold characteristics (around 12.6° C) formed in Winter generally in the north of the Algerian-Provencal basin, Levantine Intermediate Water (*LIW*) formed in winter in the eastern basin and which enters the Western Mediterranean through the Strait of Sicily (temperature of about 13.9° C and salinity of about 38.75 psu) and the *Western Mediterranean Deep Water* (*WMDW: Western Mediterranean Deep Water*) which lines everything the western basin and is characterized by a temperature of about 12.8 ° C and a salinity of about 38.45. Evaporation is higher in the eastern basin, resulting in a drop in water level and an increase in salinity from west to east. The resulting pressure gradient pushes the relatively cold, low-salt water from the Atlantic across the Mediterranean basin. This water warms up towards the east, where it becomes saltier and sinks into the Levantine Sea before flowing west and out through the Strait of Gibraltar (Coll *et al*. 2010).

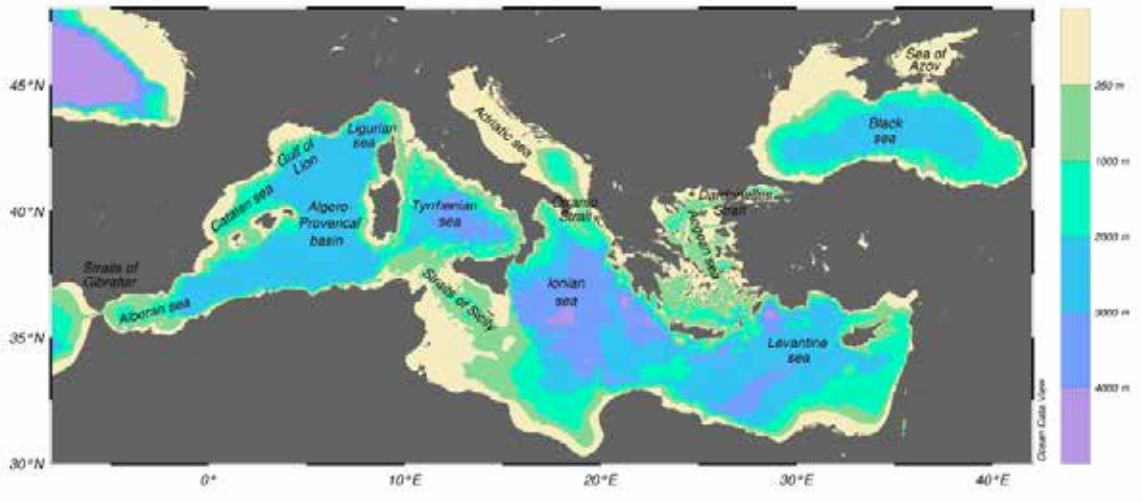


Figure 1.
Main seas, connecting straits and topography of the bottom of the Mediterranean Sea (Siokou-Frangou *et al*. 2010).

3.2. Biological characteristics

The knowledge of Mediterranean marine species and ecosystems varies from country to country, and between neritic and deep waters. The continental shelf (0 to 200 m deep) is better known than the deeper areas (UNEP / MAP and Plan Bleu, 2020). Deep-water areas and parts of the southern and eastern region are still poorly understood (Coll *et al*. 2010).

In terms of species diversity, the western Mediterranean, with the influence of the Atlantic and its wide range of physicochemical conditions, is considered to be the richest part of the Mediterranean with 87% of known life forms in the Mediterranean. Similarly, endemic species there are many more uses.

3.2.1. Benthic habitats

The complexity of the ecology of the Mediterranean Sea can be mainly attributed to its geological history, combined with the various climate conditions that characterize its different areas and sub-regions. All these factors have led to the coexistence of many ecosystems whose extent and distribution are very varied (UNEP / PAM and Plan Bleu, 2020).

The coastal and marine ecosystems of the Western Mediterranean are very diverse in both the benthic and pelagic domains.

The sea-continent interface contains many wetlands, especially coastal lagoons, which are among the most productive ecosystems on the planet. They are ecosystems of global interest for the conservation of biodiversity.

The coastal zone is also home to a wide range of ecosystems, some of which are unique in terms of structure and function. The most typical habitats are the *Lithophyllum byssoides* rims, seagrass beds of marine phanerogams among which one species is endemic to the Mediterranean (*Posidonia oceanica*), fucal forests (e.g. *Cystoseira*) and the coralligenous. To these habitats are added Vermitid platforms, Neogoniolithon brassica-florida concretion and sea caves.

Deep-water benthic systems (assembling of deep-sea corals, canyons, etc.) are key components of marine ecosystems that generate habitats for fish and invertebrate communities and act as hotspots for marine biodiversity. However, the information about deepwater habitats in the southern part of the basin is very incomplete or missing.

3.2.2. Biological communities of water column

Studies on phytoplankton remain more developed in the northern western Mediterranean compared to the countries on the southern shore of this basin. The available data do not allow us to have a global idea of the distribution patterns of this biological component over the entire western basin.

The trophic state of the Mediterranean Sea ranges from oligotrophic in the western Mediterranean to ultra-oligotrophic in the eastern Mediterranean. Primary production is on average three times lower in the eastern basin than in the western part. In the euphotic zone, primary production is respectively 40, 78 and 155 (mgC / m²) in the eastern, central and western basins. In addition to the west-east decrease, a decreasing gradient chla from north to south is also evident from satellite data and studies *in situ* in Eastern and Western basins.

The main source of nutrients in the Mediterranean is found in surface waters of the Atlantic near the Strait of Gibraltar. Other sources of nutrients exist in the Mediterranean, but they have localized and rather low impacts. One of these is the flow of surface waters from the Black Sea into the Aegean Sea, the influence of which is limited to the northern Aegean Sea; a second source is the Po River, which flows into the Adriatic on its western coast. The most eutrophic waters of the western basin are found on the north shore, at the mouths of the great rivers of the Rhône and the Ebro.

In the context of the WFD (and therefore also in the context of the DSMP), the composition and abundance of phytoplankton are not used for assessment purposes and therefore common measures or consolidated approaches have been defined mainly based on chlorophyll-a which is a good proxy for primary production.

Mediterranean and global zooplankton communities are dominated by copepods, both in terms of taxonomic diversity and abundance of individuals (Kiørboe, 2011; Siokou-Frangou

et al., 2010). As with microalgae, smaller species (<2 mm) predominate in communities, regardless of the trophic regime (Siokou-Frangou *et al*. 2010). Most of the zooplankton include a wide variety of calanoids and cyclopoids. The relative contribution of small cyclopoids is believed to increase with the west-east oligotrophy gradient, while larger species are more abundant in cooler and more productive areas (Siokou-Frangou *et al*. 1997). Some 470 species of zooplankton have been recorded in the Mediterranean (coastal and offshore waters). The abundance of zooplankton biomass testifies to the oligotrophic increase observed from the west to the east of the Basin.

Copepods frequently contribute to more than 80% of the total abundance of mesozooplankton in different regions of the Mediterranean Sea (Mazzocchi *et al*., 2014). Copepods are a diverse and relatively well-studied group (Razouls, de Bovée, Kouwenberg & Desreumaux, 2005-2017) for which relevant functional traits have been described (Brun, Payne, & Kiørboe, 2017).

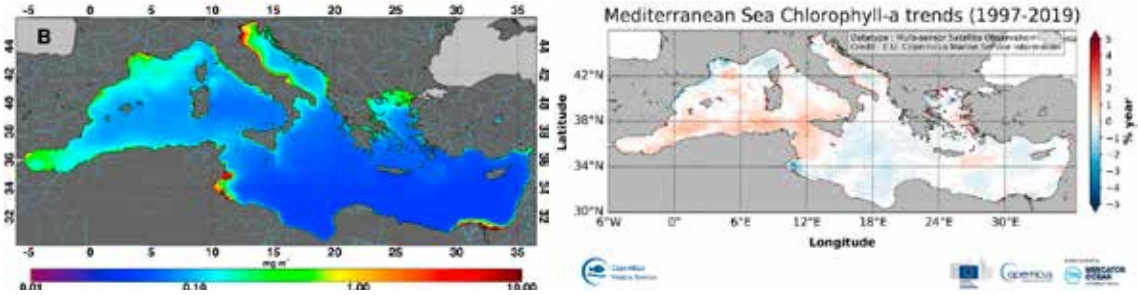


Figure 2.
(A) Concentrations of chlorophyll-a in the Mediterranean between 1998 and 2009 (Colella *et al*., 2016). (B) Trend of chlorophyll a in the Mediterranean Sea over the period 1997-2019; trends are expressed in% per year, with positive trends in red and negative in blue.

3.2.3. Information on bottom invertebrate fauna, macroalgae and angiosperms

There are five species of seagrasses in the Western Mediterranean Sea: one is endemic (*Posidonia Oceanica*), three are also found in the Atlantic Ocean (*Cymodocea nodosa, Zostera marina and Zostera noltei*) and one is a non-native species (*Halophila stipulacea*). In brackish water, one finds mainly *Potamogeton* pectinatus, *Ruppia cirrhosa, Ruppia maritima, Ruppia rostellata* and *Althenia filiformis* newly cited in Tunisia.

On a Mediterranean scale, the total number of macroalgae is estimated at around 1,131 species including 277 brown algae (17.3% of global diversity), 657 red algae (10.6% of the world), 190 green algae (7.6%) and 7 marine phanerogams (11.7%). The western Mediterranean presents a notable homogeneity with levels of similarity greater than 70% between the different riparian countries of this basin. Although on a large scale there are no significant discontinuities, on a smaller scale, certain areas (Albora Sea, Strait of Messina, North African coasts), are characterized by a flora with marked Atlantic affinities. In the colder areas of the Western Mediterranean there are algae with boreal affinity. In some

areas like the Alboran Sea and the Strait of Messina, currents and cold waters upwelling favor the presence, mostly relics, of species from the European Atlantic and North Africa, as an example, some *Cystoseira (C. tamariscifolia* or *C. usneoides*), *Laminaria ochroleuc Saccorhiza polyschides*, and *phyllariopsis purpurascens*. Most of the endemic Mediterranean species are neo-endemics including several species of the genus *Cystoseira*, considered a key genre, with 21 endemic species in the Mediterranean. However, unlike other species of this genus, the paleoendemic species *Caulerpa Cystoseira sedoides*, confined to the coasts of Algeria, Tunisia and the island of Pantelleria, can be considered as paleoendemic (Giaconne, 1991). Another paleoendemic species is the algae *Laminaria rodriguezii*.

The Western Mediterranean is also home to a rich fauna of marine invertebrates among which several species are of conservation interest and are listed in Annexes II and III of the SPA / BD protocol. These species include the gastropod mollusc Patella ferruginea, which is currently endemic to the Western Mediterranean, the bivalve mollusk Pinna nobilis, the anthozoan Corallium rubrum, etc. Other species are also listed in the IUCN Mediterranean threatened species lists such as Corallium rubrum (EN), Dendrophyllia ramea (VU), Paramuricea clavata (VU) and Elisella paraplexauroides (VU).

3.2.4. Information on the distribution and populations of vertebrates other than fish species

There is a great disparity in the overall distribution of the research effort on mammals, turtles and seabirds. Most of the research concerns the northwestern part where long data sets exist. In the south, the information of Mediterranean countries on the presence and the distribution of species come mainly from localized research projects and the followup of strandings The current gap in the availability of data, and therefore knowledge, hinders the identification of protective measures for the conservation of species at the sub- regional level.

Sea turtles

Of the seven living species of marine turtles, two (the green turtle *Chelonia mydas* and the loggerhead turtle *Caretta cartta*) are commonly found and nest in the Mediterranean, and one (the leatherback turtle *Dermochelys coriacea* - Dermochelyidae) is regularly observed but there is no evidence of nesting sites. The other two (hawksbill turtle *Eretmochelys imbricata* and Kemp's turtle *Lepidochelys kempi* - Cheloniidae) are extremely rare and are considered wanderers in the Mediterranean (Coll *et al*. 2010).

Table 1.

Species of marine turtles observed in the Western Mediterranean (Coll *et al*. 2010 modified)

Scientific names	English name	Distribution Mediterranean Occiden tale	IUCN Status	Occurrence
Caretta caretta	Loggerhead turtle	Across the Western Mediterranean. Nest on some beaches of the coasts of North Africa.	EN	Resident
Chelonia mydas	Green turtle	Nest mainly in the eastern Mediterranean, while areas off northern Africa are important for food. Sightings are recorded in the western Mediterranean.	EN	Resident
Dermochelys coriacea	Leatherback turtle	Regularly visits the Mediterranean although they do not have a permanent nesting colony. Observations in the western Mediterranean.	CR	Visitor
Eretmochelys imbricata	Hawksbill turtle	Few sightings in Marseille, Albania, southern coast of Sicily, Malta	DD	Visitor
Lepidochelys kempi	Kemp›s ridley turtle	Few sightings in Spanish waters, Malta and France	DD	Visitor

Marine mammals

Many species of marine mammals visit the Western Mediterranean. Some are residents and others are visitors. Some of these species are distributed mainly in the Western Mediterranean (*Globicephala melas, D elphinus delphis, Orcinus orca, Balaenoptera physalus, Stenella coeruleoalba*).

Table 2.

Species of marine mammals (in alphabetical order) observed in the Mediterranean (source: Coll *et al* 2010 modified).

Scientific names		English name		Distribution in the Mediterranean	IUCN Status	Occurrence
Balaenoptera physalus	Fin whale	From the Balearic Islands to the Ionian Sea. Mainly abundant in the Corso-Ligurian basin and the Gulf of Lions	DD *	Resident		
Balaenoptera acutorostrata	Common minke whale	Observations mainly in the western Mediterranean	N/A*	Visitor		

** DD = Data Deficient, NA = Not Assessed, VU = Vulnerable, EN = Endangered, CR = Critically Endangered*

Scientific names		English name	IUCN Status	Occurrence
Balaenoptera borealis	Sei whale	Observations in Spain and France	N/A*	Visitor
Delphinus delphis	Short- beaked common dolphin	Common dolphin in the past, but today it is only common in the western Mediterranean	EN*	Resident
Eubalaena glacialis	North Atlantic right whale	Observations in Algeria and Italy	N/A*	Visitor
Hyperoodon ampullatus	Northern bottlenose whale	Sightings in France and in Spain	N/A*	Visitor
Globicephala melas	Long- finned pilot whale	Mainly in the western Mediterranean, particularly abundant in the Alboran Sea and the Gulf of Vedra	DD *	Resident
Grampus griseus	Risso's dolphin	Higher concentration in the Ligurian-Corsican-Provençal basin but also present in the Balearics, the Alboran Sea , the Ionian Sea and the Aegean Sea	DD *	Resident
Kogia sima	Dwarf sperm whale	Two observations in Italy	N/A*	Visitor
Megaptera novaeangliae	Humpback whale	Across the basin, particularly in Italy, Greece and France	N/A*	Visitor
Mesoplodon bidens	Sowerby's beaked whale	Observations in France and Italy	N/A*	Visitor
Mesoplodon densirostris	Blainville's beaked whale	Observation in Spain	N/A*	Visitor
Mesoplodon europaeus	Gervais› beaked whale	Observation in Italy	N/A*	Visitor
Monachus monachus	Mediterranean monk seal	Formerly present throughout the Mediterranean and the Black Sea. This species is now limited to a few Greek Islands and Turkey, and occasionally visits other sites especially in North Africa.	CR *	Resident

** DD = Data Deficient, NA = Not Assessed, VU = Vulnerable, EN = Endangered, CR = Critically Endangered*

Scientific names		English name		Distribution in the Mediterranean	IUCN Status	Occurrence
Orcinus orca	Killer whale	Observations mainly in the western Mediterranean	N/A*	Visitor		
Phocoena phocoena	Harbor porpoise	Observations in Italy and Spain Sightings in Spain, Italy and the Aegean Sea.	N/A*	Visitor		
Physeter macrocephalus	Sperm whale	Common in the Mediterranean. Mediterranean sperm whale population has declined over the past 20 years	EN*	Resident		
Pseudorca crassidens	False killer whale	The whole Mediterranean	N/A*	Visitor		
Steno bredanensis	Rough- toothed dolphin	In the Western Mediterranean, observations mainly in Italy and France	N/A*	Visitor		
Sousa chinensis	Indo-Pacific humpback dolphin	Observations in Egypt and Israel	N /A*	Visitor		
Stenella coeruleoalba	Striped dolphin	The whole Mediterranean	VU *	Resident		
Tursiops truncatus	Common bottlenose dolphin	The whole Mediterranean	VU *	Resident		
Ziphius cavirostris	Cuvier›s beaked whale	Found most often in the deep waters of the western and central Mediterranean	DD *	Resident		

** DD = Data Deficient, NA = Not Assessed, VU = Vulnerable, EN = Endangered, CR = Critically Endangered*

Birds

Coastal wetlands, like coastal lagoons, are home to a rich and varied birdlife that uses these ecosystems as wintering sites. Many lagoons are listed by the RAMSAR convention as sites of global significance for birds.

Mediterranean seabirds have low diversity. These are mainly gulls and terns (Charadriiformes), shearwaters and storm petrels (Procellariiformes), and one species is a pelican (Pelecaniformes. Of these species, three are endemic (Coll *et al*., 2010). Many seabirds, observed in the western Mediterranean, are listed in Annex II of the SPA/BD Protocol. They're *Calonectris d. diomedea , Puffinus mauretanicus, Puffinus yelkouan, Hydrobates pelagicus melitensis,*

Phalacrocorax desmarestii aristotelis, Larus melanocephalus, Chroicocephalus genei, Larus audouinii, Sterna nilotica Sterna sandvicensis, Sterna bengalensis and *Sternula albifrons*.

The western Mediterranean has many Important Areas for Birds and Biodiversity (IABs) (Figure 3).

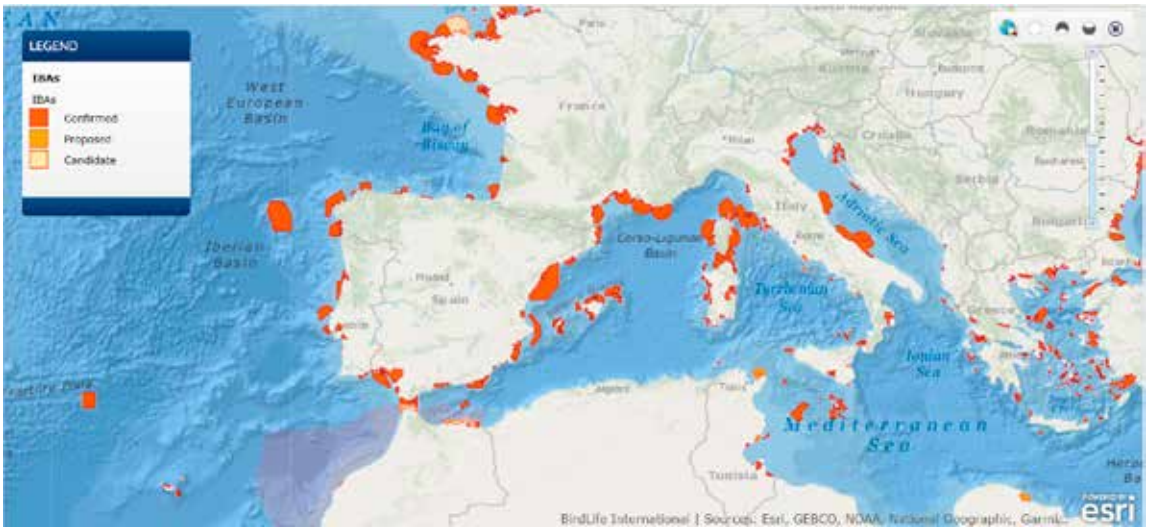


Figure 3.
Important Birds and Biodiversity Areas (IBAs) identified in the Western Mediterranean by Birdlife International (https: //maps.birdlife.org/marineIBAs/default.html)

3.2.5. Non-Indigenous Species (NIS) and invasive species

The introductions of non-indigenous species is a crucial factor that will continue to modify the biodiversity of the Mediterranean, mainly in its eastern basin. These species can spread rapidly north and west due to the warming of the Mediterranean Sea (Coll *et al*., 2010).

Recent compilations, carried out within the framework of IMAP and MSFD, report more than 312 non-indigenous species in the Western Mediterranean (Zenetos, pers. Comm.). These are mainly Annelida (32 species), Arthropoda (53 species), Bryozoa (8 species), Cerozoa (03 species), Chlorophyta (10 species), Chordata (48 species), Cnidaria (18 species), Ctenophora (01 species)), Echinodermata (03 species), Foraminefera (06 species), Mollusca (35 species), Myzozoa (01 species), Ochrophyta (22 species), Platyhelminthes (02 species), Porifera (01 species), Rhodophyta (56 species), Sipuncula (01 species) and Tracheophyta (01 species). This number will certainly increase in the years to come.

Among these NIS, many species are invasive and have impacts on marine biodiversity in the Western Mediterranean and significant socio-economic repercussions. Examples include the brown algae *Rugulopterix okamurae* and the blue crab *Callinectes sapidus*, among others.

3.2.6. Fish and other taxa of commercial interest

The Western Mediterranean, according to FAO statistics, the total unloadings made by the countries of the Western Mediterranean (GFCM sub-region) were established between 2016-2018 at an annual average of 258,300 tonnes (FAO, 2020). Three countries represent 86.5% of total production, namely: Algeria (39.9%), Spain (30.4%) and Italy (16.3%). Morocco and Italy represent 9% and 4.5% of the total volume respectively (Figure 4). Unloadings from fishing in Tunisia reached 133,972 tonnes in 2018 against 100,451 tonnes in 2009, i.e. an increase of 25%, mainly provided by pelagic species which account for 36% of catches.

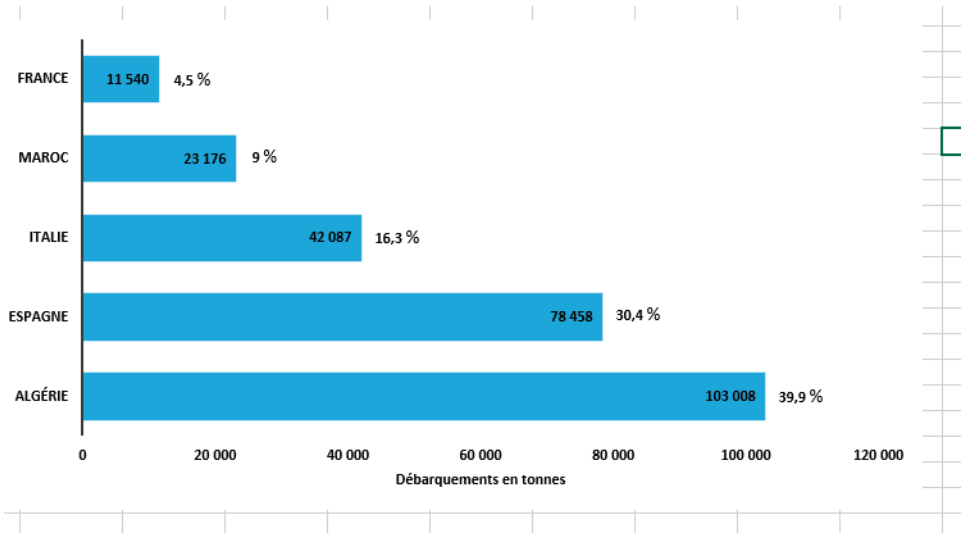


Figure 4.
Average annual unloadings (2016-2018) by country in the Western Mediterranean (GFCM sub-region).

In terms of species composition, a multitude of species are exploited by the Western Mediterranean fleet. Depending on their frequency of assessment, their importance in the fishery and their conservation status, these species are classified into three priority groups: group 1 represents species subject to regular assessment, group 2 represents species of commercial importance that are not regularly assessed and group 3, which represents species of conservation interest (Table 3).

However, fishing activity is mainly based on certain target species: sardines (*Sardina pilchardus*) are the most dominant in unloadings in the region with a value of 25.3% followed by common anchovy (*Engraulis encrasicolus* 14, 8%) and sardinella (*Sardinella* spp.) representing 8.6% of unoadings. The other species combined together represent about 51.9% of unloadings.

The majority of stocks are shared between two or more countries or even between all the countries of the Mediterranean basin as is the case of large pelagic stocks (*Coryphaena* spp., Elasmobranchs such as *Isurus oxyrinchus*, *Lamna nasus*, *Prionace glauca*) and in particular those of bluefin tuna (*Thunnus thymus*) and swordfish (*Xiphias gladius*).

In general, whether demersal or pelagic, the assessed stocks are considered to be fully or even overexploited. This statement is based in particular on the observation of changes in

some yields and some biological indices such as the reduction in individual sizes and the early maturity of the fish caught.

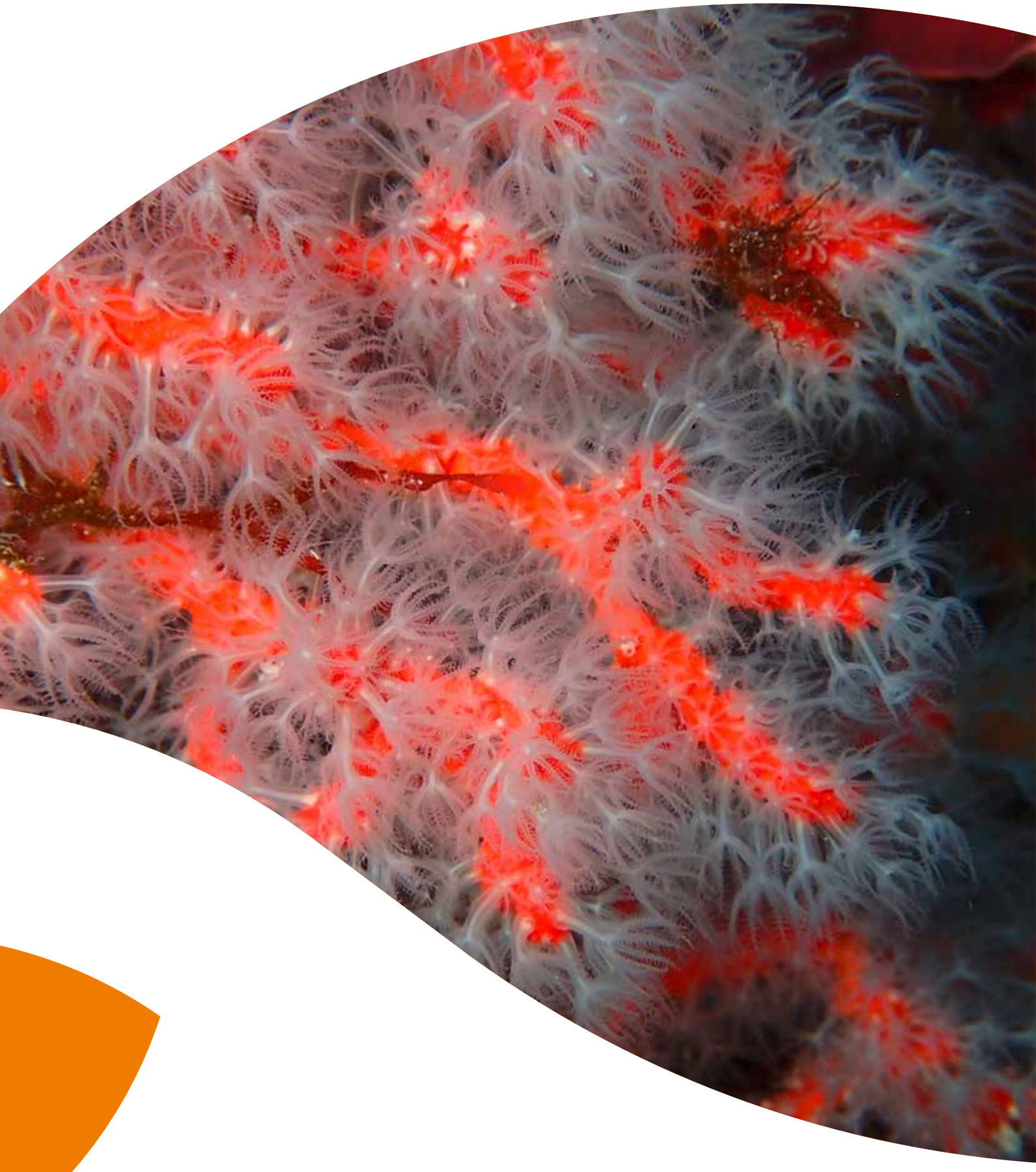
Table 3.
Priority species of commercial interest (in alphabetical order) in the Western Mediterranean (source: FAO, 2020).

Scientific name	G1	G2	G3	Stock shared between countries
Anguilla anguilla			X	The whole Mediterranean
Aristeus antennatus		X		Morocco - Spain, France - Italy, Italy - Tunisia
Boops boops		X		
Dalatias licha			X	
Dipturus oxyrinchus			X	
Eledone cirrhosa		X		
Engraulis encrasicolus	X			Spain and France
Etmopterus spinax			X	
Galeus melastomus		X		
Hexanchus griseus			X	
Lophius budegassa		X		
Merluccius merluccius	X			Spain - France - Italy - Tunisia
Micromesistius poutassou		X		
Mullus barbatus	X			
Mullus surmuletus	X			France - Italy
Mustelus asterias			X	
Mustelus mustelus			X	
Mustelus punctulatus			X	
Myliobatis aquila			X	
Nephrops norvegicus	X			Spain - Italy - France - Tunisia
Octopus vulgaris		X		
Pagellus bogaraveo	X			Spain and Morocco
Pagellus erythrinus		X		France - Italy
Parapenaeus longirostris	X			Italy - Tunisia
Prionace glauca			X	
Pteroplatytrygon violacea			X	
Raja asterias		X		

Scientific name	G1	G2	G3	Stock shared between countries
Raja clavata		X		
Raja miraletus			X	
Sardina pilchardus	X			Spain - France
Sardinella aurita		X		
Scomber japonicus		X		
Scomber scombrus		X		
Scyliorhinus canicula			X	
Scyliorhinus stellaris			X	
Sepia officinalis		X		
Squalus acanthias			X	
Squalus blainville			X	
Torpedo marmorata			X	
Torpedo torpedo			X	
Trachurus mediterraneus		X		
Trachurus picturatus		X		
Trachurus trachurus		X		

4.

Main threats, pressures and impacts



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4.1. Biological disturbances

4.1.1. Non-indigenous species and biological invasions

Invasive species can have significant impacts on the marine ecosystem, leading to adverse effects on marine biodiversity. They can cause the loss of important ecosystem goods and services offered by the marine environment, causing negative economic effects on human activities and health risks. The main pressures and impacts of invasive alien species responsible for biodiversity loss are summarized in Table 4.

Table 4.
Main pressures and impacts of invasive alien species (UNEP/MAP - RAC/SPA, 2010)

Pressures	Impacts
Competition for space and/or food	Niche reduction and contraction of native species; replacement of native species; other indirect effects on the ecosystem, including negative impact on ecosystem structures and functioning
Predation (or grazing)	Reduction in prey (or vegetation) mainly because native prey species may not have developed defenses against new predators; other indirect effects on ecosystems, including negative impact on ecosystem structures and functioning
Hybridization with indigenous species	The genes of the invaders «flood» the native species, so that no individual contains the entire genotype of the native species, effectively leading the native species to extinction.
Introduction of pathogens	Reduction of native species lacking defenses against new pathogens; other indirect effects on ecosystems

Several impacts on marine biodiversity and significant socio-economic repercussions are observed in the Western Mediterranean. Examples of this are the brown algae *Rugulopterix okamurae* and the blue crab *Callinectes sapidus*. The impacts of these species are already being felt in many sites in the Western Mediterranean. This is the case, for example, of the invasive alga *R. okamurae*, which led to a modification of the structure of the coralligenous community and regression of the bioindicator species *Paramuricea clavata* and *Mesophyllum expansum* (Sempre-Valverde *et al*. 2020). This is also the case of the blue crab *C. Sapidus,* which is well established and causes considerable damage to fishing nets. However, the impacts of invasive species are not fully known and in-depth studies are necessary.

4.1.2. Pathogens

Marine diseases caused by pathogens are regularly reported in the Western Mediterranean. They can cause massive mortalities of marine organisms. The spectacular case in recent years is that of the massive mortality (up to 100%) of the large mother-of-pearl *Pinna nobilis* observed in several sectors of the Mediterranean and which was attributed to the haplosporidian pathogen *Haplosporidium pinnae*.

The benthic dinoficea Osteropsis ovata is said to have had negative impacts (suffering or mortality) on benthic marine organisms such as mussels, sea urchins, starfish and macroalgae in Italy.

In France, between late September and late December 2018, grouper specimens showed signs of abrasion on the flank, a glassy eye, and swelling of the abdomen. Necropsies performed on some of these specimens may have shown the presence of a fish betanodavirus.

4.1.3. Harmful Algal Blooms (HABs)

Another type of biological disturbance is related to harmful phytoplankton blooms which are fatal for shellfish of socio-economic interest and for humans, in some cases. In recent years, harmful phytoplankton blooms have become regular, causing manifested intoxications in bivalves exploited in the Western Mediterranean and thus leading to a ban on fishing and the marketing of these bivalves in some countries.

The toxins produced by HABs are associated with several syndromes, including paralytic (PSP), diarrhoeal (DSP), amnesic (ASP) and neurotoxic (NSP). The toxins are bioaccumulated by organisms that ingest the algae, and thus transmitted through the food web to humans.

In the Western Mediterranean, harmful blooms are generally caused by species of the genus Pseudo-nitzschia, toxic dinoflagellates such as *Gymnodinium catenatum, Alexandrium pacificum, A. minutum, Prorocentrum Lima, P. sacculus, Dinophysis acuminata, D. sacculus, D. caudata, D. fortii, and Ostreopsis* spp. (HAEDAT, 2021).

Among these species mentioned in the Western Mediterranean, some are considered non-indigenous and/or invasive. These are *Alexandrium andersonii* (invasive), *A. ostenfeldii, A. pacificum* (invasive), *A. taylori, Coolia monotis* (invasive), *Gymnodinium catenatum* (invasive), *Karenia mikimotoi, Ostreopsis ovata* (invasive) and *O. siamensis* (Marampouti *et al*., 2021).

4.2. Urbanization and extension of the territory

Like all regions of the world, the Mediterranean coast is experiencing constantly increased urbanization and extension of the territory (urban and tourist development, construction of ports and marinas, etc.). In most cases, this results in the destruction or fragmentation of coastal habitats and/or at the sea-continent interface, especially wetlands.

Recreational boating, in particular uncontrolled anchorages, has an impact on sensitive habitats such as seagrass beds.

Tourist pressure is also important, as are the pressures related to it, both direct (nuisance) and indirect (loss or alteration of habitat due to urban development, beach regeneration, etc.).

All these pressures are particularly important in the western Mediterranean, especially on the northern part and more localised on the southern part of the basin.

4.3. Fisheries and aquaculture

Fishing is considered to be one of the most impactful activities in the marine environment. Its impacts in the Western Mediterranean are diverse in nature and it mainly deal with:

4.3.1. Habitat destruction

Among the fishing activities in the Western Mediterranean, demersal fishing leads to the destruction and fragmentation of benthic marine habitats. These impacts affect all Western Mediterranean countries but to different magnitudes (Figure 5).

In the Western Mediterranean, numerous fisheries-related impacts have been documented. They affect various habitats of conservation interest in the Mediterranean, such as coralligenous and sea phanerogam beds, etc.

Bottom trawlers and drifting and fixed longliners are by far the groups of vessels that have the greatest impact on priority species for conservation across the region.

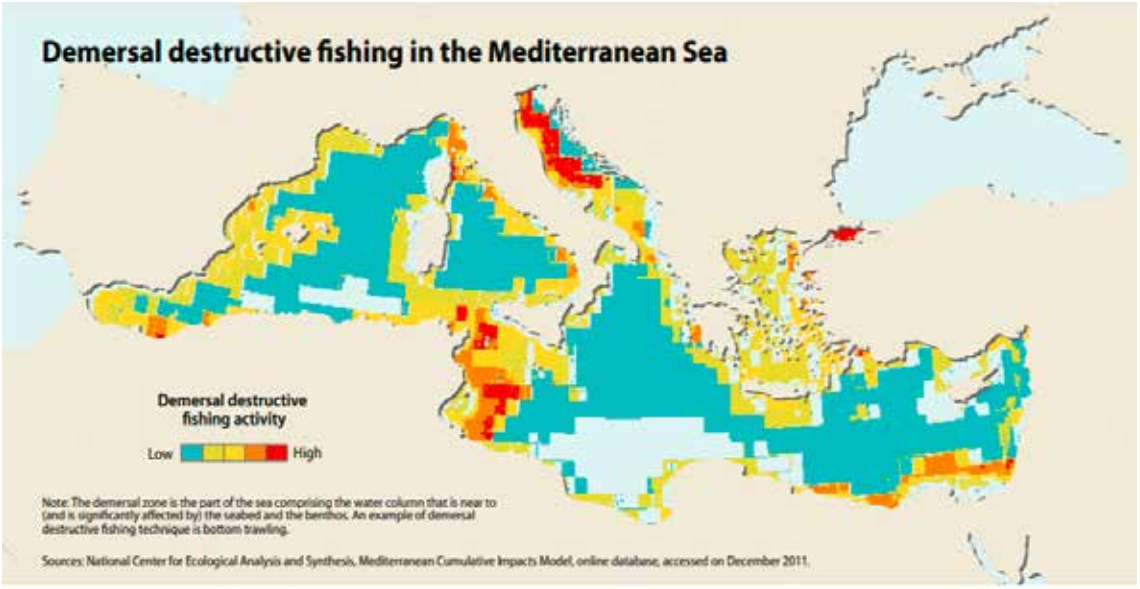


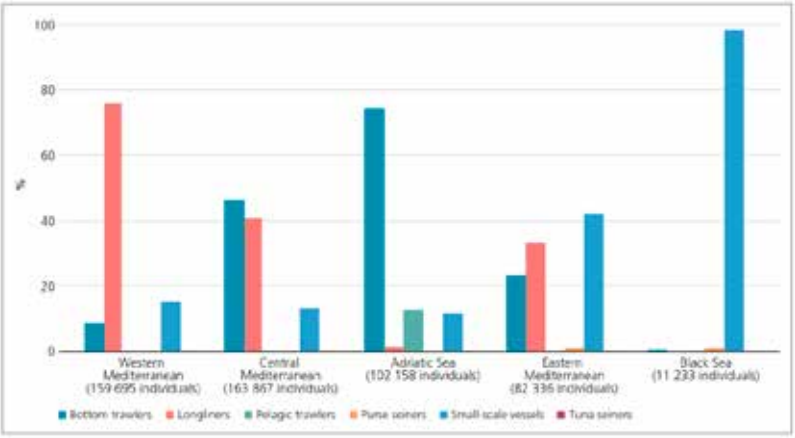
Figure 5.
Destructive demersal fishing in the Mediterranean (Source: UNEP / MAP, 2012).

4.3.2. Incidental catches (Bycatch)

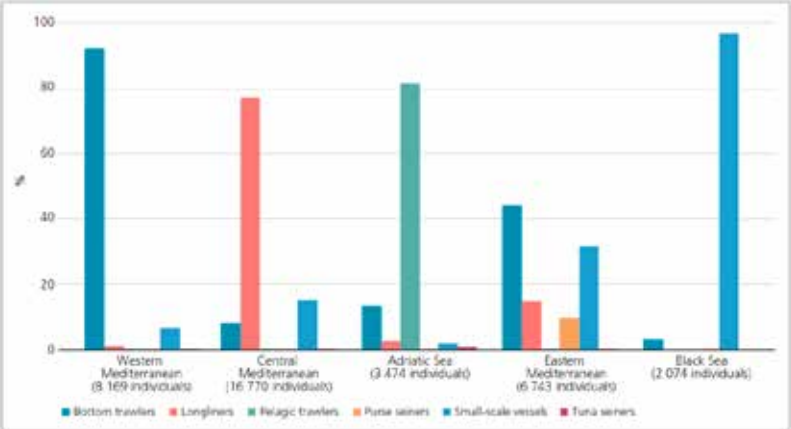
Bycatch of vulnerable species threatens the conservation of a variety of species groups, including mammals, birds, sea turtles, sharks and rays. Likewise, bycatch of coral and sponge species can also cause damage to important habitats.

In the Western Mediterranean, bycatch is mainly linked to longliners (marine turtles), bottom trawlers (elasmobranchs) and artisanal and coastal fishing vessels (birds and marine mammals) (Fig. 6). In recent years, from a strictly numerical perspective, sea turtles have accounted for the largest share of total reported bycatch of vulnerable species, followed by sharks and rays. Seabirds and marine mammals, on the other hand, are the two groups least reported as bycatch. In terms of species by vulnerable group, the most frequently reported incidents concern the loggerhead turtle (*Caretta caretta*) among sea turtles and gray sharks (Carcharinhus plumbeus), hare shark (Mustelus mustelus) and guitarfish (Rhinobatos cemiculus) among sharks and rays. The most frequently reported marine mammal species as bycatch are the striped dolphin (Stenella coeruleoalba) in the Mediterranean. In addition, two of the most endangered seabirds in Europe, the Balearic Shearwater (Puffinus mauretanicus) and the Yelkouan Shearwater (Puffinus yelkouan), both endemic to the Mediterranean, are particularly vulnerable. These species are regularly caught by pelagic and demersal longliners in the western Mediterranean and thousands of them probably die each year.

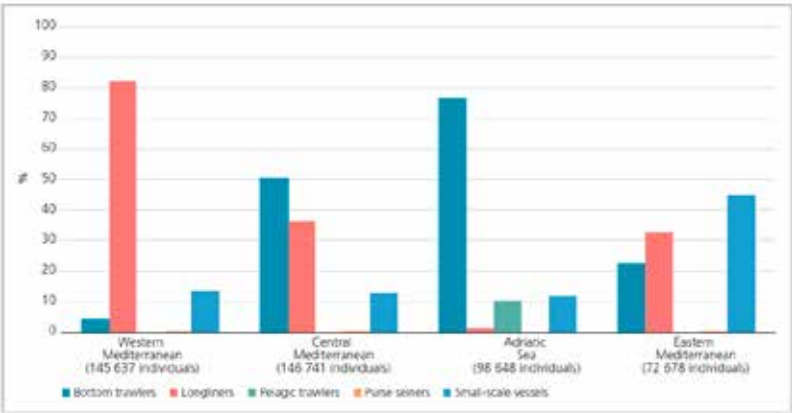
A


100
80
60
40
20
0
%
Western Mediterranean (159 695 individuals)
Central Mediterranean (163 867 individuals)
Adriatic Sea (102 158 individuals)
Eastern Mediterranean (82 336 individuals)
Black Sea (11 233 individuals)
Bottom trawlers
Longliners
Pelagic trawlers
Purse seiners
Small-scale vessels
Tuna seiners

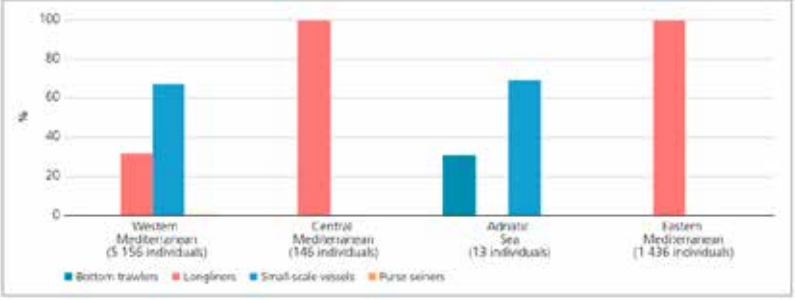
B


100
80
60
40
20
0
%
Western Mediterranean (8 169 individuals)
Central Mediterranean (16 770 individuals)
Adriatic Sea (3 474 individuals)
Eastern Mediterranean (6 743 individuals)
Black Sea (2 074 individuals)
Bottom trawlers
Longliners
Pelagic trawlers
Purse seiners
Small-scale vessels
Tuna seiners

C


100
90
80
70
60
50
40
30
20
10
0
%
Western Mediterranean (145 637 individuals)
Central Mediterranean (146 741 individuals)
Adriatic Sea (98 648 individuals)
Eastern Mediterranean (72 678 individuals)
Bottom trawlers
Longliners
Pelagic trawlers
Purse seiners
Small-scale vessels

D


100
80
60
40
20
0
%
Western Mediterranean (5 156 individuals)
Central Mediterranean (146 individuals)
Adriatic Sea (13 individuals)
Eastern Mediterranean (1 436 individuals)
Bottom trawlers
Longliners
Small-scale vessels
Purse seiners

E

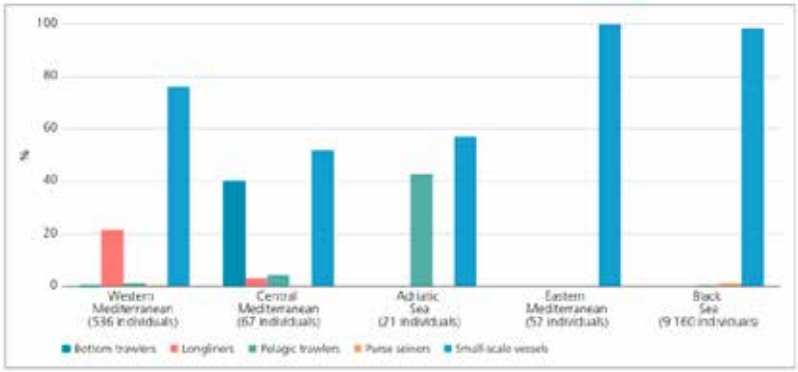


Figure 6.
Total incidental catches reported by a group of vessels and GFCM sub-region (A), Bycatch of elasmobranchs (B) of marine turtles (C) of sea birds (D) and marine mammals (E) declared by group of vessels and by GFCM sub-region between 2000-2020 (FAO 2020).

The western Mediterranean shows very low ecosystem sustainability of fisheries, which can be easily related to the high fishing pressure and the large proportion of overexploited stocks obtained from single species assessments (Colloca *et al*., 2017).

4.3.3. Overexploitation of resources

According to recent assessments in 2018 (FAO, 2020), stocks assessed in the Western Mediterranean, whether demersal or pelagic, are considered to be fully or even overexploited. The western Mediterranean shows very low ecosystem sustainability of fisheries, which can be easily related to the high fishing pressure and the large proportion of overexploited stocks obtained from single species assessments (Colloca *et al*., 2017).

4.3.4. Discharges

According to the analysis carried out by FAO in 2018, dischrages in the Mediterranean are estimated at around 230,000 tonnes per year, which corresponds to around 18% of total catches. Trawl fishing is generally responsible for the bulk of discharges in all geographic subareas of the Mediterranean and Black Sea, while information available for small-scale fishing suggests that the discharge rate is generally less than 10% (FAO, 2018).

In the Western Mediterranean, the average discard rate varies between 15% and 39% in most countries but can exceed 40% in some GFCM sub-regions of this basin (FAO, 2018).

4.4. Maritime traffic

Maritime transport is another important economic activity for the region. It represents around 30% of international maritime trade and 25% of maritime oil transport. The associated risks of accidental or deliberate pollution and the transport of exotic species are still poorly controlled (UNEP / MAP-Plan Bleu, 2020).

The increase in navigation and maritime activities is an important factor in the anthropogenic pressure on the marine environment in the Mediterranean. The pressures exerted by maritime transport mainly include: potential accidental and illicit releases of oil and noxious and potentially hazardous substances (HNS); marine litter; water discharges and fouling of the hulls; air emissions from ships; underwater noise; collisions with marine mammals; landings by port infrastructure; and anchoring (Figure 7).

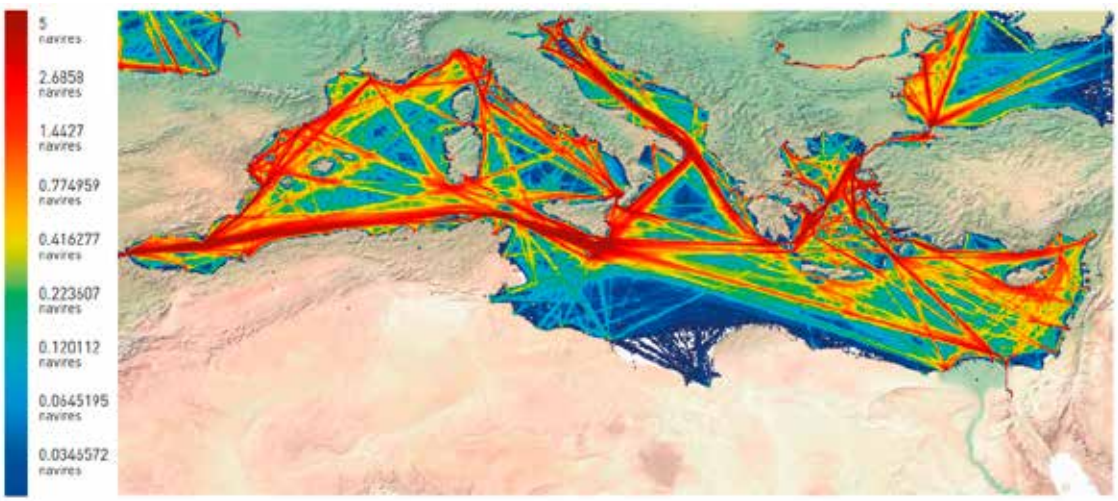


Figure 7.
Density of maritime traffic in the Mediterranean (source: INERIS, 2019).

4.5. Pollution

4.5.1. Chemical contamination

Chemical contamination of sediments and biota is usually caused by pollution from urbanization, industry, anti-fouling agents and atmospheric transport. Although the situation is improving in many Mediterranean regions, this problem still persists and many hot spots of pollution and environmental concern are identified in the western Mediterranean both on the northern shore and on the southern one (Figure 8).

Figure 8.
Pollution hot spots and areas of environmental concern in the Mediterranean (Source: UNEP / PAM - Blue Plan, 2020)

4.5.2. Noise pollution

The most important impacts of underwater noise are changes in the behavior of species, such as food and mating, which lead to population decline, as well as physical damage, such as the harm to tissues and organs which can result in the death of fish and marine mammals (Hawkins & Popper, 2016). The main responses should focus on designating restricted areas, developing quieter technologies and banning noisy technologies and techniques (Figure 8).

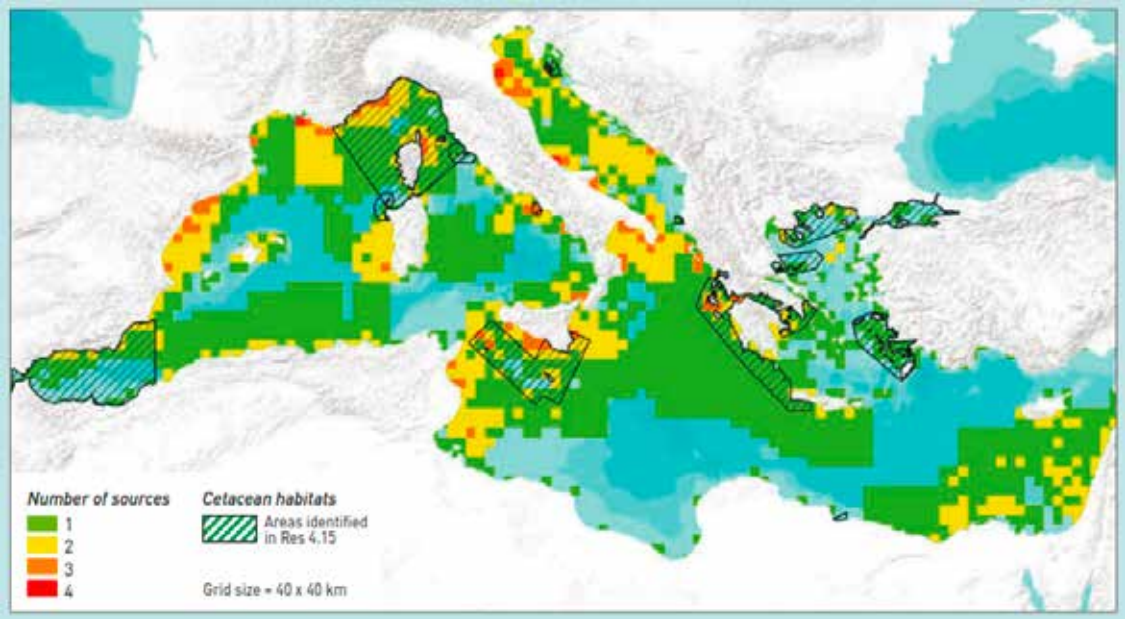


Figure 9.
Overview of noise hot spots in the ACCOBAMS area (UNEP / MAP-Plan Bleu 2020).

4.5.3. Light pollution (Spain)

Disturbances due to light pollution are recorded on the populations of procelariforms in the Balearic Islands (Rodríguez *et al.*, 2015).

4.5.4. Marine waste

Marine litter is currently a major threat to the conservation and sustainability of marine biodiversity and healthy and functioning ecosystems.

The known impacts of marine litter are mainly:

- Strangulation / Impact of abandoned fishing gear,
- Ingestion: Beyond the direct impact on survival, ingestion of waste causes sublethal effects linked, for example, to the reduction of natural food inside the stomach and therefore the quantity of nutrients. absorbed, or ingestion of toxic substances adsorbed on or released directly from plastic (Gregory, 2009),
- Transport of species / New habitats: This has become a real problem, however, due to the recent proliferation of floating particles, mainly plastic. Thus, 250 billion floating microplastics in the Mediterranean (Collignon *et al.*, 2012) are all potential carriers for harmful alien species and so-called "invasive" species (Maso *et al.*, 2003).

— Recent studies have also shown that microorganisms can colonize the plastic surface of marine debris by forming a "plastisphere". Members of the potentially pathogenic genus Vibrio have also been detected on these plastic surfaces and can be dispersed over long distances by floating debris (Zettler *et al*., 2013).

4.6. Climate change

The Mediterranean region is a hotspot of climate change (Figure 10), where the respective impacts of warming are very pronounced and relatively well documented (Cramer *et al*., 2018). It is currently widely accepted that climate change has three main consequences for the marine and coastal environment. These are (1) an increase in the sea surface (sea level rise), (2) an increase in the concentration of carbon dioxide in sea water and (3) an increase in the sea water temperature.

Marine populations are especially sensitive to temperature rise and fixed organisms appear to be the most vulnerable ones (Laubier, 2003). The response of living organisms to these CCs, in particular the rise in seawater temperature, is manifested by massive mortalities, by biological invasions due to the northward displacement of the northern distribution limits of a good number of marine species and coastal areas or by a coral bleaching phenomenon.

One of the major impacts of increasing sea surface temperature on ecosystems is the occurrence of mass mortality events (MMEs). These MMEs are well documented in the Western Mediterranean (Figure 11).

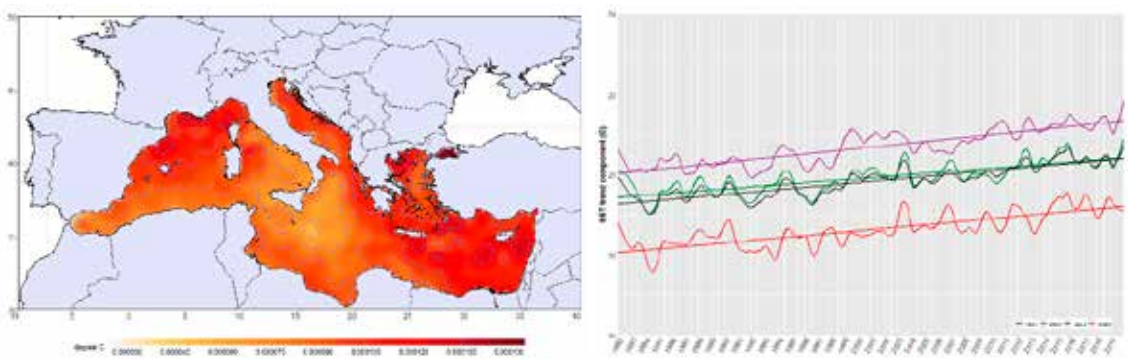


Figure 10.
Daily warming trend in the Mediterranean basin from 1982 to 2019. Each contour indicates a variation of 1.5 × 10-5 ° C / day Seasonally adjusted component of the SST trend and linear regression (at a confidence level of 99%) for the period 1982-2019 for the global Mediterranean basin (black), WMED (red), CMED (green) and EMED (magenta) (source : Pastor *et al*. 2020).

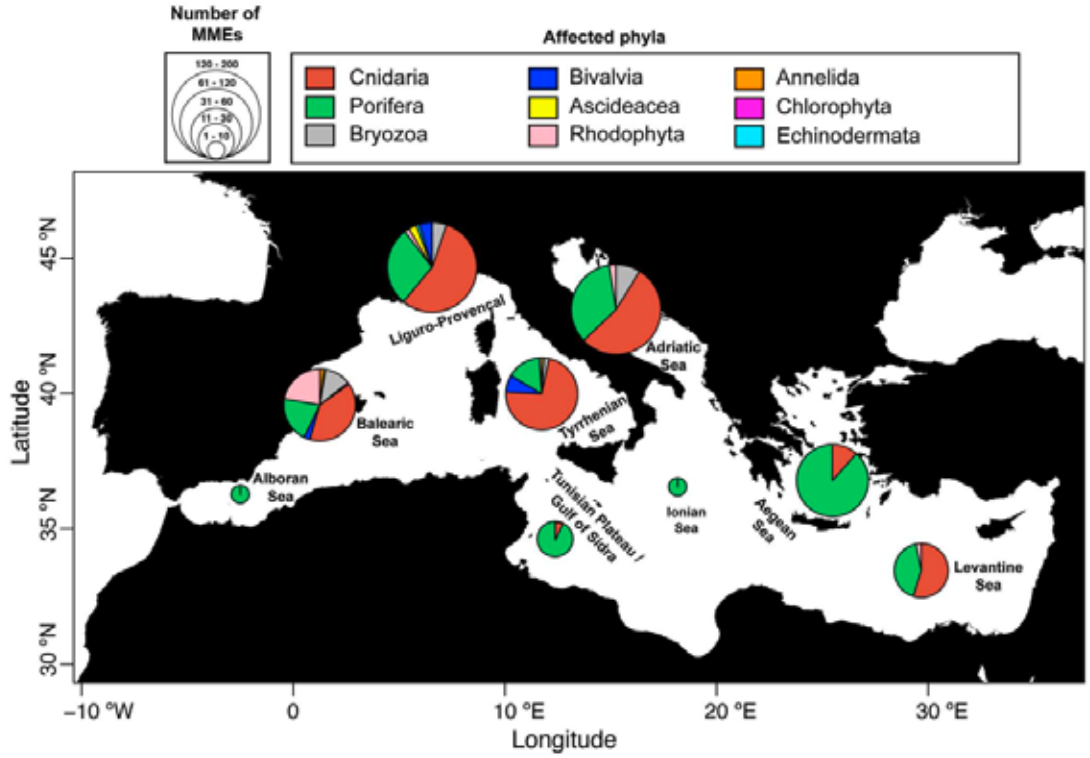


Figure 11.

Number of mass mortality events reported in the Mediterranean Sea: geographic distribution and taxa affected during the period 1979 to 2017 (the Western Mediterranean ecoregion has been divided into three sub-ecoregions: Balearic Sea, Liguro-Provençal and Tyrrhenian Sea) (source: Garrabou *et al*. 2019).

4.7. Cumulative effects of current Pressures on marine and coastal biodiversity

Analysis of the simultaneous effects of the various current pressures on marine and coastal biodiversity remains a major challenge. Phenomena such as, for example, the effects of climate change, overexploitation of resources or the spread of alien species are, in fact, increasingly studied and known, but the links between these specific pressures and the understanding of the effects accumulated over species, habitats and trophic chains, not only at the local level but also in the sub-basin, represent a complex but inevitable challenge.

At the heart of this integrated approach, the consideration of cumulative impacts is the main operational requirement linked to the implementation of the ecosystem approach (EcAp) in the Mediterranean, in the same way as the framework directive "Strategy for the marine environment "(MSFD) applied by Mediterranean member countries of the EU. However, the lack of information on many species and habitats and specific pressures at the country level or at the Western basin means that current assessments remain incomplete.

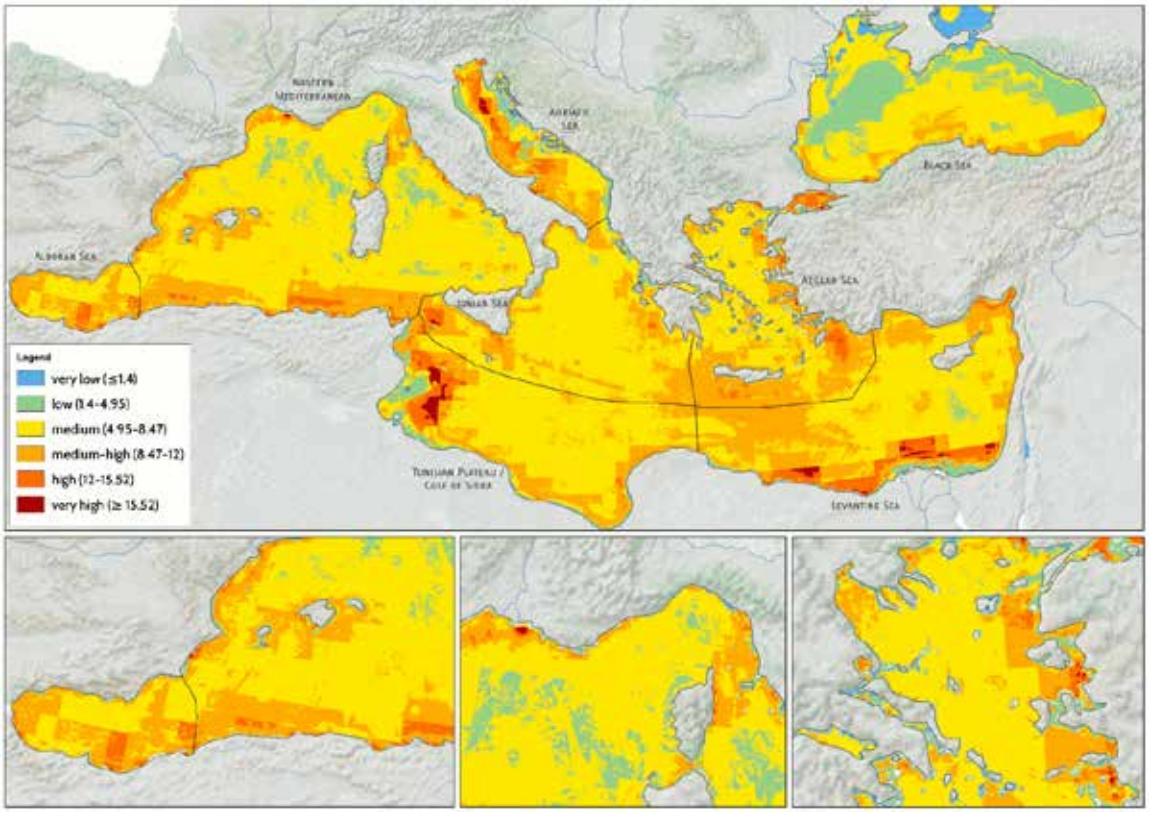


Figure 12.
Spatial distribution of the cumulative impacts on the marine ecosystems of the Mediterranean and the Black Sea. Below, wider views of the Alboran (left), the North Tyrrhenian Sea (center) and the Aegean Sea (right). The colors correspond to the different impact categories listed in the legend. (Source: Micheli *et al*., 2013)

5.

Main responses

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5.1. Inventories, monitoring and GES evaluation

In general, national reports note a great disparity between the northern and the southern shores of the Western Mediterranean in terms of inventories, mapping and ecological monitoring. Knowledge of marine and coastal biodiversity is better mastered in the European countries of this basin. However, in the southern countries (Algeria, Morocco and Tunisia), a lot of inventory and mapping has been carried out in recent years as part of regional projects such as the MedKeyhabitats project.

The significant efforts in terms of ecological monitoring in European countries are generally linked to the obligations of these countries *vis-à-vis* numerous European Directives, such as the MSFD, Habitats and Birds directives. These countries all have monitoring programmes for the evaluation of GES. This is also the case for those countries of the southern shore that have prepared in recent years, within the framework of the ecosystem approach, their national IMAP programmes.

5.2. Spatial protection measures

Spatial protection measures in the Western Mediterranean are responses to national, regional (Mediterranean-wide) and international conservation instruments. They take different names, such as Ramsar sites (Ramsar Convention), Natura 2000 sites (Habitat Directive), vulnerable marine ecosystems (CBD VME), Particularly Sensitive Sea Areas (IMO ZMPV, in English PSSA) or Biosphere Reserves and World Heritage Sites (UNESCO RB and WHS); or regional, such as the SPAMI of the Barcelona Convention or the GFCM's Restricted Fishing Areas.

Marine Protected Areas (MPAs) are important tools to protect the marine environment. Their main objective is to protect marine and coastal biodiversity (species and habitats) and can serve as reference sites to evaluate the effectiveness of measures taken to achieve GES. In the Western Mediterranean, the situation of MPA coverage at the national level differs from one country to another. With Natura 2000 sites, the area of protected areas exceeds 10% in the northern countries of the basin (Spain, France, Monaco and Italy) while it is less than 3% in the southern shore countries (Algeria, Morocco and Tunisia). The Pelagos Sanctuary (hatched area in Figure 13) alone covers 87 km^2.

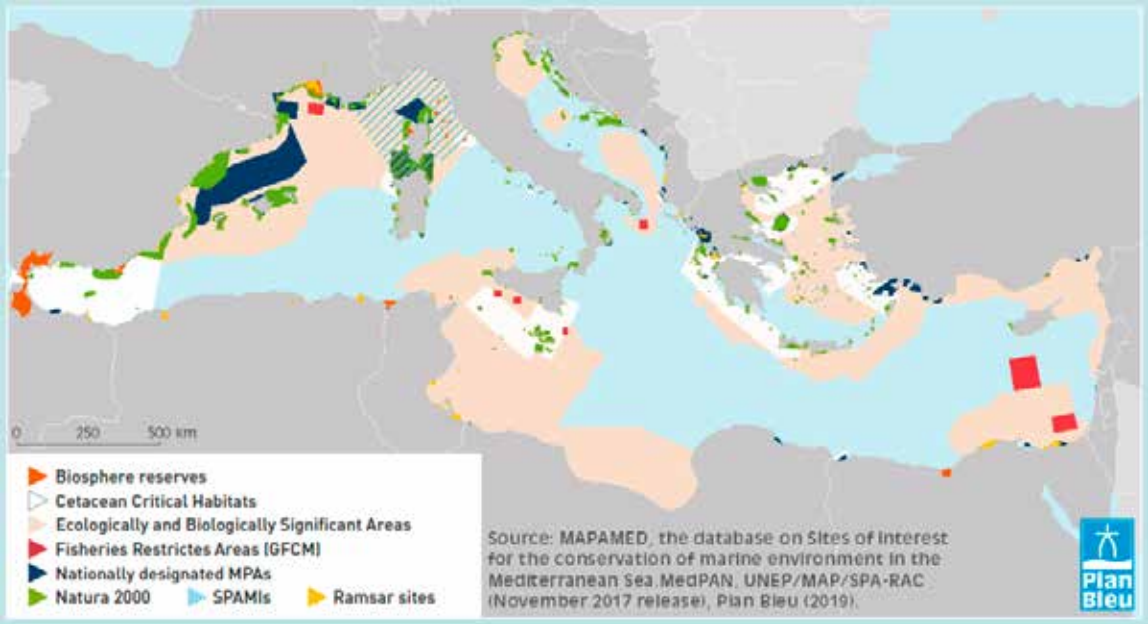

Figure 13.
Marine protected areas, fishing restriction zones, particularly sensitive maritime areas and priority areas for management (ecologically and biologically significant areas, critical cetacean habitats), 2017 (Source: MAPAMED, 2017; Plan Bleu, 2019)

5.3. Legislative framework, conservation policies and institutional capacities

On the regulatory level, all countries of the Western Mediterranean integrated the protection of marine and coastal biodiversity into their legislation. They adopted numerous regional (Barcelona Convention in particular, ACCOBAMS Agreement, etc.) and international (CBD, Ramsar, etc.) conventions, most of which they transposed into national legislation. At the European Union (EU) level, several instruments, Directives or policies have been particularly important for marine conservation.

The governance of the maritime system of the European countries of the northern shore of the Western basin (Spain, France, Italy and Monaco) is also governed through various regulatory instruments linked to the implementation of European policies. The instruments adopted at the national level to prevent the loss of biodiversity are both direct, such as actions aimed at the protection of species and ecosystems (for example the creation of protected areas and the Natura 2000 network) and indirect (i.e. measures intended to reduce sources of pressure and impacts on biodiversity). In addition, all countries of the Western Mediterranean have fully adhered to the ecosystem approach to manage human activities to achieve good ecological status (GES). They also developed their national strategies for biodiversity conservation and sustainable development in line with the most recent global goals in the post-2020 global biodiversity framework. At the level of the Mediterranean

basin, action and conservation plans for species and habitats have been drawn up within the framework of the Mediterranean Action Programme (MAP).

The **institutional** framework is different from country to country in the Western Mediterranean. In general, the integrated management of the sea and the coastline involves many actors with multiple skills and interests that are not always convergent, or rather divergent. The management of marine and coastal biodiversity and the leadership of MPAs is in most countries multi-stakeholder and involves many institutions. It can be done, depending on the country, by one or more administrations (Ministries, regional administrations, specialized agencies, etc.). Even though the institutional capacity for marine conservation is reasonably complete and in line with the provisions of the Barcelona Convention in European countries, it needs to be further strengthened with human and financial resources to face future challenges. In southern shore countries, the institutional framework has been significantly improved in recent years and should be better clarified through legal instruments. Other stakeholders (scientific institutions, NGOs, etc.) also contribute directly or indirectly to the conservation of marine and coastal biodiversity in the Western Mediterranean. Indeed, many NGOs contribute by improving scientific knowledge, play an important role of linkage between civil society and knowledge and awareness of environmental dynamics and collaborate with the administrations concerned with the co-management of certain MPAs in the Western Mediterranean.

5.4. Integration of marine biodiversity into other sectors

The integration of biodiversity in different sectors is a concept recommended by all European, international and national policies. The legal and institutional aspects of the participation of all stakeholders in different aspects of development and conservation are taken into account by all countries. However, coordination and cooperation between administrations appear to be the main factor limiting progress. In addition, competition between different economic sectors for the use of marine space is strengtheneing this lack of intersectoral administrative cooperation. In addition, the integration of biodiversity protection tools into economic and social policies and relevant sectoral or intersectoral plans at the local level does not appear to be complete.

The integration of biodiversity is generally taken into account as part of the environmental impact assessment process. The designation of areas such as FRAs or other similar nationally designated areas, where fishing activities are temporarily and permanently limited (no-take zones) are examples of the integration of biodiversity into other sectors. Maritime spatial planning (MSP) is also another framework to integrate biodiversity into the territorial planning of countries, in particular the European countries of the northern shore of the Western Mediterranean.

5.5. Cross-border collaboration

Migratory species (such as cetaceans and sea turtles) and fish stocks shared between various countries of the Western Mediterranean are a common threatened natural heritage which cannot be managed by a single country, it requires common policies and active measures. Due to the migratory nature of these species and the shared responsibility at the sub-regional level, collaboration is key to plan effective long-term conservation strategies.

The EU adopted and implemented strategies that encourage cross-border cooperation in several areas, including environmental protection and exploitation of fisheries resources. In this context, many cross-border cooperations exist or are in the process of being implemented between the European countries of the Western Mediterranean in terms of marine and coastal biodiversity.

Several cross-border collaborations are identified in the Western Mediterranean, among which we can quote:

- The Western Mediterranean was one of the first sub-regions in the Mediterranean to have seen the birth of operational instruments of international cooperation for the protection of the marine environment. Indeed, France, Italy and the Principality of Monaco signed the RAMOGE agreement in 1976.

- The Western Mediterranean was one of the first sub-regions in the Mediterranean to have seen the birth of operational instruments of international cooperation for the protection of biodiversity. Indeed, Italy, France and the Principality of Monaco signed the RAMOGE agreement in 1976.

- It is also important to underline the presence, in this basin, of the only “Particularly sensitive maritime zone” (PSSA) Strait of Bonifacio, result of cooperation between the two countries

- The presence of the Pelagos Sanctuary for Mediterranean marine mammals is another important cross-border measure to ensure the protection of biodiversity. The Sanctuary is a marine area of 87,500 km, which is the subject of an agreement between France, Italy and Monaco for the protection of marine mammals. What makes Pelagos Sanctuary unique is the fact that it is a site managed by the three different countries under the coordination of the Agreement Secretariat. It includes coastal areas and international waters that form a large ecosystem of a major scientific, socio- economic, cultural and educational interest.

- Spain and France are working together for a better management of the cetacean populations in the Western Mediterranean. In addition, Spain agreed, with France, Italy and Monaco, to carry out an assessment of the pressure of maritime traffic on cetaceans, and could, if the conclusions suggest it, propose to the IMO the creation of ‘a particularly sensitive maritime area, (PSSA) in the north-western Mediterranean area.

- Blue growth is a subject which will become increasingly important in the years to come and which will require governance tools shared between cross-border countries.

- The European Union is strongly strengthening cooperation policies between Mediterranean countries (for example, the WestMED initiative, BLUE MED) in order to fight against the fragmentation of the sectors of the sea and to develop a common approach in the use of sea resources. In addition, the creation of groups (Clusters) is encouraged.

- The SPA/RAC SPAMI twinning programme aimed to strengthen the effective management of SPAMIs, involving Italian SPAMIs / MPAs and SPAMIs / MPAs from countries in Mediterranean sub-regions including Tunisia.

- The Intercontinental Biosphere Reserve of the Mediterranean (IBRM), also enables cooperation development between the two Mediterranean shores to improve environmental conditions while trying to create and consolidate channels of communication and the participation of local communities.

- The Regional Fisheries Management Organizations (RFMOs) are real platforms for coordination and technical and scientific cooperation on themes related to the management and conservation of fishery resources in the Mediterranean:

    - General Fisheries Commission for the Mediterranean (GCFM): In this context, multiannual management plans have been drawn up between various partners taking into account the overlap of shared stocks. For example, in the Alboran Sea, a management plan for pink sea bream in the Strait of Gibraltar was drawn up in 2019 between Morocco and Spain;
    - The International Commission for the Conservation of Atlantic Tunas (ICCAT / CICTA).

6.

Main gaps and challenges

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Biodiversity and the sustainable use of natural resources are a major issue for all Western Mediterranean countries. This is clearly reflected in all their national strategies and initiatives.

This holistic diagnosis revealed, however, shortcomings at several levels in national and sub-regional achievements. The priority needs identified in this report are multiple and take the form of strategic axes which can be a framework of post-2020 priority actions in a horizon beyond 2030.

6.1. Improved knowledge on marine and coastal biodiversity for a reliable diagnosis across the Western Mediterranean

Current knowledge of marine and coastal biodiversity is much better in European countries (northern shore) of the Western Mediterranean. In the non-European countries in the south of the same basin, knowledge about MCBD remains low despite the notable improvements in knowledge in recent years.

Overall, the available data do not allow a reliable diagnosis (presence, long-term trend, response to pressures, interactions and functioning) of marine and coastal biodiversity on the scale of the Western Mediterranean to be drawn up. All the more so, few studies aim at analyzing the interactions between the various biotic components from an ecosystem perspective.

Another need is that of knowledge sharing which requires the development of platforms and mechanisms for the exchange of information specific to marine and coastal biodiversity across the entire Western Mediterranean.

6.2. Strengthening the role of Marine Protected Areas and other effective zone conservation measures (OECM - CBD)

The main gap in national spatial protection initiatives is the failure to consider what is called by CBD the other effective conservation measures by area (ECMAs). MPAs are the most common forms of conservation. Several categories of protection such as Ramsar sites (Ramsar Conventions), vulnerable marine ecosystem systems (CBD VME), Particularly Sensitive Sea Areas (PSSAs) or biosphere reserves and World Heritage sites (UNESCO RB and WHS) or regional, such as GFCM Restricted Fishing Areas are not declared as protected areas.

Despite the existence of management plans for most countries, the effectiveness of MPA management remains one of the weakest points in the Western Mediterranean. The existing

network of MPAs and their representativeness lacks consistency across the western basin and its riparian countries. The financial and control insufficiency as well as the lack of trained human resources in MPAs clearly hampers the effective management of these spatial protection measures.

6.3. IMAP programme and the evaluation of the Good Ecological Status

The IMAP programme, developed within the framework of the ecosystem approach, should allow an adequate assessment of good ecological status based on solid scientific data and monitoring programmes aligned and therefore comparable from one country to another.

If the European countries of the Western Mediterranean have established their monitoring programmes in line with European and also regional directives, the national IMAP plans drawn up by the countries on the shore of this basin require support for their implementation and consolidation.

Another common need to all the countries of the Western Mediterranean is that of improving the collection of data / information for the regional evaluation of GES and updating the monitoring programmes, so that they are aligned and coherent with the IMAP process.

6.4. Spatial planning

The ICZM and PEM are a strategic planning process, implemented through a coherent and agreed framework, which allows integrated, forward-looking and coherent decision-making on the spatial use of the sea for all the countries of the western basin.

Spatial planning efforts are more important in the European countries of the western basin's northern shore and are mainly linked to European Directives. In this sense, the processes of land use planning and management and marine spatial planning are being developed in all European countries for the implementation of European directives. However, efforts to strengthen / develop spatial planning must be made in all Western Mediterranean countries, but more so in southern shore countries.

6.5. Mitigation of pressures and current pressures

There are currently many pressures on the conservation of marine and coastal biodiversity in the Western Mediterranean. Achieving the BEE necessarily requires actions to mitigate these pressures. Thus, a deepening of knowledge on the impacts of these pressures and their cumulative effects is necessary.

6.6. Capacity Building

The need for capacity building, targeting managers and field technicians, local authorities responsible for the environment, fisheries and implementation, was expressed by most of Western Mediterranean countries. The aim is to strengthen scientific expertise for some countries and the capacity for management and control in protected areas. The establishment of sectoral networks at the western basin level would be a good initiative to share experiences between the various countries.

6.7. Cross-border collaboration

Cross-border collaboration is a major challenge in the Western Mediterranean. It is more developed between European countries than between countries on the southern part of this basin. North-South cross-border collaboration is also underdeveloped, and remains dependent on one-off actions within the framework of projects, particularly European programmes (Interreg, H2020, etc.).

The needs identified relate to cross-border projects around priority themes, the coordinated management of MPAs and AMCEs, the coordination of monitoring systems to facilitate the comparability of data, invasive non-indigenous species and the identification and declaration of MPAs and AMCEs outside national jurisdictions, particularly on high seas.

6.8. Mainstreaming biodiversity

The legal and institutional aspects of the participation of all stakeholders in different aspects of development and conservation, especially for MPAs, are taken into consideration by all countries. However, coordination and cooperation between administrations appear to be the main factor limiting progress.

In addition, competition between different economic sectors for the use of marine space reinforces this lack of intersectoral administrative cooperation. In addition, the integration of biodiversity protection tools into economic and social policies and relevant sectoral or intersectoral plans at the local level does not appear to be complete.

6.9. Funding

In most countries, the available national and international funds are not sufficient to finance the necessary activities related to the improvement of knowledge and the conservation of marine and coastal biodiversity in all countries.

There is a need for the development of national or sub-regional trust funds or other innovative and sustainable financing mechanisms to support the proper management of MPAs. In addition, the development of public-private partnerships to co-finance marine conservation and MPAs can be a sustainable financing solution for the management of biodiversity in the Western Mediterranean.

Table 5.

Overview of strengths, weaknesses, opportunities and threats (SWOT Analysis), giving an overview of the current state of marine and coastal biodiversity conservation in the Western Mediterranean.

Strengths	Weaknesses
• The conservation of biodiversity is a major issue for all Western Mediterranean countries, • Western Mediterranean countries are committed to many relevant international and regional agreements, • Sufficient institutional and legislative framework in most countries and improvements are envisaged, • All countries have adopted spatial measures, in particular MPAs, for the conservation of marine and coastal biodiversity and the management of natural resources, • Awareness of the integration of biodiversity in other sectors, • Reinforced cross-border collaboration, more between the European countries of the Western basin›s northern shore, • All countries have developed national IMAP plans under the ecosystem approach, • Citizen science increasingly developed, • Active involvement of NGOs in improving knowledge and co-management of MPAs.	• Insufficient knowledge of marine and coastal biodiversity (inventory, trends, trophic networks, etc.) to establish a reliable diagnosis on the level of the Western Mediterranean (species and habitats), • Lack of knowledge on local pressures and their impacts on biodiversity, • Aichi Target 11 not met in all countries of the Western Basin, • Insufficient information sharing between countries, • Insufficient North-South and South-South cross-border collaboration, • Still inefficient management of MPAs, • Coherence and connectivity of MPAs in the western basin and poorly developed riparian countries, • Lack of strategy and action plans for MPAs and AMCEs, • Consideration of AMCE is low in most countries, • No-take zones are poorly developed, • Territorial planning is not generalized in all Western Basin countries, • Monitoring programmes are not aligned and consistent for a process across the entire Western Basin, • Institutional and financial capacities are not sufficient for effective management of biodiversity in many countries, • Unsustainability of funding, • Adaptations to climate change are lacking in most countries.

Opportunities	Threats
• New Post-2020 regional and international strategies to achieve the objectives of sustainable development and the conservation of marine and coastal biodiversity, • Potential partnerships between the public and private sectors, • Blue economy represents an opportunity for better management of the marine space, • Regional and international funds are still available to improve knowledge and management of marine and coastal biodiversity.	• Climate change and its effects on the marine environment, • Overexploitation of halieutic resources, • The increasingly growing urban development in Western Basin countries, • Solid waste which is becoming a major problem for the marine ecosystem, • The introductions of non-indigenous and invasive species which are becoming increasingly alarming in the Western Mediterranean, • Maritime traffic.

7. Main opportunities for future cross-border collaboration

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In the years to come, cross-border collaboration will be a major challenge in the Western Mediterranean. Migratory species (cetaceans and sea turtles) and fish stocks shared between various countries of the Western Mediterranean will be a common threatened natural heritage which cannot be managed by one single country, but will require common policies and active measures. Due to the migratory nature of these species and the shared responsibility at the sub-regional level, collaboration is key to plan effective long-term conservation strategies. In addition, cross-border efforts are needed to mitigate the effects of anthropogenic pressures across the Western Basin.

The Post-2020 SAPBIO national reports all underlined the interest of cross-border collaboration for a good knowledge and conservation of marine and coastal biodiversity in the Western Mediterranean. Most of the needs declared by the countries are common to the whole communities of this Basin even though at different levels from one country to another. **Table 6** summarizes the needs identified by the countries by classifying them by categories, considered here as strategic axes for the post-2020 SAPBIO at the Western Mediterranean level. Needs with potential for future cross-border cooperation are clearly indicated.

The opportunities for cross-border collaborations between all Western Mediterranean countries relate to all strategic axes identified at the sub-regional level:

- Improved knowledge on biodiversity,
- Spatial protection measures,
- IMAP programme and assessment of Good Ecological Status,
- Spatial planning,
- Mitigation of current pressures and threats,
- Capacity building,
- Cross-border needs
- Integration of biodiversity in other sectors,
- Sustainable financing.

Table 6.

Overview of the needs expressed by Western Mediterranean countries in their national Post-2020 SAPBIO reports. Potential needs for future cross-border cooperation are indicated by an asterisk (*)

Needs	Alg	Spa	Fra	Ita	Mor	Mon	Tun
Improved knowledge on biodiversity							
Updating of manuals relating to protected species and priority habitats identified within the framework of UNEP / MAP				■			
Inventories of marine and coastal habitats and species, especially in deep waters and high seas (*)	■	■	■	■	■	■	■
Mapping of marine habitats in unexplored areas, with standardized tools and according to the recent nomenclature repository SPA / RAC 2019 (*)	■	■	■	■	■	■	■
Improved knowledge on species trends (*)		■	■	■	■		
Inventories, distribution and trends of species of conservation interest in the Mediterranean (Appendices II and III of the SPA / BD protocol) (*)	■	■	■	■	■	■	■
Answers of species and habitats to current pressures (*)		■	■	■	■		
Effects of cumulative impacts on marine and coastal biodiversity (*)		■	■	■			
Knowledge of the characteristics and structure of marine ecosystems as well as the processes that regulate them (*)		■		■	■		
Red lists of marine species and habitats	■	■	■	■	■	■	■
Identification of ecosystem services and definition of their value, also in monetary terms (*)				■			
Knowledge sharing, databases and lack of synergy between different information tools (*)	■	■	■	■	■	■	■
Strengthen the role of PMAs and AMCE							
Declare new MPAs to achieve the 10% coverage target at sea					■		
Improve the level of protection and effective management of their MPAs (*)	■	■	■	■	■	■	■
Identify and map marine and coastal areas potentially designatable as MPAs or OECMs							
Increase the surface area of non-sampling zones in MPAs (*)		■		■			
A regular update and implementation of MPA development and management plans in line with the new planned provisions					■		
Retwork of representative MPA Marine and coastal Biodiversity (*)	■	■	■	■	■	■	■
Strengthen the network of Natura 2000 sites at sea and their effective management		■		■			
Consideration of AMCE in the consideration of marine and coastal biodiversity(*)		■		■	■		
IMAP and BEE programme							
Concretization of national plans developed under IMAP	■				■		■
Development and operational implementation of sub-region-wide indicators, item lists, threshold values, in order to lead to updated, improved and more comprehensive sub-regional assessments.	■				■		■
Spatial planning							
Develop conservation planning taking into account ICZM and maritime spatial planning (*)	■	■	■	■	■	■	■
Finalize the process of approval of MEP plans at local and sub-regional levels				■			
Pressure mitigation on marine and coastal biodiversity							

Needs	Alg	Spa	Fra	Ita	Mor	Mon	Tun
Identification of specific anthropogenic pressures which, at the sub-regional level, affect biotic and abiotic marine resources.							
Ensure a more effective implementation of the ecosystem approach to artisanal and commercial fishing, paying particular attention to vulnerable marine ecosystems (*)							
Accurate assessment of bycatch to identify hotspots, and mitigation of bycatch (*)							
Strengthen the control and monitoring of fishing activities and establish effective mechanisms to limit Illegal, Unreported and Unregulated (IUU) fishing							
Alleviation and eradication of the most problematic invasive species (*)							
Early warning system in the Western Mediterranean to monitor NIS (*)							
Identify noise pollution hot spots (*)							
Reduce noise pollution in the marine environment (*)							
Efficient measures for vessel traffic management to minimize the risk of collision (*)							
Supervision of climate change and its effects on marine and coastal biodiversity (*)							
Evaluation of the cumulative effects of current pressures (*)							
Restoration of disturbed habitats (*)							
Capacity building							
Capacity building for managers, field technicians, local authorities responsible for the environment, fisheries and implementation (*)							
Cross-border collaboration							
Joint measures regarding non-indigenous and invasive species (*)							
Recognition of the Alboran Sea as EBSA (*)							
AMP and AMCE outside national jurisdictions, particularly on high seas (*)							
Integration of biodiversity in other sectors							
Integration of biodiversity at the country's local and sub-regional levels							
Integration of stakeholders into the planning of maritime space							
Promote the concepts of Gender and Equity in the conservation of marine and coastal biodiversity (*)							
Strengthening of citizen science in terms of observations and ecological monitoring (*)							
Sustainable funding							
Strengthening the capacity of MPAs to develop long-term mechanisms to support their management (*)							
Public Private Partnerships to cofinance marine conservation and MPAs (*)							

8.

Conclusions and recommendations regarding necessary actions and sub-regional strategic orientations

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8.1. Conclusions

8.1.1. National conclusions

&Algeria

Knowledge of the marine ecosystem is heterogeneous in Algeria. The country adhered to the main regional conventions and treaties (e.g., Barcelona Convention) and international (CBD, Ramsar, etc.). The country also developed its national IMAP programme within the framework of the ecosystem approach, but progress is insufficient. The country declared MPAs and SPAMIs whose management needs improvement. Knowledge of marine and coastal biodiversity has improved markedly in recent years but remains intermittent.

&Spain

During the decade 2010-2020, Spain made enormous progress in terms of knowledge of marine and coastal biodiversity. MPAs now cover 28.8% of Mediterranean waters of the country which is committed to protecting 30% of marine waters by 2030. The legal and institutional framework for marine conservation in Spanish waters of the Mediterranean is reasonably complete and in accordance with the provisions of the Barcelona Convention. However, many needs have been identified.

&France

The French Mediterranean seafront offers immense potential which must be preserved and enhanced. The coastal strip concentrates 90% of the permanent and seasonal population there. Many threats currently weigh on its natural heritage, mainly fishing, pollution, urbanization, etc. The institutional and legislative frameworks are satisfactory. France has extensive experience in monitoring the marine environment and assessing its ecological state. Many MPAs and SPAMIs have been declared by the country but management is not always satisfactory.

&Italy

Italy has a long experience in marine and coastal biodiversity. It has developed an efficient and comprehensive surveillance system. Also, the legislative framework and policies comply with EU requirements. The measures implemented by Italy are generally appropriate and effective, but enforcement, especially at the local level, is not always effective. The MPA system is well defined at the regulatory level and covers more than 10% of the country's marine surface, meeting Aichi Target 11. The implementation of MEP and ICZM is well advanced. Cross-border cooperation already exists in the Western sub-basin. However,

many shortcomings have been identified and many challenges remain to be faced in the years to come in terms of knowledge and management of marine and coastal biodiversity.

&Morocco

Morocco adheres to all regional and international initiatives in the field of biodiversity conservation and sustainable development. The Institutional and legislative framework is in continuous improvement. Knowledge of marine and coastal biodiversity (species and habitats) on the Moroccan Mediterranean has been significantly improved in recent years within the framework of regional projects. The country has only one officially declared MPA in the Mediterranean and other potential ones are identified. Morocco drew up its national IMAP plan, the implementation of which needs financial support. Management remains ineffective and national funding is unsufficient.

&Monaco

Monaco has the shortest coast in the Western Mediterranean. The country developed a national strategy for biodiversity which is currently being validated. The Principality's policy for the sustainable management of coastal resources is based on the creation of two marine protected areas, registered as Marine Protected Areas and all the country's marine space is covered by the Pelagos Sanctuary. Finally, because environmental protection may prove insufficient, the Principality also implemented actions aimed at restoring and repopulating the maritime coastline.

&Tunisia

Tunisia hosts many MCPAs and SPAMI. The legal system is insufficient with delays in implementing the provisions of the MCPA Act. Knowledge of marine and coastal biodiversity is satisfactory in areas classified as MCPA and lacking in other sectors of the country. The country developed its national biodiversity conservation strategies and action plan but their marine components need further development. Many needs have been identified as part of the Post 2020 SAPBIO national report. The involvement of NGOs in the co-management of Tunisia's MCPAs is relatively advanced.

8.1.2. Situation of the Western Mediterranean sub-region

This sub-regional report concerns the Western Mediterranean, bringing together Algeria, Spain, France, Italy, Morocco, Monaco and Tunisia. Its main objective is to identify the priorities and orientations for the conservation of marine and coastal biodiversity in the sub-region from the diagnoses carried out at the national level in the sub-region's countries.

Knowledge of Mediterranean marine species and ecosystems varies from country to country, and between neritic and deep waters. The continental shelf (0 to 200 m deep) is better known than the deeper areas. In terms of species diversity, the Western Mediterranean,

with the influence of the Atlantic and its wide range of physicochemical conditions, is considered to be the richest part of the Mediterranean with 87% of known life forms in the Mediterranean. Likewise, endemic species are more numerous there compared to other parts of the Mediterranean. Also, the complexity of the ecology of the Mediterranean Sea resulted in the coexistence of many ecosystems whose extent and distribution are very varied. However, knowledge on the components of biodiversity is still insufficient or limited, in particular in the countries of the southern shore and in deep habitats. In general, the national reports note a great disparity between the Western Mediterranean's northern and southern shores in terms of inventories, mapping and ecological monitoring. Knowledge of marine and coastal biodiversity is better controlled in the European countries of this basin. However, in southern countries (Algeria, Morocco and Tunisia), a lot of inventories and mappings have been carried out in recent years as part of regional projects such as the MedKeyhabitats project. The significant efforts in terms of ecological monitoring in European countries are linked to the obligations of these countries vis-à-vis numerous European Directives, in particular the MSFD, Habitats and Birds directives. These countries all have monitoring programmes for the evaluation of GES. This is also the case for the countries of the southern shore which have prepared in recent years, within the framework of the ecosystem approach, their national IMAP programmes.

The main threats and pressures identified in the Western Mediterranean relate to disturbances linked to invasive non-indigenous species, pathogens, impacts of fishing, pollution in various forms, coastal urban development, maritime traffic and climate change. However, the cumulative effects of these threats remain poorly studied in the region.

Spatial protection measures in the Western Mediterranean constitute responses to national, regional (Mediterranean-wide) and international conservation instruments. They take different names, such as Ramsar sites (Ramsar Convention), Natura 2000 sites (Habitat Directive), vulnerable marine ecosystems (CBD VME), Particularly Sensitive Sea Areas (PSSA) or Biosphere Reserves and World Heritage Sites (UNESCO RB and WHS); or regional names, such as the GFCM Restricted Fishing Areas.

Marine protected areas (MPAs) are recognised worldwide as tools for the conservation of marine and coastal biodiversity. All countries in the Western Basin have officially declared MPAs under the Barcelona Convention. In the European countries of the Western Mediterranean (Spain, France, Monaco and Italy), the surface area of protected areas (including Natura 2000 sites) exceeds 10% of their maritime space, whereas it is less than 3% in the countries of the southern shore (Algeria, Morocco and Tunisia). Furthermore, not all potential OECM are officially characterised or included in national reports to international or regional instruments. National and international funding sources remain insufficient and do not meet the real needs for monitoring and conservation of marine biodiversity in the countries of this basin. Transboundary cooperation on various aspects (monitoring, non-native and invasive species, adaptation to climate change, etc.) is strongly encouraged by all the countries of the Western Mediterranean.

All Western Mediterranean countries expressed, in the Post-2020 SAPBIO reports, their needs and proposed priority actions.

8.2. Recommendations

Biodiversity and the sustainable use of natural resources are a major issue for all Western Mediterranean countries. This is clearly reflected in all their national strategies and initiatives.

This holistic diagnosis revealed inadequacies at several levels in national and sub-regional achievements. The priority needs identified in this report are multiple and take the form of recommendations that can be a framework of Post-2020 priority actions in a Post 2030 horizon.

Priority actions for the Western Mediterranean (Table 7) are organized into nine strategic axes:

- **Improving knowledge on biodiversity (7 actions):** Improving knowledge on marine species and habitats (distribution, trends, responses to impacts, etc.) is fundamental to establish a reliable diagnosis of marine and coastal biodiversity in the Western basin and riparian countries.

- **Spatial protection measures (8 actions):** The spatial protection measures (MPAs and AMCE) must be representative, well managed and be a coherent network in the Western Mediterranean;

- **IMAP programme and assessment of Good Ecological Status (7 actions):** The IMAP programme, developed within the framework of the ecosystem approach, should allow an adequate assessment of good ecological status based on solid scientific data and aligned monitoring programmes and therefore comparable from one country to another;

- **Spatial planning (2 actions):** ICZM and MEP can be seen as a strategic planning process, implemented through a coherent and agreed framework that allows integrated, forward-looking and coherent decision-making on the spatial use of the sea.

- **Mitigation of current pressures and threats (21 actions):** Achieving GES necessarily involves actions to mitigate the pressures reported in the Western Mediterranean.

- **Capacity building (2 actions):** national capacity building is important for effective management of MPAs;

- **Cross-border needs (6 actions):** cross-border actions are able to improve knowledge and strengthen the management and conservation of marine biodiversity at the sub-regional level;

- **Integration of biodiversity into other sectors (3 actions):** The participatory approach is a priority axis in national strategies and action plans in the area of biodiversity and sustainable development. The involvement and support of civil society in the objectives of MPAs requires awareness-raising, information, communication and education. Citizen science has proven to be a good example of civil society involvement in ecological observation and monitoring in many MPAs around the world.

— **Sustainable funding (3 actions):** All conservation-related activities must be supported by sufficient funding, which implies better use of the already available funds, but also the search for new funding mechanisms, such as public-private partnership.

All these actions could be linked to regional (EU biodiversity strategy 2030, EcAP, PEM, ACCOBAMS, CGPM, etc.) and global (post-2020 CBD global biodiversity framework) policies.

Table 7.

Proposal of key actions for the conservation of marine and coastal biodiversity in the Western Mediterranean Post 2030, as a contribution to the development of the Post-2020 SAPBIO strategy.

Knowledge of biodiversity **Objective: Improve knowledge on marine and coast biodiversity in the Western Mediterranean.** **Indicator of achievement of objectives: Sufficient knowledge to establish a reliable and integrated diagnosis of marine biodiversity in the Western Mediterranean and in the riparian countries of this basin.**							
No.	Activity	Expected outcomes	Concerned countries	Level of priority 1	Potential financing sources 2	Link with other relevant strategies	Potential actors 3
1.1	Update of the manuals relating to priority habitats and species identified under the Barcelona Convention, including recent updates to the list of species appearing in Annexes II and III of the SPA/BD protocol of the Barcelona Convention, as well as the new 2019 habitat classification.	Develop manuals relating to protected species and priority habitats identified under the SPA/BD Protocol.	All countries	Very high	SPA/RAC	Barcelona Convention's SAP /BD Protocol	Expert (s) contracted by the SPA/RAC
1.2	Complete inventories on marine and coast species and habitats, highlight their trends, identify functional aspects and ecosystem interactions and assess their responses to current threats and impacts.	Sufficient information to establish a reliable and integrated diagnosis	All countries	Very high	IPF, NF, OSF	Global Biodiversity Framework for Post 2020 EU biodiversity strategy for 2030 ACCOBAMS strategy	OM, NA, SI, NGO and other stakeholders

1. Very high immediate implementation of the activity, High Implementation of the activity until 2025, Medium Implementation of the activity until 2030, Low Implementation of the activity until 2035

2 IPF - International Public Funding, NF - National Funding, OSF- Other sources of funding such as the private sector.

3. MO: Mutilateral organizations, NA: National authorities (including expert agencies, MPA management authorities), SI: scientific institutions, NGOs or other relevant stakeholders

Knowledge of biodiversity Objective: Improve knowledge on marine and coast biodiversity in the Western Mediterranean. Indicator of achievement of objectives: Sufficient knowledge to establish a reliable and integrated diagnosis of marine biodiversity in the Western Mediterranean and in the riparian countries of this basin.							
No.	Activity	Expected outcomes	Concerned countries	Level of priority 1	Potential financing sources 2	Link with other relevant strategies	Potential actors 3
1.3	Strengthen and complement efforts to map marine habitats using the updated SPA/RAC repository.	Improved habitat mapping nationally and across the Western Mediterranean	All countries	High	IPF, NF, OSF	Global Biodiversity Framework for Post 2020 EU BD strategy for 2030	OM, NA, SI, NGO and other stakeholders
1.4	Undertake studies to improve their knowledge of inventories, distributions and trends of species and habitats of conservation interest in the Mediterranean (Annexes II and III of the SPA/BD protocol of the Barcelona Convention).	Improved inventories, distribution of and trends for species and habitats in the appendices of the SPA/BD protocol.	All countries	Very high	IPF, NF, OSF	Global Biodiversity Framework for Post 2020	OM, NA, SI, NGO and other stakeholders
1.5	Establish a red list of species and habitats and put in place priority plans for their safeguard at the national and sub-regional levels.	Establish red list of species and habitats and action plans to saveguard them.	All countries	Medium	IPF, NF, OSF	Listes rouge de l'UICN	MO, NA, SI, NGO and other stakeholders
1.6	Promote, strengthen and consolidate monitoring networks and long-term biodiversity monitoring programmes.	Launch and consolidate long term follow up programmes	All countries	High	IPF, NF, OSF	Global Biodiversity Framework for Post 2020 EU BD strategy for 2030	MO, NA, SI, NGO and other stakeholders
1.7	Develop a platform for the exchange of information specific to marine and coast biodiversity in the Western Mediterranean.	Functional information exchange platform.	All countries	Medium	IPF, NF, OSF	Global Biodiversity Framework for Post 2020 EU BD strategy for 2030	MO, NA, SI, NGO and other stakeholders

Spatial protection measures

Objective: Spatial biodiversity protection measures are strengthened, effectively managed and representative networks are established.

Indicator of achievement of objectives: Significant number of MPAs are managed efficiently, coherent and representative networks across the Western Mediterranean and the riparian countries.

No.	Activity	Expected outcomes	Concerned countries	Level of priority 1	Potential financing sources2	Link with other relevant strategies	Potential actors3
2.1	Support countries that have to achieve the 10% coverage target at sea.	MPA and AMCE covers are greater than 10% of the country›s marine area.	Algeria, Morocco, Tunisia	Very high	IPF, NF, OSF	Global Biodiversity Framework for Post 2020 EU BD strategy for 2030	MO, NA, IS, NGO and other stakeholders
2.2	Support countries that have to achieve the 30% coverage target at sea.	MPA and AMCE covers are greater than 30% of the country›s marine area.	Spain, France, Italy	Medium	IPF, NF, OSF	Global Biodiversity Framework for Post 2020 EU BD strategy for 2030	MO, NA, IS, NGO and other stakeholders
2.3	Support countries to improve their level of protection and the effective management of their MPAs.	MPAs effectively managed in the western Mediterranean sub-basin.	All countries	Very high	IPF, NF, OSF	Global Biodiversity Framework for Post 2020 EU BD strategy for 2030	MO, NA, IS, NGO and other stakeholders
2.3	Strengthen the development of a coherent network of protected areas at the national and sub-regional levels.	Coherent networks of MPAs established at national level and in the Western Mediterranean.	All countries	Very high	IPF, NF, OSF	Global Biodiversity Framework for Post 2020 EU BD strategy for 2030	MO, NA, IS, NGO and other stakeholders
2.4	Increase the surface area in MPAs no-take zones.	Improved non-sampling area surface.	All countries	High	IFP, NF, OSF	Global Biodiversity Framework for Post 2020 EU BD strategy for 2030	MO, NA, IS, NGO and other stakeholders
2.5	Strengthen the network of Natura 2000 sites at sea and their efficient management.	Natura 2000 network at sea is efficiently managed.	Spain, France, Italy	Medium	IFP, NF, OSF	Global Biodiversity Framework for Post 2020 EU BD strategy for 2030	MO, NA, IS, NGO and other stakeholders

1. Very high immediate implementation of the activity, High Implementation of the activity until 2025, Medium Implementation of the activity until 2030, Low Implementation of the activity until 2035

2. IPF - International Public Funding, NF - National Funding, OSF- Other sources of funding such as the private sector.

3. MO: Mutilateral organizations, NA: National authorities (including expert agencies, MPA management authorities), SI: scientific institutions, NGOs or other relevant stakeholders

Spatial protection measures

Objective: Spatial biodiversity protection measures are strengthened, effectively managed and representative networks are established.

Indicator of achievement of objectives: Significant number of MPAs are managed efficiently, coherent and representative networks across the Western Mediterranean and the riparian countries.

No.	Activity	Expected outcomes	Concerned countries	Level of priority 1	Potential financing sources2	Link with other relevant strategies	Potential actors3
2.6	Strengthen the concept of AMCEs at the national level and help countries identify AMCEs and integrate them into their national strategic plans.	Significant number of ECMAs at country level.	All countries	High	IFP, NF, OSF	Global Biodiversity Framework for Post 2020 EU BD strategy for 2030	MO, NA, IS, NGO and other stakeholders
2.7	Support countries to prepare a strategy and an action plan for MPAs and AMCEs.	Strategy and action plan for MPAs and AMCEs developed by countries.	All countries, in particular, those of the southern shore of the Western Mediterranean	High	IFP, NF, OSF	Global Biodiversity Framework for Post 2020 EU BD strategy for 2030	MO, NA, IS, NGO and other stakeholders
2.8	Develop guidelines to measure the connectivity, coherence and representativeness of MPAs and AMCEs on the basis of indicators adapted to the specificities of the Mediterranean region.	Guidelines to measure the connectivity, consistency and representativeness of established MPAs and AMCEs.	All countries	High	IFP, NF, OSF	Global Biodiversity Framework for Post 2020 EU BD strategy for 2030	MO, NA, IS, NGO and other stakeholders

IMAP and BEE Programme

Objective: Evaluation adequacy of a good ecological status

Indicator of objective achievement : Sufficient data for BEE evaluation

No.	Activity	Expected outcomes	Concerned countries	Level of priority 1	Potential financing sources2	Link with other relevant strategies	Potential actors3
3.1	Promote scientific research on trophic networks and the functioning of ecosystems in general in the evaluation of GES within the framework of IMAP programmes.	Information on trophic networks and ecosystem functioning are sufficient for GES assessment.	All countries	High	IFP, NF, OSF	Global Biodiversity Framework for Post 2020 EU BD strategy for 2030 MEP	MO, NA, IS, NGO and other stakeholders

1. Very high immediate implementation of the activity, High Implementation of the activity until 2025, Medium Implementation of the activity until 2030, Low Implementation of the activity until 2035

2. IPF - International Public Funding, NF - National Funding, OSF- Other sources of funding such as the private sector.

3. MO: Mutilateral organizations, NA: National authorities (including expert agencies, MPA management authorities), SI: scientific institutions, NGOs or other relevant stakeholders

IMAP and BEE Programme Objective: Evaluation adequacy of a good ecological status Indicator of objective achievement : Sufficient data for BEE evaluation							
No.	Activity	Expected outcomes	Concerned countries	Level of priority 1	Potential financing sources2	Link with other relevant strategies	Potential actors3
3.2	Support and strengthen the implementation of national plans developed under IMAP.	IMAP national plans are implemented.	In particular southern shore countries (Algeria, Morocco and Tunisia).	High	IFP, NF, OSF	Global Biodiversity Framework for Post 2020 EU BD strategy for 2030 MEP	MO, NA, IS, NGO and other stakeholders
3.4	Help countries identify gaps that hinder good BEE evaluation and support them to fill them out.	BEE evaluation is done on a sound scientific basis.	All countries	High	IFP, NF, OSF	Global Biodiversity Framework for Post 2020 EU BD strategy for 2030 MEP	MO, NA, IS, NGO and other stakeholders
3.5	Initiate monitoring of non-indigenous species with particular attention to the main port enclosures in the region which are secondary sources of dispersion of these species in the Moroccan Mediterranean.	Contribution of Ports in the introduction and dispersal of NIS identified	All countries	Medium	IFP, NF, OSF	Global Biodiversity Framework for Post 2020 EU BD strategy for 2030	MO, NA, IS, NGO and other stakeholders
3.6	Support the development and operational implementation of sub-region-wide indicators, item lists, threshold values, in order to lead to updated, improved and more comprehensive sub-regional assessments.	BEE evaluation at the sub-regional level is possible	All countries	High	IFP, NF, OSF	Global Biodiversity Framework for Post 2020 EU BD strategy for 2030	MO, NA, IS, NGO and other stakeholders
3.7	Improve data / information collection for the regional BEE evaluation and update monitoring programmes, so that they are aligned and consistent with the IMAP process.	Aligned and coherent monitoring programmes between the countries of the Western Basin	All countries	High	IFP, NF, OSF	Global Biodiversity Framework for Post 2020 EU BD strategy for 2030.	MO, NA, IS, NGO and other stakeholders

Spatial planning Objective: Strengthen the use of ICZM and MEP in the territorial planning of the countries Indicator of objective achievement: Biodiversity conservation is integrated in territorial planning							
No.	Activity	Expected outcomes	Concerned countries	Level of priority 1	Potential financing sources2	Link with other relevant strategies	Potential actors3
4.1	Support countries to strengthen and/or develop conservation planning taking into account ICZM and maritime space planning.	ICZM and MEP principles	All countries	High	IFP, NF, OSF	Global Biodiversity Framework for Post 2020 EU BD strategy for 2030 GIZC Protocol MEP	MO, NA, IS, NGO and other stakeholders
4.2	Finalize the process of approving MEP plans at the local and/or sub-regional level in the riparian countries of the Western Basin.	MEP plans approved at local and sub-regional country levels.	Italy (but applicable to all other countries)	High	IFP, NF, OSF	Global Biodiversity Framework for Post 2020 EU BD strategy for 2030 ICZM Protocol MEP	MO, NA, IS, NGO and other stakeholders

Mitigation of pressures on marine and coastal biodiversity Objective: Mitigate anthropogenic pressures on marine and coastal biodiversity in the Western Mediterranean. Indicator of objective achievement: Reduced sources of threats and mitigated impacts on marine and coastal biodiversity							
No.	Activity	Expected outcomes	Concerned countries	Level of priority	Potential financing sources	Link with other relevant strategies	Potential actors
5.1	Increase the number of target species subject to stock assessment	Complete view of the status of stocks exploited by artisanal and commercial fishing.	All countries	High	IFP, NF, OSF		MO, NA, IS, NGO and other stakeholders
5.2	Ensure a more effective implementation of the ecosystem approach to artisanal and commercial fishing, paying particular attention to vulnerable marine ecosystems.	Artisanal fishing governed according to an ecosystem approach	All countries	High	IFP, NF, OSF	Strategy for sustainable fisheries in the Mediterranean (GFCM) Global Biodiversity Framework for Post 2020 EU biodiversity strategy for 2030	MO, NA, IS, NGO and other stakeholders

1. Very high immediate implementation of the activity, High Implementation of the activity until 2025, Medium Implementation of the activity until 2030, Low Implementation of the activity until 2035

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Mitigation of pressures on marine and coastal biodiversity Objective: Mitigate anthropogenic pressures on marine and coastal biodiversity in the Western Mediterranean. Indicator of objective achievement: Reduced sources of threats and mitigated impacts on marine and coastal biodiversity							
No.	Activity	Expected outcomes	Concerned countries	Level of priority	Potential financing sources	Link with other relevant strategies	Potential actors
5.3	Accurately assess bycatch to identify hotspots, develop a strategy and promote specific mitigation measures to reduce bycatches.	Controlled and reduced accidental bycatch	All countries	High	IFP, NF, OSF	Strategy for sustainable fisheries in the Mediterranean (GFCM) Global Biodiversity Framework for Post 2020 EU biodiversity strategy for 2030 ACCOBAMS strategy	MO, NA, IS, NGO and other stakeholders
5.4	Raise awareness in the fishing sector of the damage caused to marine biodiversity by abandoned or lost fishing gear, and strengthen controls to prevent ghost fishing.	Fishermen and other users of the sea are sensitized.	All countries	High	IFP, NF, OSF	EU SUP Directive	OM, AN, Fishery sector, NGOs and other stakeholders
5.5	Training and awareness-raising on vulnerable species, with regard to best practices relating to methods of treatment and release in the event of capture of vulnerable species.	Awareness-raising of fishermen and other sea users.	All countries	High	IFP, NF, OSF	Strategy for sustainable fisheries in the Mediterranean (GFCM) Global Biodiversity Framework for Post 2020 EU biodiversity strategy for 2030 ACCOBAMS strategy	MO, NA, IS, NGO and other stakeholders
5.6	Implementation of an efficient and standardized data collection system and discharge control system in all Mediterranean countries.	Discharges under control and well controlled.	All countries	High	IFP, NF, OSF	Strategy for sustainable fisheries in the Mediterranean (GFCM) Global Biodiversity Framework for Post 2020 EU biodiversity strategy for 2030 ACCOBAMS strategy	MO, NA, IS, NGO and other stakeholders

Mitigation of pressures on marine and coastal biodiversity Objective: Mitigate anthropogenic pressures on marine and coastal biodiversity in the Western Mediterranean. Indicator of objective achievement: Reduced sources of threats and mitigated impacts on marine and coastal biodiversity							
No.	Activity	Expected outcomes	Concerned countries	Level of priority	Potential financing sources	Link with other relevant strategies	Potential actors
5.7	Strengthen the control and monitoring of fishing activities and establish effective mechanisms to limit Illegal, Unreported and Unregulated fishing (IUU) with a particular attention to the use of drifting nets.	IUU fishing controled	All countries	High	IFP, NF, OSF	Strategy for sustainable fisheries in the Mediterranean (GFCM) Global Biodiversity Framework for Post 2020 EU biodiversity strategy for 2030 ACCOBAMS strategy	MO, NA, IS, NGO and other stakeholders
5.8	Ratification of the International Convention for the Control and Management of Ballast Water and Sediments from Ships (BWM Convention).	BWM Convention ratified	Italy (and all countries)	Medium	IFP, NF, OSF	International Convention for the Control and Management of Ships› Ballast Water and Sediments (BWM Convention). Cadre mondial de la biodiversité pour l'après 2020 EU biodiversity strategy for 2030	MO, NA, IS, NGO and other stakeholders
5.9	Ensure rapid and complete implementation of the new MSFD measure on the national focal point for exotic and dangerous species.	MSFD measures on the focal point are implemented.	Italy (potentially all countries)	Medium	IFP, NF, OSF	Global Biodiversity Framework for Post 2020 EU biodiversity strategy for 2030	MO, NA, IS, NGO and other stakeholders
5.10	Add IMO guidelines on bio-fouling to the prevention list of non-indigenous species.	IMO guidelines on bio-fouling considered in the list of preventions against NIS.	EU recommendation to member countries	Medium	IFP, NF, OSF	IOM Directives Global Biodiversity Framework for Post 2020 EU biodiversity strategy for 2030	MO, NA, IS, NGO and other stakeholders
5.11	Develop strategies and action plans for the mitigation and eradication of the most problematic invasive species.	Key invasive species eradicated	All countries	High	IFP, NF, OSF	Global Biodiversity Framework for Post 2020 EU biodiversity strategy for 2030	MO, NA, IS, NGO and other stakeholders
5.12	Develop an early warning system in the Western Mediterranean to monitor NISs.	Functional NIS warning system.	All countries	High	IFP, NF, OSF	Global Biodiversity Framework for Post 2020 EU biodiversity strategy for 2030	MO, NA, IS, NGO and other stakeholders

Mitigation of pressures on marine and coastal biodiversity Objective: Mitigate anthropogenic pressures on marine and coastal biodiversity in the Western Mediterranean. Indicator of objective achievement: Reduced sources of threats and mitigated impacts on marine and coastal biodiversity							
No.	Activity	Expected outcomes	Concerned countries	Level of priority	Potential financing sources	Link with other relevant strategies	Potential actors
5.13	Reduce the impact of pollutants of land origin and their effects on the quality of seawater as well as on sensitive species and habitats.	Pollutants reduced and their effects decreased	All countries	High	IFP, NF, OSF	MedPOL Programme Global Biodiversity Framework for Post 2020 EU biodiversity strategy for 2030	MO, NA, IS, NGO and other stakeholders
5.14	Identify noise pollution hotspots where there is a strong interaction with cetaceans and sea turtles and other affected species, in order to provide adequate protection measures for the area.	Noise pollution Hotspots identified	All countries	High	IFP, NF, OSF	Global Biodiversity Framework for Post 2020 EU biodiversity strategy for 2030 ACCOBAMS strategy	MO, NA, IS, NGO and other stakeholders
5.15	Develop, in cooperation with industries and specialized companies, technologies to reduce noise pollution in the marine environment.	Noise nuisance in marine environment reduced	All countries	Medium	IFP, NF, OSF	Global Biodiversity Framework for Post 2020 EU biodiversity strategy for 2030	MO, NA, IS, NGO and other stakeholders
5.16	Consider effective maritime traffic management measures to minimize the risk of collision. A good knowledge of the migration routes and other uses and other spatial uses of vulnerable species would certainly help in this direction.	Reduced risk of collision with vulnerable species	All countries	High	IFP, NF, OFS	Global Biodiversity Framework for Post 2020 EU biodiversity strategy for 2030 ACCOBAMS strategy	MO, NA, IS, NGO and other stakeholders
5.17	Establish / Strengthen the monitoring system for climate change and its effects on marine and coast biodiversity in the Western Mediterranean and riparian countries.	Well-developed and functional CC monitoring systems	All countries	High	IFP, NF, OFS	Global Biodiversity Framework for Post 2020 EU biodiversity strategy for 2030	MO, NA, IS, NGO and other stakeholders
5.18	Promote research on the assessment of the cumulative effects of current pressures in the countries (other than those of tourism and recreation).	Knowledge of cumulative effects improved	All countries	Medium	IFP, NF, OFS	Global Biodiversity Framework for Post 2020 EU biodiversity strategy for 2030	MO, NA, IS, NGO and other stakeholders

Mitigation of pressures on marine and coastal biodiversity Objective: Mitigate anthropogenic pressures on marine and coastal biodiversity in the Western Mediterranean. Indicator of objective achievement: Reduced sources of threats and mitigated impacts on marine and coastal biodiversity							
No.	Activity	Expected outcomes	Concerned countries	Level of priority	Potential financing sources	Link with other relevant strategies	Potential actors
5.19	Promote studies on the carrying capacity of ecosystems for tourist and recreational activities and propose measures to reduce their effects.	Cumulative impacts of tourism on habitats and marine species are reduced.	All countries	High	IFP, NF, OFS	Marine strategies Maritime space planning Blue Growth	
5.20	Promote ecological restoration of disturbed habitats.	Disturbed habitats are restored and their ecological functions and services recovered	All countries	Medium	IFP, NF, OFS	Global Biodiversity Framework for Post 2020 EU biodiversity strategy for 2030	MO, NA, IS, NGO and other stakeholders
5.21	Promote the development of the blue economy for better conservation of biodiversity in the Western Mediterranean.	Blue economy promoted in the countries of the western basin	All countries	High	IFP, NF, OFS	Global Biodiversity Framework for Post 2020 EU biodiversity strategy for 2030	MO, NA, IS, NGO and other stakeholders

Capacity building Objective: Strengthen the capacities of countries in the study and conservation of marine biodiversity. Indicator of objectivve achievement : Improvement of stakeholders' capacities							
No.	Activity	Expected outcomes	Concerned countries	Level of priority	Potential financing sources	Link with other relevant strategies	Potential actors
6.1	Capacity building, in particular for marine environment conservation objectives, targeting managers and field technicians, local authorities responsible for the environment, fisheries and enforcement.	Strengthened capacities for biodiversity conservation and sustainable use of marine resources.	All countries	High	IFP, NF, OFS	Global Biodiversity Framework for Post 2020 EU biodiversity strategy for 2030	MO, NA, IS, NGO and other stakeholders
6.2	Develop / strengthen local and national and regional networks around marine and coast biodiversity in the Western Mediterranean (harmonized monitoring systems, application procedures and / or management of MPAs, etc.).	Functional local, national and regional capacity building networks	All countries	Medium	IFP, NF, OFS	Global Biodiversity Framework for Post 2020 EU biodiversity strategy for 2030	MO, NA, IS, NGO and other stakeholders

Transboundary actions

Objective: Strengthen cross-border actions in terms of knowledge, conservation and management of marine and coast biodiversity

Indicator of objective achievement : Increase in cross-border actions between the various countries of the Western Mediterranean

No.	Activity	Expected outcomes	Concerned countries	Level of priority	Potential financing sources	Link with other relevant strategies	Potential actors
7.1	Develop cross-border projects around priority themes identified in the western sub-region (inventories, mapping, etc.).	Improved knowledge across the sub-region	All countries	High	IFP, NF, OFS	Global Biodiversity Framework for Post 2020 EU biodiversity strategy for 2030	MO, NA, IS, NGO and other stakeholders
7.2	Ensure better and more effective integration of questions relating to biodiversity protection with other sectoral policies and by considering the protection of biodiversity in a systemic logic, which provides for coordinated local and sub-regional actions consistent with general objectives of the ecosystemic approach.		Italy		IFP, NF, OFS	Global Biodiversity Framework for Post 2020 EU biodiversity strategy for 2030	MO, NA, IS, NGO and other stakeholders
7.3	Help countries develop coordinated management of MPAs or ECAs.	Coordinated management of MPAs and AMCEs	All countries	High	IFP, NF, OFS	Global Biodiversity Framework for Post 2020 EU biodiversity strategy for 2030	MO, NA, IS, NGO and other stakeholders
7.4	Provide, within MPAs, a systematic, coordinated and coherent monitoring system, shared at the sub-regional level, in order to also facilitate data comparability.	Data from ecological monitoring are comparable and vision at the sub-regional scale is improved	All countries	High	IFP, NF, OFS	Global Biodiversity Framework for Post 2020 EU biodiversity strategy for 2030	MO, NA, IS, NGO and other stakeholders
7.5	Improve cooperation between countries for the definition of transboundary measures at sub-regional level with regard to non-indigenous and invasive species.	Regional measures established for NIS and invasive species	All countries	High	IFP, NF, OFS	Global Biodiversity Framework for Post 2020 EU biodiversity strategy for 2030	MO, NA, IS, NGO and other stakeholders
7.6	Support countries to identify and declare MPAs and AMCEs outside national jurisdictions, especially in high seas.	Significant number of MPAs and AMCEs outside national jurisdictions	All countries	Very high	IFP, NF, OFS	Global Biodiversity Framework for Post 2020 EU biodiversity strategy for 2030	MO, NA, IS, NGO and other stakeholders

Integration of biodiversity in other sectors Objective: Strengthen the integration of biodiversity in all sectors related to the marine environment Indicator of objective achievement: Biodiversity well integrated at the sub-regional level and in riparian countries							
No.	Activity	Expected outcomes	Concerned countries	Level of priority	Potential financing sources	Link with other relevant strategies	Potential actors
8.1	Promote better integration of stakeholders in maritime spatial planning to adopt systematic conservation planning.	The participation of all stakeholders in territorial planning decisions and actions	All countries	Very high	IFP, NF, FS	Global Biodiversity Framework for Post 2020 EU biodiversity strategy for 2030	MO, NA, IS, NGO and other stakeholders
8.2	Promote the concepts of Gender and Equity in the conservation of marine and coast biodiversity.	Gender and equity respected in the management and conservation of marine and coast biodiversity	All countries	Very high	IFP, NF, OFS	Global Biodiversity Framework for Post 2020 EU biodiversity strategy for 2030	MO, NA, IS, NGO and other stakeholders
8.3	Strengthen citizen science in terms of observations and ecological monitoring.	Strengthening knowledge and ecological monitoring programmes	All countries	Very high	IFP, NF, OFS	Global Biodiversity Framework for Post 2020 EU biodiversity strategy for 2030	MO, NA, IS, NGO and other stakeholders

Sustainable Financing Objective: Ensure sustainable funding for the characterization, monitoring and conservation of marine biodiversity Indicator of objective achievement réalisation des objectifs: The actions proposed in the PASBIO post 2020 are carried out							
No.	Activity	Expected outcomes	Concerned countries	Level of priority	Potential financing sources	Link with other relevant strategies	Potential actors
9.1	Support the development of national or sub-regional trust funds or other innovative and sustainable financing mechanisms to support the proper management of MPAs.	National and sub-regional trust funds are established	All countries	Very high	IFP, NF, OFS	Global Biodiversity Framework for Post 2020 EU biodiversity strategy for 2030	MO, NA, IS, NGO and other stakeholders
9.2	Assist and strengthen the capacity of MPAs to develop long-term mechanisms to support their management.	MPAs sufficiently autonomous in terms of budget or participate significantly in the financing of its management	All countries	High	IFP, NF, OFS	Global Biodiversity Framework for Post 2020 EU biodiversity strategy for 2030	MO, NA, IS, NGO and other stakeholders
9.3	Encourage public-private partnerships to co-finance marine conservation and MPAs.	Significant involvement of the private sector in biodiversity issues	All countries	High	IFP, NF, OFS	Global Biodiversity Framework for Post 2020 EU biodiversity strategy for 2030	MO, NA, IS, NGO and other stakeholders

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SPA/RAC WORKING AREAS

*SPA/ RAC, the UNEP/ MAP **Specially Protected Areas Regional Activity Centre**, was created in 1985 to assist the Contracting Parties to the Barcelona Convention (21 Mediterranean contries and the European Union) in implementing the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean (SPA/BD Protocol).*

POST-2020
SAPBIO

Strategic Action Programme for the **Conservation** of **Biodiversity** and **Sustainable Management** of **Natural Resources** in the **Mediterranean Region**

Marine turtles

Cetaceans

Mediterranean Monk Seal

Cartilaginous fishes
(Chondrichtyans)

Marine and coastal bird species
Listed in Annex II of the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean

SPAMI

Specially Protected Areas of Mediterranean Importance

Specially Protected Areas

Monitoring

Coralligenous and other calcareous bio-concretions

Marine vegetation

Dark Habitats

Habitats and species associated with seamounts, underwater caves and canyons, aphotic hard beds and chemo-synthetic phenomena

Species introduction and invasive species

POST-2020

SAP BIO

Strategic Action Programme
for the **Conservation** of **Biodiversity**
and **Sustainable Management**
of **Natural Resources**
in the **Mediterranean Region**

UN environment programme

Mediterranean Action Plan
Barcelona Convention

SPA / RAC
The Mediterranean Biodiversity Centre

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