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Mediterranean Action Plan
Barcelona Convention

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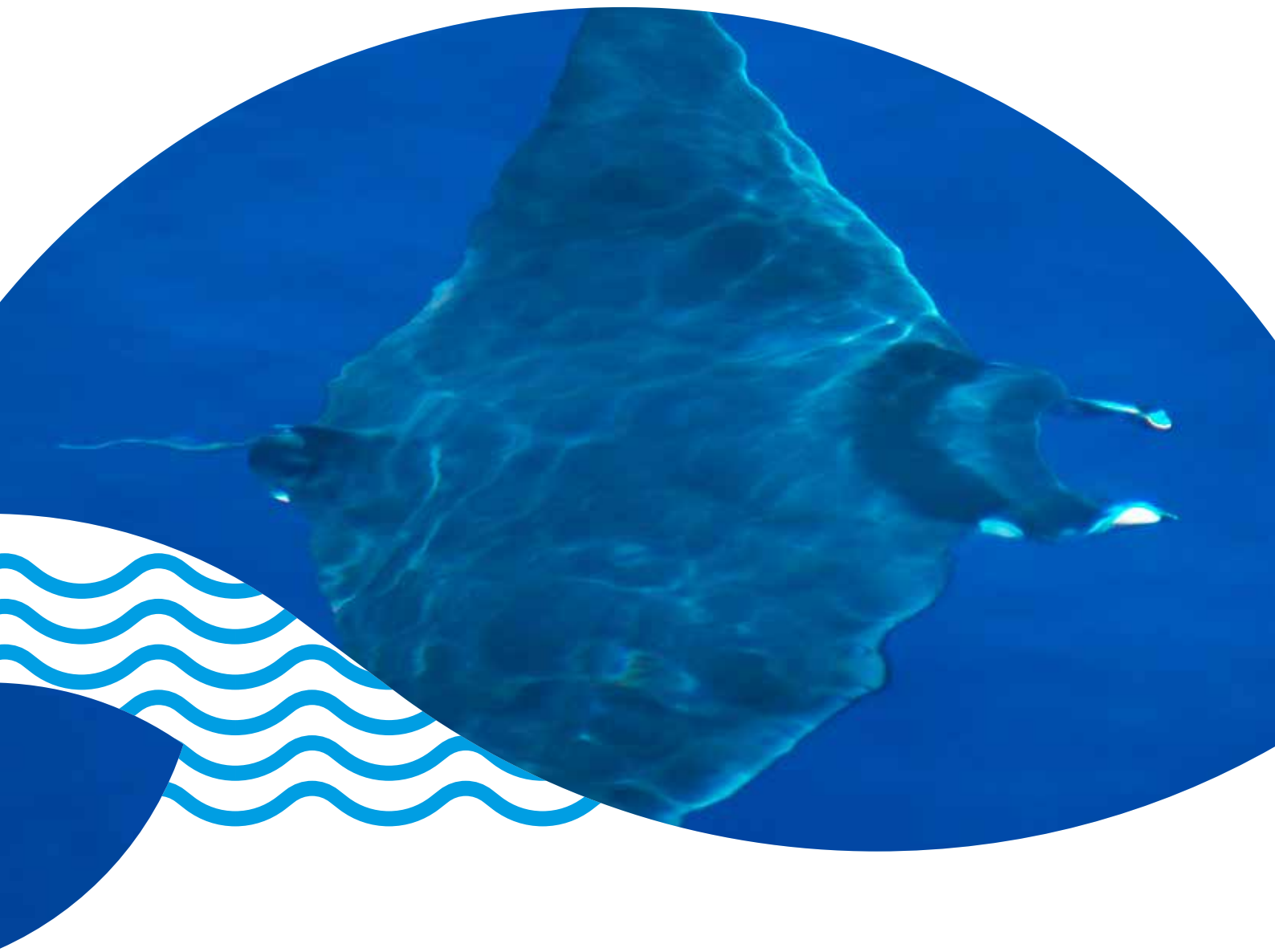
POST-2020 SAP BIO

CONSERVATION OF MARINE AND COASTAL BIODIVERSITY IN THE ADRIATIC SEA SUB-REGION BY 2030 AND BEYOND



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CONSERVATION OF MARINE AND COASTAL BIODIVERSITY IN THE ADRIATIC SEA 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

Barcelona Convention	The Barcelona Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean
BiH	Bosnia and Herzegovina
CAMP	Coastal Area Management Programme
CFP	Common Fisheries Policy
COP	Conference of the Parties
EcAp	Ecosystem approach under Barcelona Convention
EU	European Union
GDP	Gross Domestic Product
GEF Adriatic	GEF supported project - Implementation of Ecosystem Approach in the Adriatic Sea through Marine Spatial Planning
GFCM	General Fisheries Commission for the Mediterranean
IAS	Invasive Alien Species
ICCAT	International Commission for Conservation of Atlantic Tunas
ICZM	Integrated Coastal Zone Management
IMAP	Integrated Mediterranean Monitoring and Assessment Programme
IUCN	International Union for Conservation of Nature
IUCN ECARO	IUCN Regional Office for Eastern Europe and Central Asia
MPA	Marine (and coastal) Protected Areas
MSFD	EU Marine Strategy Framework Directive
MSP	Maritime/Marine Spatial Planning
NETCET	EU IPA Adriatic project - Network for the Conservation of Cetaceans and Sea Turtles in the Adriatic
NIS	Non-indigenous species
OECM	Other effective area-based conservation measures
PAP/RAC	Priority Actions Programme Regional Activity Centre
Post-2020 SAPBIO	Post-2020 Strategic Action Programme for the Conservation of Biodiversity and Sustainable Management of Natural Resources in the Mediterranean Region
SAPBIO	Strategic Action Programme for the Conservation of Biological diversity in the Mediterranean Region
SOUNDSCAPE	EU INTERREG Croatia-Italy project – Soundscapes in the north Adriatic Sea and their impact on marine biological resources
SPA/BD Protocol	Protocol concerning specially protected areas and biological diversity in the Mediterranean
SPA/RAC	Specially Protected Areas Regional Activity Centre
SPAMI	Specially Protected Areas of Mediterranean Importance
UNCLOS	United Nations Convention on the Law of the Sea
UNEP/MAP	Mediterranean Action Plan of the UN Programme for Environment
WWF	The World Wide Fund for Nature

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Executive Summary

Preparation of the Sub-regional report for the Adriatic Sea is and intermediate step in the participatory process of elaboration of the Post 2020 SAP-BIO; a Mediterranean level strategy for conservation of biodiversity under Barcelona Convention. As such, it is prepared foremostly based on national reports developed in 2020 under the guidance of SPA/RAC by each of the 6 Adriatic countries: Albania, Bosnia and Herzegovina, Croatia, Italy, Montenegro and Slovenia. In addition, other resources were used, foremostly documents that provide overviews of state of biodiversity and pressures specifically at the Adriatic level. The Draft document was discussed and revised in the Adriatic Sea sub-regional workshop, with participation of representatives of Adriatic countries, UNEP/MAP, SPA/RAC and WWF Adria.

Sub-regional report consists of description of methodology; overview of key biodiversity values of the Adriatic Sea and their status; main threats, pressures and impacts to biodiversity; main responses; main gaps and challenges; main opportunities for transboundary cooperation, and finally conclusions and recommendations for needed actions and Adriatic Sea level strategic orientations.

Adriatic Sea is a northernmost semi-enclosed part of the Mediterranean Sea, featured with rich biodiversity, but also with presence of various anthropogenic economic activities, as sources of pressures and impacts on biodiversity, which accentuate even more being concentrated in such an enclosed area. The one of the peculiarities of the Adriatic Sea is also the main coastal sea current, which runs from south to the north, and back to the Ionian Sea. Due to all indicated main features, any conservation effort in the Adriatic Sea must be undertaken in close cooperation between all Adriatic countries.

The current responses to all biodiversity related challenges are very much linked to the political position of the Adriatic countries. Majority of countries are EU Member States, with non-EU candidate or potential candidate countries present in the south-eastern and southern part of the Adriatic. The EU membership supports, among all, better data availability, development of adequate legislative framework and acquisition of more sufficient funding for biodiversity conservation.

Main gaps and challenges for biodiversity conservation may be grouped into:

- Lack of knowledge on biodiversity status, ecosystem services, pressures and impacts on biodiversity (including data availability and sharing), particularly for coralligenous communities, deep/dark and pelagic habitats, and ecosystem services provided by the marine and coastal environment on the one hand, and NIS/IAS pathways, bycatch of

vulnerable species, commercial exploitation of invertebrates, climate change stressors, marine litter and underwater noise, as well as cumulative impacts on the other hand,

- Lack of legislation fully addressing conservation of marine environment in non-EU countries and species conservation planning in general,
- Limited capacities, limited cooperation between different sectors and lack of involvement of general public in conservation,
- Lack of MPAs representativity and weak management,
- Limited implementation of other conservation mechanisms and measures,
- Insufficient funding.

At the same time there are strongpoints which present important assets for improvement of current situation, particularly already set legislation and institutional frameworks and implementation of conservation measures with the strong support from the EU funds and GEF, as well as already evident change in consumers habitats, opportunities to strengthen general public cooperation through initiatives such as citizen science etc. On the other hand, it is important to be aware that current threats could only be more intensified in the future, notably due to anticipated increase of intensity of majority of economic activities.

Countries have identified various future needs to address current challenges, which all have a potential for transboundary cooperation.

Based on analysis of present state of marine and coastal biodiversity in the Adriatic Sea sub-region, identification of gaps and future needs, five strategic objectives were identified under five main themes with clear indicators and supported with 36 more concrete proposed activities. The main objectives are:

- **Improving knowledge on biodiversity, with focus on priority species and habitats (SPA/BD Protocol and EU directives)**, notably mapping of seagrass meadows, coralligenous, deep/dark habitats, as well as migratory species. Offshore areas are of particular interest,
- **Mitigating anthropogenic pressures on marine and coastal biodiversity in the Adriatic Sea, with active cooperation of all relevant stakeholders**, with focus on assessment, monitoring and mitigation of impacts of NIS/IAS and addressing climate change,
- **Improving representativity of marine and coastal protected areas and status of biodiversity in them**, notably extend the existing MPA network, particularly in the open sea and in the southern Adriatic, as well as to improve overall management effectiveness,
- **Improving experts' capacities at the Adriatic level and involvement of stakeholders**, focusing on exchange of knowledge between sub-regional experts, involvement in

biodiversity monitoring through citizen science and active participation in management of MPAs,

- **Ensuring sufficient long-term funding for conservation activities**, through better use of already available funds, but also by exploring and using new funding mechanisms, such as private-public partnerships.

It should be stressed that proposed actions are also linked to regional, EU level and global strategies on biodiversity and pressures, notably Post-2020 global biodiversity framework under the CBD (under development), EU Biodiversity Strategy for 2030, ACCOBAMS Strategy for 2014 – 2025 and new strategy for Mediterranean and Black Sea fisheries and aquaculture under the GFCM (under development).

Introduction

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The Mediterranean Sea is one of the biodiversity hot-spots, but at the same time it is a subject of significant and increasing human pressures. The key to effective conservation of biodiversity is finding a balance between these two components, and to do so, it is important to think strategically and well in advance. In November 2003 at the COP 13 in Catania (Italy), the Contracting Parties to the Barcelona Convention adopted the first comprehensive strategic plan to conserve biodiversity in the Mediterranean Region - SAPBIO. Since then, SAPBIO has played an important role both as a strategic framework for implementation of the SPA/BD Protocol at national and regional levels for all concerned stakeholders (governmental, non-governmental and inter-governmental actors) and in facilitating exchanges among departments within and among countries on common concerns in biodiversity conservation. Considering the changes occurred in relation to the status of Mediterranean biodiversity and the related policies, the Barcelona Convention COP 21 (December 2019) requested to prepare in 2020-2021 the Post-2020 Strategic Action Programme for the Conservation of Biodiversity and Sustainable Management of Natural Resources in the Mediterranean Region (Post-2020 SAPBIO). This strategic programme should be specifically tailored to address current and future regional and national challenges in the Mediterranean, and in doing so, to contribute to global processes, particularly the 2030 Agenda for Sustainable Development and Sustainable Development Goals (SDGs) and CBD Post-2020 Global Biodiversity Framework.

The elaboration of the Post-2020 SAPBIO follows a bottom-up and participatory approach, starting with the development of national reports, which then represent bases for sub-regional level analyses and consultations for 4 sub-regions, including the Adriatic Sea. The main objective of the sub-regional report is to promote complementarity and harmonisations of the priority actions identified at national level, most notably for transboundary issues such as biological invasions, climate change, representativity and connectivity of MPAs. This report will further indicate the objectives to achieve and priority actions at the Mediterranean level.

2. Methodology

The Sub-regional report for the Adriatic Sea is prepared by the SPA/RAC selected sub-regional expert, under the coordination of SPA/RAC and in cooperation with different national and sub-regional stakeholders.

The preparation of the document is foremostly based on desk research, complemented with inputs from different stakeholders during the sub-regional workshop organised on 26 February 2021

The most relevant documents used for preparation of the sub-regional report are national reports prepared in 2020 under the guidance of SPA/RAC by each of the 6 Adriatic countries: Albania, Bosnia and Herzegovina, Croatia, Italy, Montenegro and Slovenia. The national reports contain, among all, analysis of current state, pressures, responses and identified needs and future priorities. These reports were prepared by appointed national experts and finalized after the national workshops with relevant stakeholders, organised in July (Albania and Slovenia) and October 2020 (BiH, Croatia, Montenegro and Italy). Besides national reports, following main groups of documents were used:

- National reports describing GES of the Barcelona Convention Ecosystem Approach prepared under UNEP/GEF Adriatic project (Albania and Montenegro) and by some EU Member States pursuant to the obligations under the EU MSFD (Croatia)
- Adriatic level specific reports on state of marine biodiversity and pressures, prepared under:
  - UNEP/MAP SPA/RAC,
  - WWF,
  - In the framework of the Adriatic transboundary cooperation project EU IPA-Adriatic NETCET.
- Additional scientific literature on different group of species in the Adriatic Sea
- Mediterranean level reports on environment and state of fisheries, prepared by UNEP/MAP Plan Bleu and GFCM
- Strategic documents at the global, European and Mediterranean levels; Post-2020 global biodiversity framework under the CBD (in preparation process), EU Biodiversity Strategy for 2030, ACCOBAMS Strategy for 2014 – 2025 and new strategy for Mediterranean and Black Sea fisheries and aquaculture under the GFCM (in preparation process).

The full list of all used documents is provided in the List of References.

The Draft Sub-regional report for the Adriatic Sea was presented to different stakeholders during the sub-regional workshops organized on-line on 26 February 2021. Altogether 26 participants were present from almost all Adriatic countries (except BiH), UNEP/MAP SPA/RAC, WWF Adria (full list in Annex 1). As a result, 5 set of comments were received from representatives of Albania, Croatia, Italy, Slovenia and WWF Adria. The comments were integrated in the Draft document and submitted as the Final version of the document to the SPA/RAC. This document represents a basis for compiling the Mediterranean level SAP/BIO document.

Key biodiversity values of the Adriatic sea and their present status

3.1. main physical and geopolitical features

The Adriatic Sea is the northern semi-enclosed arm of the Mediterranean Sea, which is over 800 km long and around 150 – 200 km wide, with surface area of 138.600 km^2 and average depth of 252,2 m. The Adriatic continental shelf is the most extensive one in the central Mediterranean Sea. The Adriatic basin can be divided into three sub-basins: the shallow northern Adriatic, with average depth of about 35 m; central and middle Adriatic, featured with three depressions; and deep southern Adriatic, with maximum depth of around 1.200 m (Figure 1). The western coast is largely sedimentary, low and mostly sandy, while the eastern coast is generally high and rocky, consisting of karst and featured with numerous islands, particularly along the Croatian coast. The Adriatic Sea has a water volume of about 35.000 km^3; 80% of which is held in the southern portion of the basin. The main freshwater inflow comes from the Po River in the north. It is considered a mildly warm sea, with high salinity - 38,30‰. One peculiarity of the Adriatic Sea is the flow of the main sea current, which runs from the south up to the north along the eastern coast, and then returns back to the south along the western coast.

The Adriatic Sea is bordered by Albania, Bosnia and Herzegovina, Croatia, Italy, Montenegro and Slovenia. Italy and Croatia have the longest coast, while Bosnia and Herzegovina and Slovenia the shortest (21,2 km and 47 km respectively).

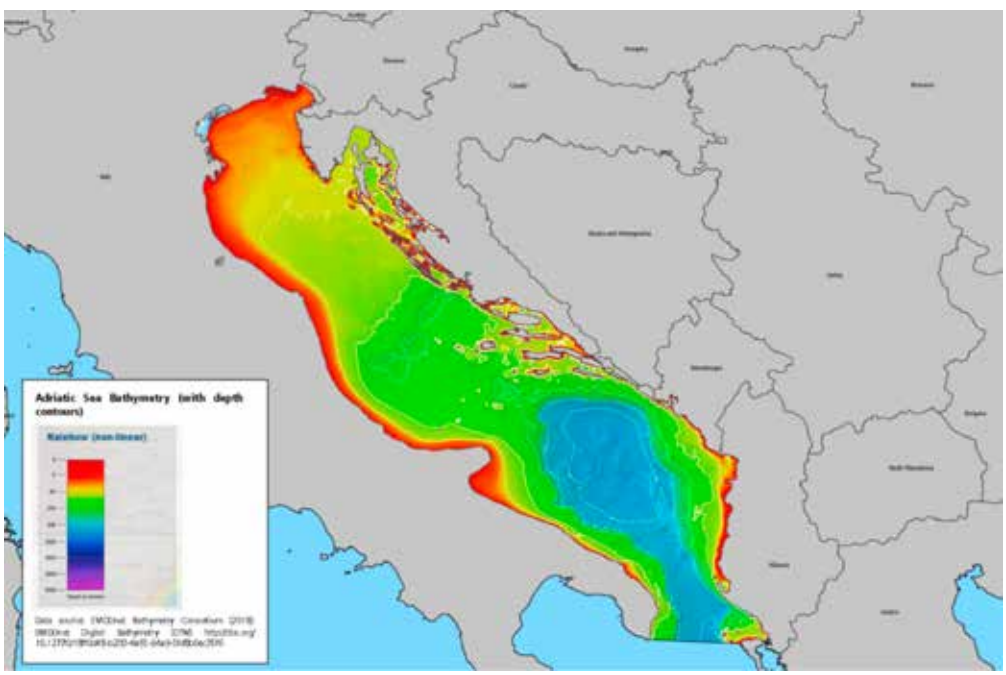

Figure 1.
Adriatic Sea bathymetry, as basis for division on sub-basins. Prepared by Petra Štrbenac (Stenella consulting, Croatia) based on EMODnet Bathymetry Consortium, 2018: EMODnet Digital Bathymetry)

3.2. Biodiversity characteristics

The Adriatic Sea contains diverse and unique habitats, which provide home for more than 7.000 species, including many endemic and rare species. It is estimated that 49 % of the known forms of life in the Mediterranean are present in the Adriatic Sea.

3.2.1. Benthic habitats

The Adriatic Sea's most notable marine and coastal habitats are seagrass (Posidonia) meadows, coralligenous, sea caves, coastal lagoons and marshes. Seagrass meadows are considered as one of the most important habitats in the Adriatic in biological, ecological and economic sense. Some of habitats are very specific for the Adriatic Sea, such as submerged marine caves, submerged freshwater springs, karstic estuaries and marine lakes. There is no detailed habitat map for the Adriatic, only few habitat maps exist covering national territorial waters, such as habitat map of the Croatian part of the Adriatic, which is currently being updated and mapped in a more detailed way. The knowledge on distribution, abundance and condition of habitats is limited, particularly for coralligenous and dark habitats. Although knowledge on Posidonia meadows is better, trends are still not fully known. Still, according to the available information from the Croatian strategy document prepared pursuant to obligations from Articles 8, 9 and 10 of the EU MSFD, it seems that Posidonia meadows are in a good state in the largest portion of the eastern Adriatic.

3.2.2. Water column biological communities

The Adriatic basin is featured with the hyper-productive and mesotrophic north and central western coast, as well as more oligotrophic eastern and southern coasts. The highest levels of production are linked to the discharges of the Po River on the west coast of the Adriatic Sea.

The Adriatic is characterized by high biodiversity of phytoplankton. The literature concerning phytoplankton distribution and dynamics in the Adriatic Sea is wide, however information is often limited to coastal areas and mostly to the northern Adriatic. The typical phytoplankton annual dynamics in the northern Adriatic Sea shows a succession between diatom-dominated and phytoflagellate-dominated phytoplankton assemblages. Oligotrophy of the central and southern Adriatic Sea is reflected in the phytoplankton assemblages dominated by nanoplankton (small flagellates, coccolithophorids and nanoplanktonic dinoflagellates).

Feeding on phytoplankton, zooplankton in the Adriatic Sea has the highest biomass and species richness of the Mediterranean basin. Geographically, northern Adriatic is a habitat for smaller number of very abundant species, whilst the highest biodiversity is characteristics of the deeper southern Adriatic waters.

The condition of plankton could be only partly assessed. So far, based on the national documents related to the GES assessment under Barcelona Convention EcAP (Albania,

Montenegro) and EU MSFD (Croatia), it could be estimated that the GES is achieved in the largest portion of the eastern Adriatic (Croatia, Montenegro), but situation further in the south and in the western Adriatic coast is still not known (Albania).

3.2.3. Invertebrate bottom fauna, macro-algae and angiosperms

The Adriatic Sea is home of four species of **angiosperms**: *Posidonia oceanica*, *Cymodocea nodosa*, *Zostera marina* and *Zostera noltii*. *Posidonia oceanica* shows the widest distribution and a greater biomass, forming extensive seagrass meadows.

The brown **macroalgae** of the genus Cystoseira forms already indicated important habitat type - photophilic algal communities. *Fucus virsoides* is an endemic species to the Adriatic. Red algae *Lithophyllum byssoides* and *L. trochanter* play have an important ecological role in forming of coralligenous , particularly in the western part of the Adriatic.

Corals are important benthic **invertebrates**, due to their role in building of coralligenous habitat. *Corallium rubrum* (red coral) is one of the most characteristic species, which is also considered the indicator of GES. The knowledge on distribution, abundance and conservation status of *C. rubrum* is very limited, but so far it is recorded in the western and the largest portion of the eastern Adriatic Sea (except Slovenia, Bosnia and Herzegovina and Montenegro). In Croatia and Italy, it is assessed as EN (Endangered) according to the IUCN classification. Along the eastern Adriatic coast several populations of gold coral (*Savalia savaglia*) and black coral (*Anthipatella subpinnata*) have been recorded, which play a key structural and functional role as ecosystem engineers.

Adriatic Sea is also a habitat for two vulnerable mollusc species with significant ecological role: *Pinna nobilis* and *Lithophaga lithophaga*. Besides being listed on Annex II of Endangered or Threatened species of the SPA/BD Protocol, *P. nobilis* is recently listed as Critically Endangered on the IUCN Red List, due to mass mortality.

3.2.4. Vertebrates other than fish

Marine mammals

Eleven marine mammal species are recorded in the Adriatic Sea: ten cetacean and one pinniped species. The Mediterranean monk seal (*Monachus monachus*) is the only recorded seal species, which in the past was regular inhabitant of the Adriatic Sea. However, at present time, it only appears occasionally. Four cetaceans are regular in the Adriatic: bottlenose dolphin (*Tursiops truncatus*), stripped dolphin (*Stenella coeruleoalba*), Cuvier's beaked whale (*Ziphius cavirostris*) and Risso's dolphin (*Grampus griseus*) (Table 1). Common dolphin (*Delphinus delphis*) used to be common in the Adriatic until late 1970^{s}, but at present, it is only very rarely sighted.

Fin whale (*Balaenoptera physalus*) is the only baleen whales' species with regular seasonal sightings in the central Adriatic over the last decade. In 2020, more frequent occurrence of this species has also been recorded in some other parts of the Adriatic, up to the Gulf of Trieste.

The most abundant species are striped dolphins and bottlenose dolphins, which are present in relatively large number and year-round.

Based on combined results of the first two aerial surveys, carried out in the summer of 2010 and 2013, 5.700 specimens of bottlenose dolphin are estimated in the entire Adriatic, with 0,042 specimen per km^2. Estimated abundance of striped dolphins in 2010 is minimally 15.343 individuals and 41.533 in 2013 survey. Third aerial survey was carried out in 2018 in the scope of the ACCOBAMS Survey Initiative (ASI) project, but the data are still being processed.

Population structure of marine mammals in the Adriatic Sea is still unknown. Furthermore, no assessments of conservation status of cetaceans were carried out at the Adriatic Sea level, such as regional assessment based on the IUCN criteria.

Table 1.

Cetacean species recorded and confirmed in the Adriatic Sea. Source: Fortuna et al, 2015, EU IPA Adriatic NETCET project

Species scientific name	Species common name	Current occurrence in the Adriatic
Tursiops truncatus	Common bottlenose dolphin (hereafter bottlenose dolphin)	Regular
Stenella coeruleoalba	Striped dolphin	Regular (southern Adriatic), occasional (northern and central Adriatic)
Delphinus delphis	Common dolphin	Rare visitor
Ziphius cavirostris	Cuvier's beaked whale	Regular
Grampus griseus	Risso's dolphin	Regular (southern Adriatic)
Balaenoptera physalus	Fin whale	Seasonally regular (central and southern Adriatic)
Physeter macrocephalus	Sperm whale	Rare visitor (all basin), potentially regular (southern Adriatic)
Pseudorca crassidens	False killer whale	Not occurring
Globicephala melas	Long-finned pilot whale	Not occurring
Megaptera novaeangliae	Humpback whale	Rare visitor or not occurring

Marine reptiles

Three species of marine turtles occur in the Adriatic Sea: (i) the loggerhead turtle (*Caretta caretta*); (ii) the green turtle (*Chelonia mydas*); and (iii) the leatherback turtle (*Dermochelys coriacea*).

The most abundant species is loggerhead turtle. The northern and central Adriatic represent some of the largest neritic habitats, and pelagic habitats are present in the parts of Ionian and southern Adriatic Sea. Furthermore, recent research showed that loggerhead turtles inhabiting the Adriatic dominantly belong to Greek nesting population (75%). There are some records on nesting activity in Albania, but due to ongoing increase of temperature caused by climate change, there is a potential that more nesting activities will occur in the future. Combined data from already mentioned 2010 and 2013 summer aerial surveys in the Adriatic Sea, show the northern Adriatic is the most abundant area for loggerhead turtle, with the estimated 27.000 specimen in the entire Adriatic and relative density of 0,203 individuals per km^2. As already mentioned, results of the ACCOBAMS ASI project aerial survey should provide a better knowledge on marine turtles, as well as results of the ongoing LIFE EUROTURTLES project.

Same as with marine mammals, population structure of marine turtles in the Adriatic Sea is unknown, nor the conservation status at the Adriatic Sea level.

Sea birds

The seabird community in the Adriatic Sea only represents a small fraction of all the seabirds found in the Mediterranean, which is linked with absence of significant oceanographic features in the Adriatic.

Four true seabird species occur in the Adriatic Sea: Scopoli's shearwater (*Calonectris diomedea)*, Yelkouan shearwater (*Puffinus yelkouan)*, European shag (*Phalacrocorax aristotelis desmarestii*) and Audouin's gull (*Larus audouinii*). These species highly depend on good status of marine environment, because they feed on the sea, mainly on large areas. Main habitats of true seabirds are located in the central and northern part of the Adriatic (Figure 2), where they nest and breed. Islands in the eastern Adriatic are also habitats of Eleonora's falcon (*Falco eleonorae*).

Coastal wetlands are important habitats for nesting and wintering of water birds, particularly in the southern Adriatic.

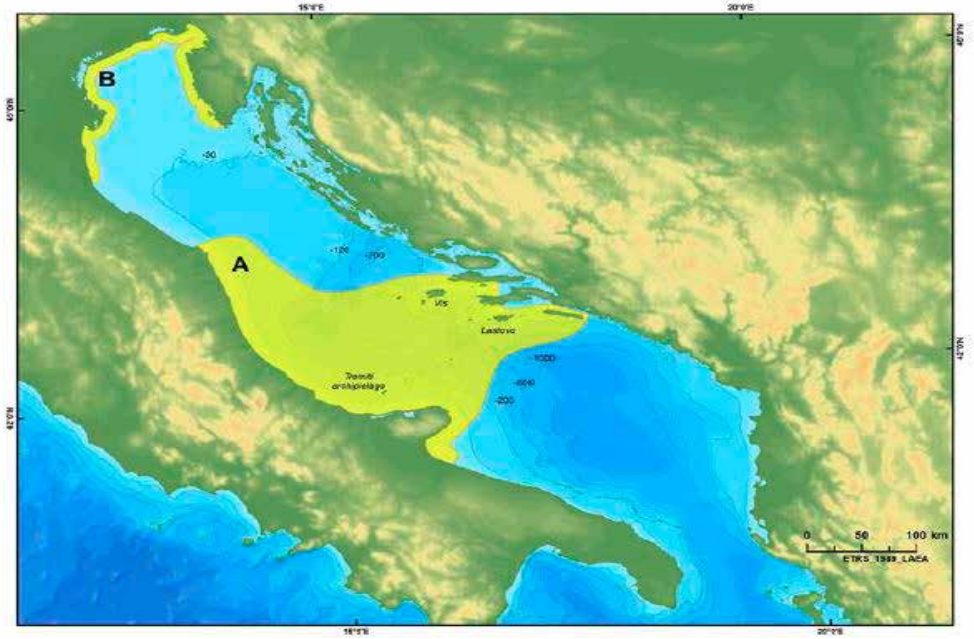

Figure 2.
View of the study area (Adriatic Sea), showing the Important Areas for the conservation of seabirds proposed – A: Central Adriatic Sea, B: Northern Adriatic Sea. Source: UNEP/MAP – RAC/SPA by Requena and Carboneras, 2015 for RAC/SPA.

3.2.5. Fish, including molluscs and shellfish species of commercial interest

Altogether 452 fish species (Elasmobranchii 53, Actinopterygii 397) are recorded in the Adriatic Sea so far, representing approximately 70% of Mediterranean taxa, with at least 7 species endemic to the Adriatic, including Adriatic sturgeon (*Acipenser naccarrii*). The available data suggest that the Adriatic is a nursery and spawning area for many large shark species (Figure 3). The central and southern Adriatic is also important for endangered species giant devil ray (*Mobula mobular*).

About 120 of fish species has certain commercial significance. The Adriatic Sea is one of the largest areas of occurrence of demersal and small pelagic shared stocks in the Mediterranean, such as sardine (*Sardina pilchardus*), anchovy (*Engraulis encrasicolus*), horse mackerel (*Trachurus spp.*) and mackerel (*Scomber spp.*). Furthermore, it is also one of the most important habitats for the growth of tunas, which according to the literature data, spawn in the Mediterranean. On the continental shelf from 10-50 depth the dominant fish species in terms of biomass are red mullet (*Mullus barbatus*), poor cod (*Trisopterus minutus*), various species of triglids, sole (*Solea solea*), various species of flatfishes, gobies and pandoras (*Pagellus spp.*). Anglerfish (*Lophius* spp.), European hake (*Merluccius merluccius*), greater forkbeard (*Phycis blennoides*) and red bandfish (*Cepola rubescens*) are abundant deeper than 50 m, as well as blue whiting (*Micromesistius poutassou*) at 100 to 200 m deep. The continental shelf a is also rich in invertebrate fauna, where some of the most abundant species are cuttlefish (*Sepia officinalis and S. elegans*), octopuses (*Eledone*

moschata, Eledone cirrhosa and *Octopus vulgaris*), squids (*Loligo vulgaris and Alloteuthis media*), shrimps (deep-sea pink shrimp (*Parapenaeus longirostris*), Norway lobster (*Nephrops norvegicus*) and scallops (*Pecten jacobaeus and Chlamys opercularis*).

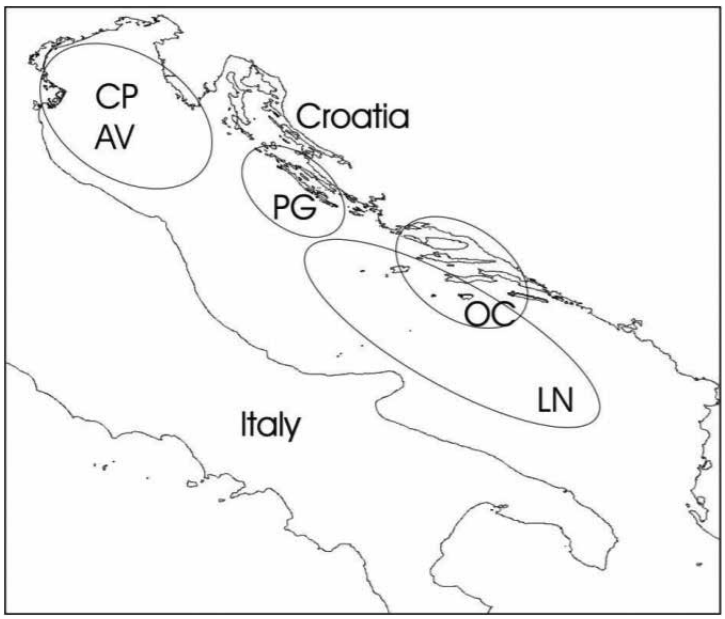

Figure 3.
Possible nursery areas in the Adriatic for large shark species Carcharhinus plumbeus (CP), Alopias vulpinus (AV), Prionace glauca (PG), Oxynotus centrina (OC), and Lamna nasus (LN). Source: UNEP-MAP-SPA/RAC. 2014.

4.

Main threats, pressures and impacts on biodiversity

4.1. Economic drivers and pressures

The various anthropogenic economic activities in the Adriatic generate pressures to marine and coastal ecosystems; notably urbanization and industry, tourism, maritime transport, fishery and aquaculture, energy sector and agriculture. In general, highest concentration of anthropogenic activities is in the north-western and western part of the Adriatic.

Around 13.600.000 inhabitants live along the Adriatic coast, with highest **urbanization** and population density in Italy and parts of Albania (Figure 4).

The Adriatic Sea is interwoven with the rather dense network of the **marine traffic** routes, particularly in the northern Adriatic and along the western coast (Figure 5), which are supported by adjacent coastal infrastructure, such as ports, marinas etc. The maritime traffic is linked to **oil and gas exploration** and exploitation in the Adriatic, concentrated mostly along the western coast, but with planned future activities in the south; as well as supplies coming from other regions. It is estimated that due to intensive traffic of tankers containing oil and gas, the south of the Adriatic has a high probability of oil spills (Figure 6). Maritime traffic is also significant promotor of non-indigenous species (NIS), including IAS, which will be elaborated in more details in section 4.2.

At the same time, Adriatic Sea is one of the top touristic destinations in the Mediterranean Sea, with Croatia and Italy as the most targeted countries. **Tourism** is one of the key growth generators, contributing in some countries up to one third of the national GDP, and the same applies to the employment. On the other hand, touristic development is significant generator od pressures and negative impacts to biodiversity.

Fisheries have always had an important socio-economic importance. However, at present both fisheries and mariculture have a low share in national GDPs. The fisheries sector is mostly based on small-scale fisheries. The highest catches are recorded from the Italian vessels, followed by Croatia, Albania and Slovenia. Demersal fishing is estimated to be most destructive fishing activity along the western coast (Figure 7). Aquaculture is spread along the entire Adriatic coast, with high concentration of aquaculture production in the coastal lagoons of the north-western Adriatic and economically notable production of the bluefin tuna in the eastern Adriatic (Croatia) Overall the most spread is sea bass, sea bream and mussel cultivation.

Intensive **agricultural** activities that affect the Adriatic are more present in the coastal hinterland then along the coast itself. The share of agriculture in GDP and employment is in majority of Adriatic countries rather low, apart from Albania where it amounts to 18,9% of GDP. Agricultural runoffs contribute to higher productivity and eutrophication, foremostly in the north-western part of the Adriatic. These are supported with other sea water pollution drivers, such as wastewater discharges in **urban** and other populated areas (Figure 8).

Anthropogenic activities are also drivers of marine litter (including microplastic and ghost-nets) production and underwater noise pollution, which are considered as **growing issues** in the Adriatic. Parts of the western Adriatic are already identified as the noise hotspots (Figure 9). In the scope of the ongoing EU INTERREG SOUNDSCAPE project, underwater

noise will be mapped in the northern part of the Adriatic, impacts assessed, and mitigation measures developed.

High dependence and promotion of use of fossil fuels is the powerful driver of the **climate change** at all levels. Although the increase of sea surface temperature in the Adriatic, as a result of climate change, appears to be mostly low, more significant increase could be anticipated in the future.

On the other hand, one of the measures to mitigate climate change is the use of renewable energy. In this regard, in the marine environment, this foremostly means construction of on shore and offshore facilities, like solar (onshore) and wind power plants etc. Based on the results of the technical potential and levelized cost of electricity 10 areas were identified as most suitable for application of mixed renewable energy production technologies, including part of the northern Adriatic, as well as area around the Otranto strait (Figure 10). Although these facilities are to the most part beneficial for the environment, potential negative impact on marine and coastal biodiversity (e.g. impact on sea birds etc.) have to be well considered before embarking in these endeavours.

Regarding future trends, increase of activities and related pressures in all sectors is foreseen, except fisheries, the latter mostly due to low recovery rates of fish stocks.

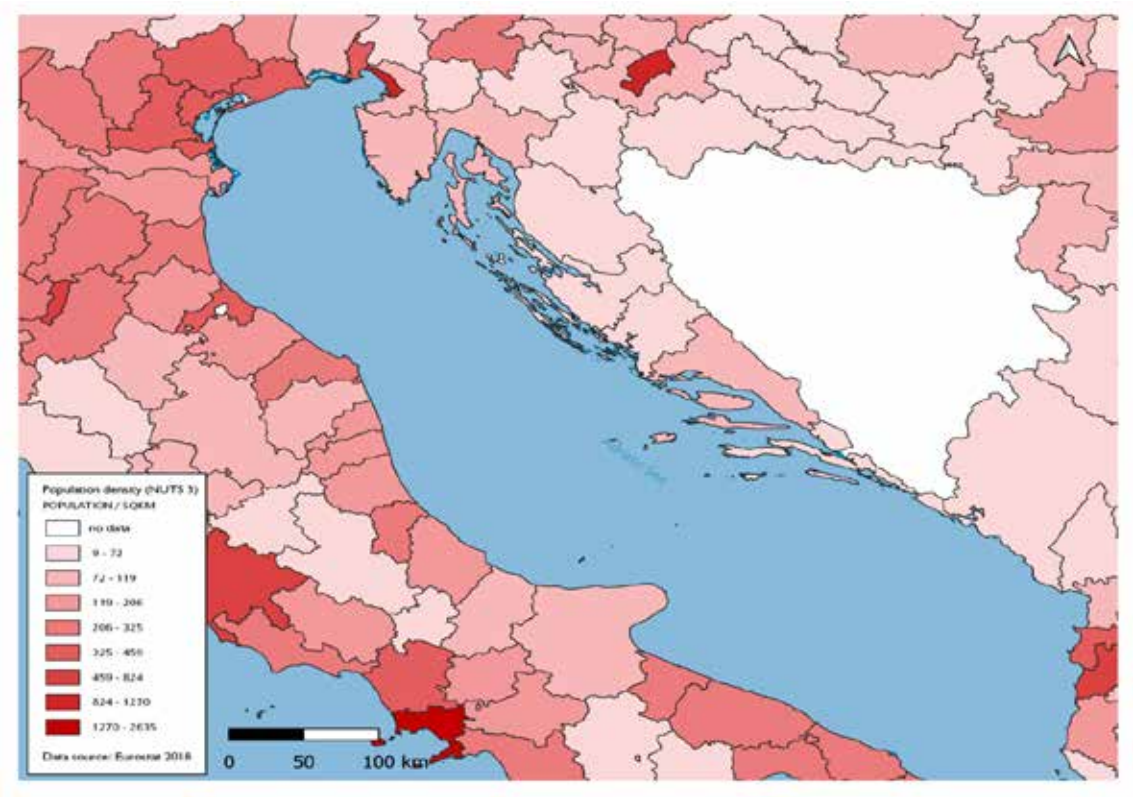

Figure 4.
Population density (NUTS3) in the Adriatic region (persons per km2). Prepared by Petra Štrbenac (Stenella consulting, Croatia) based on Eurostat data 2018

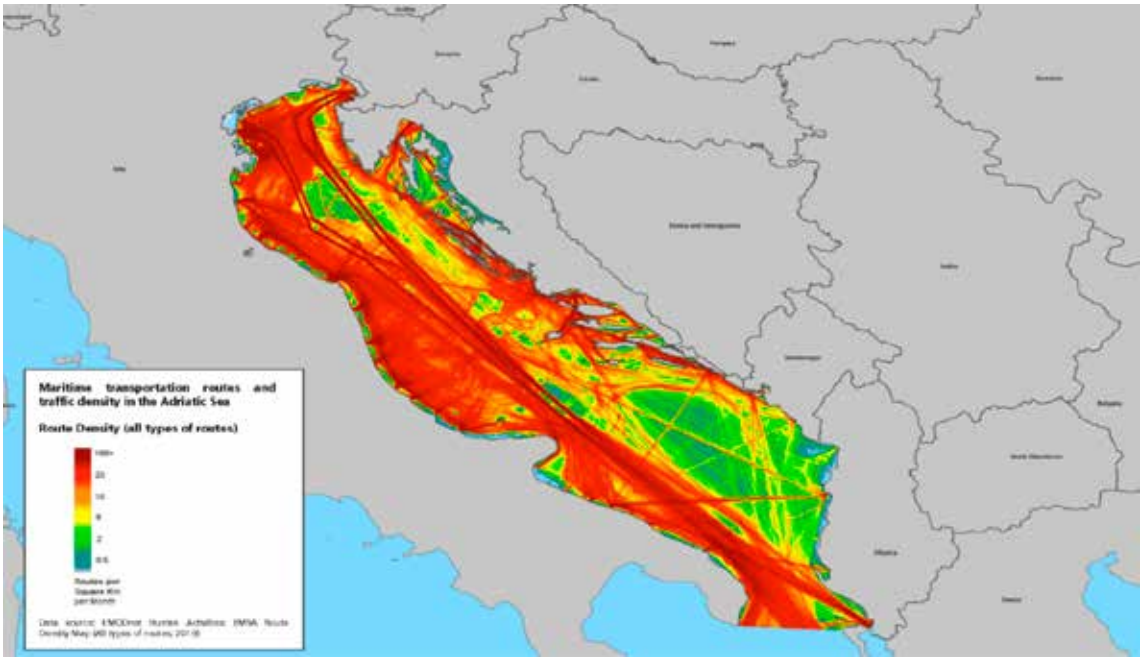

Figure 5.
A snapshot of maritime transportation routes and traffic density (all types of vessels) in the Adriatic Sea. Prepared by P. Štrbenac (Stenella consulting Croatia), based on EMCDnet Human Activities. EMSA Route Density Maps (all types of routes), 2019

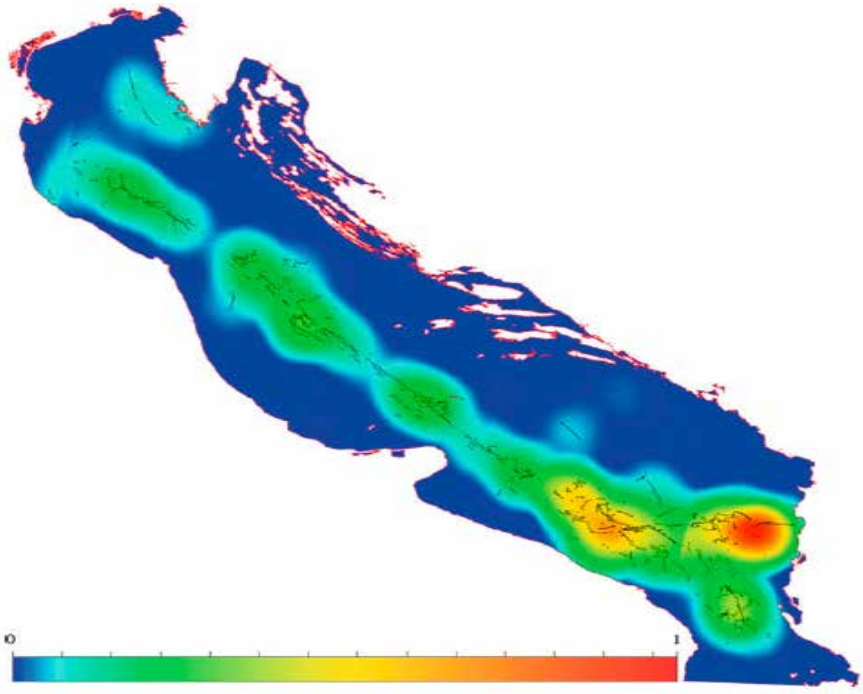

Figure 6.
Probable spills and normalised pollution density in the Adriatic Sea (green – low probability, red – high probability). Source: Perković et al, 2016.

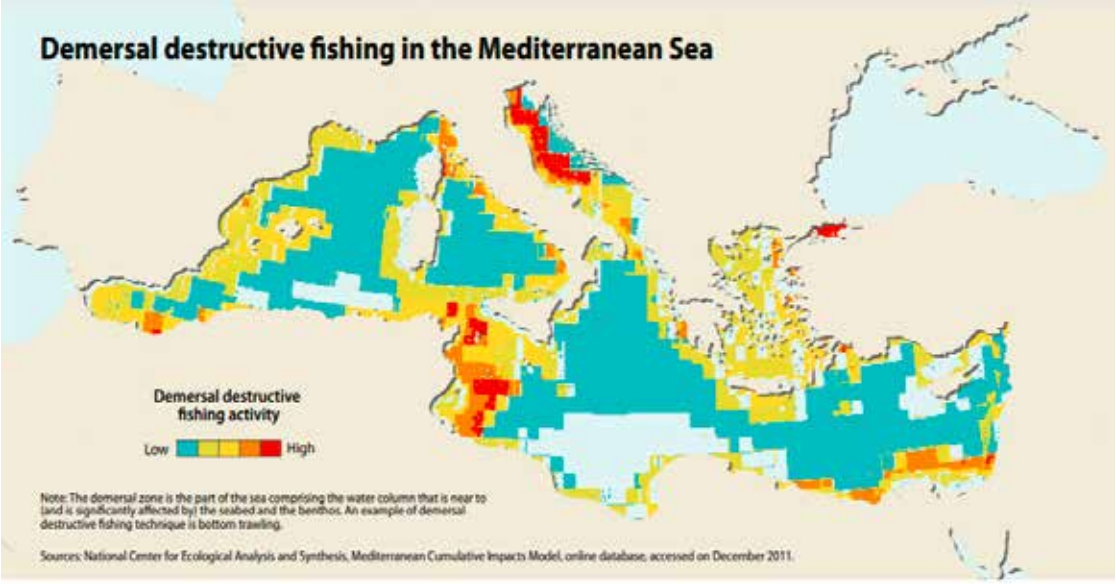

Figure 7.
Demersal destructive fishing in the Mediterranean Sea. Source: UNEP/MAP, 2012

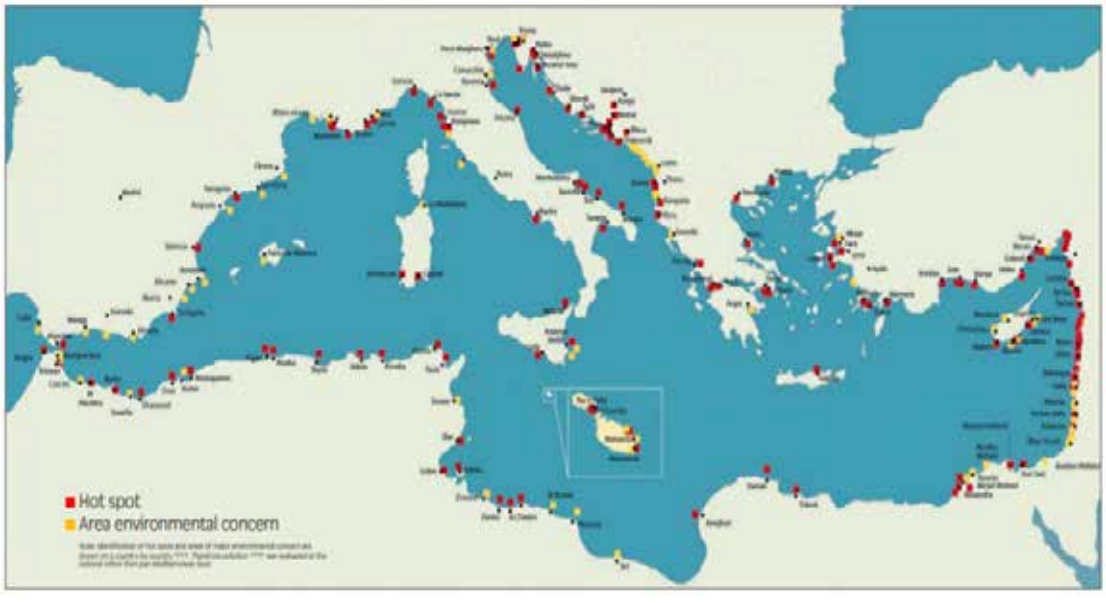

Figure 8.
Pollution hot spots and areas of environmental concern in the Mediterranean. Source: UNEP/MAP – Plan bleu, 2020

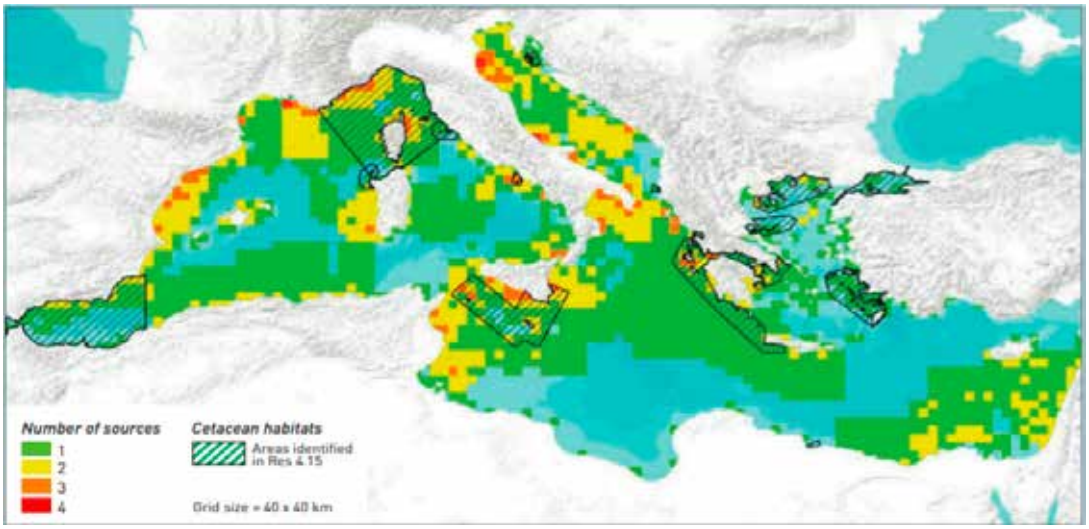

Figure 9.
Overview of noise hotspots in the ACCOBAMS area, based on mapping of sources of pressure. Source: Maglio et al, 2016

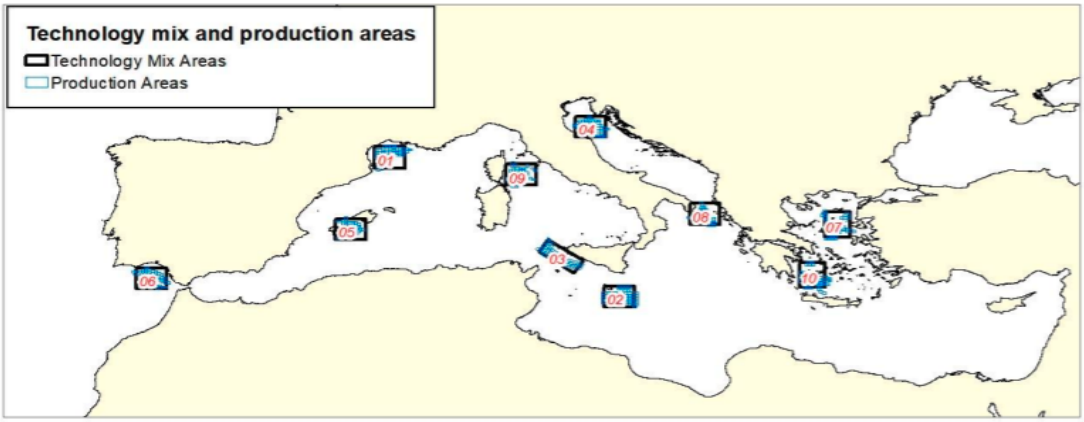

Figure 10.
Most interesting areas for application of mixed technologies for energy production from renewable energy sources. Source: European Commission, 2020.

4.2. Impacts/effects on marine biodiversity

Economic sectors and related pressures have certain impacts/effects on marine biodiversity. In the marine environment, pressures are often combined and they have cumulative and synergistic impacts, although it is a challenge to understand clearly these correlations.

Recent analyses showed that cumulatively the Adriatic is one of the most impacted sub-regions of the Mediterranean Sea, both in nearshore and offshore benthic and pelagic

habitats, and particularly in the offshore northern and central Adriatic (Figure 11). The major contributors are climatic stressor, demersal fishing, hypoxia and pollution from land-based activities.

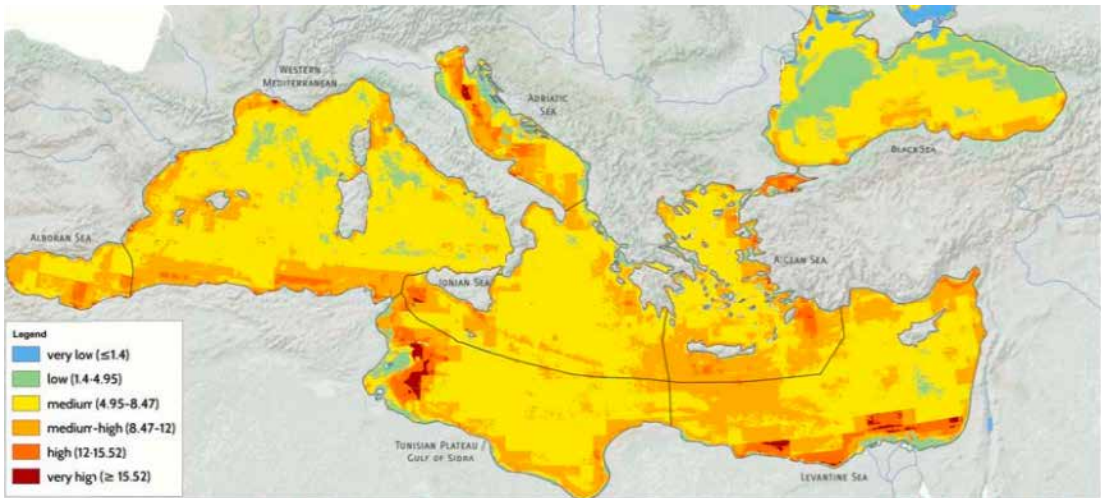

Figure 11.
Spatial distribution of cumulative pressures and impacts on marine ecosystems of the Mediterranean and Black Seas. Source: UNEP/MAP-SPA/RAC, 2015a

Regarding specific impacts, **interactions with fisheries** have already contributed to significant decrease of overall fishable biomass in the Adriatic, particularly of sardines and demersal fish, most notably cartilaginous fish. Decrease of red coral population in some parts of the eastern Adriatic is linked to over-exploitation, mostly due to illegal practices. Over-exploitation in some areas also threatens *L. lithophaga* in the eastern Adriatic. Loggerhead turtles appears to be one of the most threatened non-targeted species caught as a bycatch, particularly in bottom trawlers (Figure 12). Cetaceans, non-commercial cartilaginous fish and seabirds are also by-caught, but the full scope is not yet known. Significance of impact of aquaculture on biodiversity in the Adriatic is also not known, although some ongoing project, such as "Aquapop - Aquaculture impact on wild marine populations" in Croatia, should improve that knowledge.

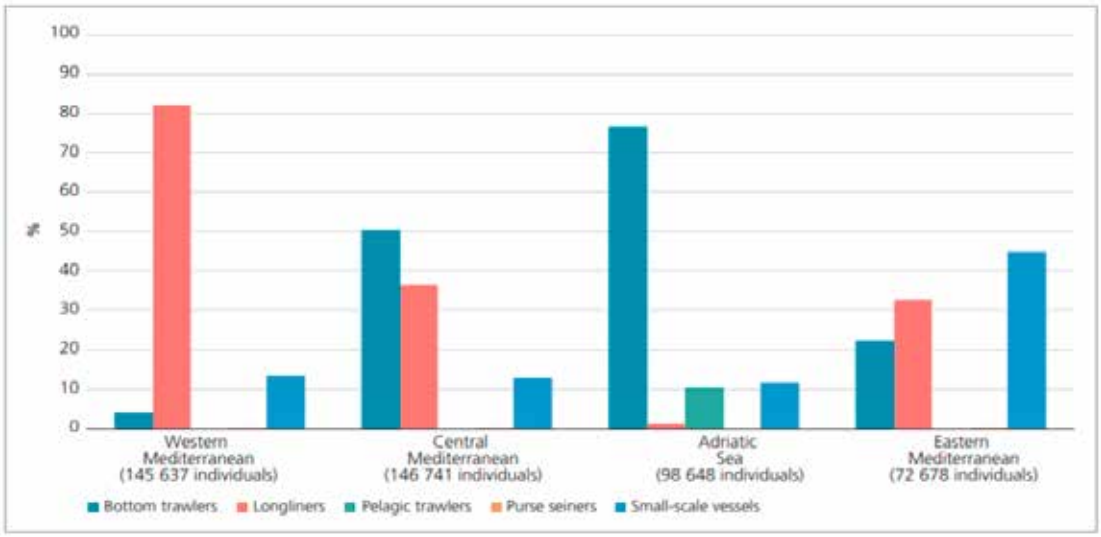

Figure 12.
Reported incidental catch of marine turtles by vessel group and GFCM region, 2000 – 2020.
Source: The State of Mediterranean and Black Sea Fisheries 2020, FAO

Destruction and defragmentation of habitats is not only caused by fishing, but it is often a result of over-constructions in the coastal area, land-based pollution, fisheries and touristic activities. Seagrass (Posidonia) meadows are sensitive to pollution, over-sedimentation, eutrophication, interaction with fisheries (related to use of certain fishing gear), as well as anchoring caused by recreational boats.

Non-indigenous species (NIS), notably invasive alien species (IAS) are regarded as one of the main threats to the biodiversity loss in the Mediterranean. Distribution, abundance and trends have not been analysed at the Adriatic level, but there is certain information at national levels, which give insight in the current state. In general, NIS are introduced via maritime traffic and aquaculture. The highest number of alien species in the Italian part of the Adriatic has been observed in the northern Adriatic Sea and particularly in the Lagoon of Venice. At least 113 introduced species have been recorded in the eastern part of the Adriatic Sea, with the highest share of zoobenthic species (39%). Almost half of these species are alien and introduced, in relation to consequences of climate change. Some of the most notable IAS in the Adriatic are algae species of the genus *Caulerpa (C. taxifolia, C. racemosa, C. cylindracea)*. In many areas they seem to have successfully competed with the seagrasses and they largely cover benthic habitats, on both hard and soft bottoms. Non-indigenous pathogen dinoflagellate *Osteropsis ovata*, which is observed systematically in the Italian waters, appears to have harmful effects on benthic marine organisms. There is also an increasing trend in occurrence of tropical fish species.

Besides *O. ovata*, another important and also a recent example of **microbal pathogens** is *Haplosporidium pinnae*, responsible for the recent mass mortality event of *Pinna nobilis* specimens in the Adriatic. In some areas, this pathogen caused 100% of mortality on the site. It is worth mentioning that one of the rarest areas spared from this pathogen are Slovenian waters.

The cetacean morbilliviruses (CeMV) are also recorded in the Adriatic Sea, with unusual mortalities happening more intensively in the end of 20th century.

Coral bleaching is one of the clear indicators of effects of **climate change** and it has been recorded in some parts of Adriatic, notably along the eastern Adriatic coast. However, the coverage and frequency of this phenomenon is not known. Coastal wetlands and lagoons are particularly sensitive to the effects of climate change, notably raise of sea levels. The effects of climate change, particularly the raise of the sea water temperature, facilitate spreading of NIS and IAS.

Knowledge on impacts of **marine litter** and **underwater-noise pollution** on biodiversity in the Adriatic Sea is still patchy. However, there are records of temporary re-distribution of bottlenose dolphin populations due to noise from the touristic boats in some areas. Socio-economic impacts of underwater noise on fisheries will be examined in the Jabuka/Pomo pit, in cooperation between GFCM and OceanCare NGO.

5.

Main responses

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A need for conservation of marine and coastal biodiversity in the Adriatic Sea has been recognized, which is evident in establishment of legislative and institutional frameworks, as well as implementation of certain conservation mechanisms, measures and actions.

5.1. Legislative framework, conservation policies and institutional capacities

All Adriatic countries have national nature protection **legislation** in place, which is supported with environmental protection legislation which addresses issues such as strategic and environmental impact assessments and waste management. Countries also adopted legal acts to regulate activities with impacts on marine biodiversity, such as legislation on marine fisheries and mariculture, sea (for maritime traffic), mining (for oil and gas exploitation), construction and physical planning, and tourism. The EU Member States (Croatia, Italy, Slovenia) have already harmonised their legislation with the EU environmental *acquis*, notably the Marine Strategy Framework Directive (MSFD), as well as Habitats and Birds Directive, Maritime Spatial Planning (MSP) Directive, Water Framework Directive and Common Fisheries Policy. The other Adriatic countries have a status of EU candidate (Albania and Montenegro) or potential candidate countries (Bosnia and Herzegovina), and as such they have already progressed with transposition of the EU requirements in their national regulations.

Furthermore, Adriatic countries are parties of international and regional (Mediterranean level) agreements on marine biodiversity conservation, notably Barcelona Convention and majority of its seven protocols (all countries are parties to the SPA/BD Protocol), ACCOBAMS Agreement of CMS (except Bosnia and Herzegovina). They are also members of the GFCM and ICCAT (except BiH and Montenegro)

It is important to stress that all Contracting Parties to the Barcelona Convention, including the Adriatic countries, have adopted the Ecosystem Approach (EcAp) and have committed to its implementation to management of human activities (Decision IG.17/6), with the aim to achieve the Good Environmental Status (GES) of the Mediterranean sea. This EcAp process is being implemented in synergy with the EU MSFD.

Main nature conservation specific national **policy** documents are national biodiversity strategies and action plans, developed under the umbrella of the CBD. These strategies are also aligned with other regional strategies, notably EU 2030 Biodiversity strategy, as well as Aichi targets. The EU has also adopted and implemented the EU Strategy for the Adriatic and Ionian region (EUSAIR), which promotes transboundary cooperation in several areas, including environmental protection. Other sectoral strategies and plans are also in place at national levels, including strategy on integrated coastal zone management (i.e., Montenegro and Croatia).

Furthermore, there are strategic documents and action plans dedicated to conservation of particular biodiversity component, such are the species and habitats conservation and action plans. Several species action plans were developed within the framework of the

Mediterranean Action Programme (MAP), i.e. Mediterranean monk seal, cetaceans, marine turtles, sea bird , cartilaginous fish, marine vegetation, coralligenous and other calcareous bio-concretions, and dark habitats. Strategic plans for conservation of cetaceans and marine turtles in the Adriatic Sea for the 2016 to 2025 period were prepared in the scope of the EU IPA Adriatic NETCET project. Development of specific national plans is still an exception in the Adriatic Sea countries. Some countries are currently actively engaged in preparation of species action plans (Croatia).

Institutional setting includes ministries in charge of nature protection, as well as different use of marine resources and activities, notably fisheries, maritime traffic, energy production, physical planning and tourism. Ministries are usually decision-making bodies, while the special government agencies provide technical and experts support for activities such as monitoring of marine and coastal biodiversity, threat assessments and implementation of conservation actions. Scientific institutions (institutes and faculties), NGOs and other experts provide significant scientific/expertise support to governmental institutions. Management of marine protected areas falls under specific managing institutions, at local or national level (i.e., Albania).

MPAs authorities in the Adriatic are organised in the Adriatic Protected Areas Network (AdriaPAN) and they are also involved in activities of the Network of Marine Protected Areas managers in the Mediterranean (MedPAN). NGOs also act as advocates for nature conservation or promote interests of certain marine resources users, such as fisherman associations. There is a number of international organizations active in the region, both intergovernmental and non-governmental. However, there is no standing intergovernmental organization specifically focused on Adriatic, although the cooperation between Adriatic countries is promoted through implementation of the already mentioned EUSAIR Strategy. International non-governmental organizations have Adriatic level branches, such as WWF Adria or wider regional branch IUCN ECARO. Business sector is still not actively involved in the conservation.

5.2. Inventorying, monitoring and GES assessments

Inventorying and monitoring in the Adriatic Sea is mostly done sporadically, focussed on few species and habitats both at national and Adriatic level. However, efforts are made toward more systematic monitoring, foremostly in the EU countries, further to relevant EU related obligations, particularly MSFD, Habitats and Bird directives, as well as Common Fisheries Policy (CFP). Several Adriatic countries already prepared habitat map either covering all marine territory under national jurisdiction (Croatia) or certain areas (Italy and Montenegro) and/or are engaged in more detailed habitat mapping (Croatia). Significant joint efforts have been made so far in increasing of knowledge on migratory species, notably cetaceans and marine turtles. This was done foremostly through implementation of the cross-border projects like already mentioned EU IPA Adriatic NETCET and EU LIFE EUROTURTLES, and ACCOBAMS ASI project.

The Adriatic EU Member States already made initial assessments of the state of marine environment, and prepared monitoring programmes for GES assessment. There is ongoing work on establishment of more systematic monitoring of priority species and habitats and pressures to biodiversity, as basis for further GES assessments. Integrated monitoring and assessment programmes (IMAPs) under the EcAp process of the Barcelona Convention were prepared in Albania and Montenegro in 2020, with the support of the GEF Adriatic project. National IMAPs should contribute to the implementation of the systematic monitoring of biodiversity in the future, supported with active roles of national authorities and institutions. However, initial GES assessments of biodiversity made for Albania and Montenegro showed knowledge gaps on trends in abundance, distribution and condition of biodiversity and NIS, particularly in Albania, so GES for many biodiversity components could not be assessed.

Monitoring of vulnerable/non-targeted species mortality is important for understanding impacts of different human activities. In the Adriatic, Croatian, Italian and Slovenian coasts are covered with operational stranding networks, which are responsible for responding to stranding events of large species, like cetaceans and marine turtles, including assistance in recovery of injured specimen.

Collection of data related to fish, including molluscs and shellfish species of commercial interest is done for all countries according to the Data Collection Reference Framework (DCRF) of the GFCM.

Acquired biodiversity data are mostly not organized and available through web-interfaced applications and interactive web maps/geoportals etc. There is even limited knowledge on use and application of GIS and geospatial data, which is identified as particular issue in the non-EU countries.

5.3. Marine and coastal protected areas and other spatial protection tools

Spatial protection is one of the best toolsfor conservation of biodiversity, notably vulnerable ecosystems, habitats and species. In the Adriatic Sea there are different established marine and coastal protected areas (MPAs), as well as other types of spatial protection (Figure 13). Those can be grouped as:

a) Areas protected in national protected areas categories, which are more or less related to the IUCN protected areas classification,

b) EU level designated protected areas: EU Natura 2000 sites established under the EU Habitats and Birds Directives,

c) Internationally designated areas: Specially Protected Areas of Mediterranean Importance (SPAMI) under the Barcelona Convention, Ramsar sites,

d) Internationally recognised areas of significant biodiversity value, suitable for spatial protection or application of other conservation tools: Ecologically or Biologically Significant Areas (EBSAs) under the CBD, Important Marine Mammals Areas (IMMAs), Important Bird Areas (IBAs),

e) Other effective area-based conservation measures (OECM): Fishery Restricted Areas (FRAs) under the GFCM,

Natura 2000 sites and national MPAs are more concentrated along the Croatian part of Adriatic coast and in coastal waters. Conservation objectives are among all, seabirds and cetaceans.

No MPAs have been established yet in Montenegro and BiH. However, Montenegro is currently working on establishment of 3 MPAs based on the findings of the rapid assessment survey of coastal habitats to help prioritize the suitable new areas needing a status of protection for the development of a network of Marine and Coastal Protected Areas in Montenegro, undertaken by SPA/RAC within the framework of the MedMPAnet project). This process is supported by UNEP/GEF project "Promoting Protected Areas Management through Integrated Marine and Coastal Ecosystems Protection in Coastal Area of Montenegro". Evaluation of MPA effectiveness is an important step in management of MPAs, since it provides a review of current management practices and recommends improvements. Such evaluations were carried out only for a few MPAs (e.g. in Croatia) and they showed weaknesses in management.

Two of the Adriatic Italian MPAs are designated as SPAMIs; Torre Guaceto in the southern and Miramare MPA in the northern Adriatic. Northern and southern parts of the Adriatic are recognized as EBSAs and northern Adriatic is also identified as IMMA. There are at around 20 wetlands of international importance (Ramsar sites) along the Adriatic coast, mostly in the northern Adriatic and on both sides of the southern Adriatic. Since 2017 Jabuka/ Pomo Pit in the central Adriatic is designated FRA due to its importance as spawning and nursery area.

Figure 13.
Protected areas in the Mediterranean Sea, Source: MAPAMED, MedPAN & UNEP-MAP-SPA/RAC (2017)

5.4. Marine biodiversity mainstreaming in other sectors and natural based solutions

Mainstreaming of biodiversity in different sectors is a concept well embedded in the EU, international and national policies. There are also good examples implemented in the practice, such as the designation of areas like FRA or similar nationally designated areas, where fishing activities are limited on temporary and permanent basis (no-take zones). There are also limits on the use of certain fishing gear, which may harm non-targeted species and habitats, such as Posidonia meadows. The use of devices to prevent bycatch of vulnerable species is also tested through various projects. Potential impacts of underwater noise on fish stocks were recognized, and there are efforts of GFCM to address this issue.

Maritime traffic practices are also being changed, including adequate handling of ballast waters, so to prevent possibility of introduction of IAS.

Balanced and sustainable use of marine space should be promoted through maritime special planning (MSP), which is still a new process, at present mostly focussed on development of MSP strategic plans. The MSP process is complemented with also partially addressed integral coastal zone management. In the framework of the UNEP/MAP supported Coastal Area Management Programme (CAMP) project in Montenegro, vulnerability assessment of coastal area was carried out, as the basis for the integrated coastal zone management.

There is ongoing shift of current tourism concepts towards more sustainable and environment friendly practices, including so called wildlife tourism. Dolphin watching has already been

organized in some areas, such as Cres-Lošinj Natura 2000 in Croatia, bringing benefits to local communities. Furthermore, local people once involved in exploitation of red coral in the eastern Adriatic slowly shift their operations to organizing watching of red corals, since there is growing demand of tourists – divers for this activity.

Environment impact assessments (strategic, project-based, appropriate assessments) are mechanisms implemented in the Adriatic countries, but the quality of these assessments in some cases may be questionable, combined with limitation of knowledge on biodiversity. It should also be stressed that there is almost complete lack of strategic/cumulative impact assessments at national and basin level.

In addition, natural based solutions are being promoted related to mitigation of impacts of climate change, notably promotion of conservation of marine carbon sink habitats, important for carbon sequestration, e.g. seagrass meadows, as well as appropriate management of MPAs.

5.5. Mitigation or eradication of IAS

As already mentioned, some IAS already cause problems for marine and coastal biodiversity. So far, only some actions have been taken to eradicate or at least mitigate presence of some IAS, notably of *Caulerpa taxifolia*. This is partly related to lack of knowledge of IAS. At present, some Adriatic Sea countries work intensively to identify and target other problematic IAS species (i.e., Croatia).

5.6. Financing

Marine and coastal biodiversity conservation in Adriatic is supported through different sources of funding, including state budgets, EU funding, and other modes of international funding (public or private), such as MedFund - Environmental Fund for Mediterranean MPAs (particularly in Albania). State budgets are mainly used for maintenance of the set governmental/national institutional frameworks and capacities, as well as for certain conservation activities and to add up to the EU and international co-funding. There is a difference in the invested national funding, with northern Adriatic countries, particularly Italy, investing more funds than the southern Adriatic countries. However, it is the support from funds like EU funds (IPA, LIFE, INTERREG) and GEF that enables implementation of bigger scale projects. The EU cross-border programmes are particularly important in the Adriatic, since they specifically enhance transboundary cooperation. Still, this funding is not systematic and continuous, which is challenging for the activities that need long-term intensive efforts, such as monitoring, communications with stakeholders etc. Once these

conservation systems and activities are set with the support of the external funding, it is upon countries to ensure long-term continuation.

5.7. Transboundary cooperation

Transboundary cooperation is a necessity in the Adriatic region in order to ensure effective nature conservation. There is already a certain cross-border cooperation, such as already mentioned activities on conservation of certain migratory species, as well as projects dealing with mitigation of certain existent and growing pressures, such as marine litter (including ghost nets) and underwater noise, as well as marine protected areas, maritime spatial planning pilot activities.

The SPAMI twinning programme of SPA/RAC was aimed at strengthening of effective management of SPAMIs, involving Italian SPAMI/MPAs and SPAMIs/MPAs from countries of the Mediterranean sub-regions of which Italy is part, including one protected area in Albania and Slovenia.

There is bilateral cooperation/networking between some MPAs and national authorities, such as standing cooperation between the Institute of the Republic of Slovenia for Nature Conservation and the Miramare MPA. Establishment and management of FRA Jabuka/Pomo pit is a joint venture of Croatia and Italy promoted through FAO/GFCM. As already indicated, many Adriatic MPAs are also involved in regional networks.

There is a clear support towards promotion of the harmonized transboundary coastal management approach (transboundary CAMP), like for example Albania – Italy Otranto CAMP.

Adriatic NGOs also cooperate with governmental organizations and research institutions in these projects. But NGOs also join their forces in some specific situations. Hence, in 2013 S.O.S Adriatic coalition of different international and local NGOs was gathered to prevent the planned 2D seismic surveys in the Croatian waters. However, there is more room to improve and enhance this cooperation, which will be discussed in the next chapters.

6.

Main gaps and challenges

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Many efforts have been invested so far to preserve marine and coastal biodiversity in the Adriatic Sea, however there are still many weaknesses and gaps to address and opportunities and threats to take into account (Table 2). the main **strongpoint** is that in the Adriatic countries already national institutional and legislative frameworks are established, combined with affiliation to international and EU policies. There is certain implementation of conservation mechanisms, mostly at national level, as well as ongoing transboundary cooperation, i.e., through implementation of the EUSAIR strategy and joint projects, and particularly supported from the EU funds (Table 2). Based on the national reports prepared in 2020 under the guidance of SPA/RAC by each Adriatic country, knowledge from other Adiratic level documents, as well as the sub-regional expert knowledge, there are several main groups of **gaps**:

a) Lack of knowledge on biodiversity, its status and ecosystem services

Knowledge on species and habitats groups is lacking or missing, particularly in the non-EU countries and offshore.

Basic knowledge on overall distribution of habitats is scarce, with already mentioned absence of Adriatic level habitat map, complemented with lack of knowledge on abundance and condition of habitats, particularly coralligenous communities (*C. rubrum*), deep/dark habitats and pelagic habitats. State of benthic invertebrates such as *P. nobilis* and *L. lithophaga*, seabirds and their pathways are also less known. Furthermore, knowledge about trends is limited even for some better-known biodiversity components, such as seagrass (Posidonia) meadows, cetaceans and marine turtles. These gaps are very much linked with lack of systematic monitoring species and habitats.

There is also lack of knowledge on importance of marine biodiversity for provision of ecosystem services.

b) Lack of knowledge on pressures and impacts on biodiversity

There is also lack of knowledge on distribution on pressures, as well as their impacts on biodiversity, with focus on pathways and distribution of NIS and IAS, as well as bycatch of vulnerable species, level of exploitation of commercial invertebrates (sponges, crustaceans), climate change stressors and impacts, presence and pathways of marine litter, level of underwater noise. Particularly lacking is knowledge on cumulative impacts on biodiversity and marine environment in general.

c) Patchy overall data availability and sharing

Biodiversity data for the Adriatic are sporadically available, such as on specific organizations or projects web-sites and global platforms like OBIS-SEAMAP or GBIF. There were some attempts to improve stranding data sharing on migratory species through Adriatic level databases, but with not much success. Records on mortality are being filled to certain extent into unique Mediterranean database – MEDACES, hosted by University of Valencia. Databases active at Mediterranean level are also Mediterranean Biodiversity Platform, developed by SPA/RAC within MedKeyHabitats project, as an online tool to inventory, catalogue and store data on marine and coastal biodiversity in the Mediterranean. Currently it also contains data from several Adriatic countries: Albania, Italy and Montenegro. In addition, MAPAMED database gathers information on MPAs in the Mediterranean and it is

administered jointly ba MedPAN and SPA/RAC. There is limitation to national level storage, availability and overall management of biodiversity information.

d) Lack of legislation fully addressing conservation of marine environment in non-EU countries

Even though majority of the Adriatic countries have adopted legislation which covers all marine environment conservation issues (EU Member states), in the non-EU countries this process is still not completed, particularly in Bosnia and Herzegovina and Albania.

e) Lack of species conservation planning

Despite the fact that Mediterranean and Adriatic Sea level strategic and action plans for some habitat types and species exist, it appears that Adriatic Sea countries still do not consider strategical thinking for conservation of species as important. However, development of species conservation strategic plans may facilitate effective conservation, in particular through streaming current needs and mechanisms into concrete conservation actions, so to use the available often limited resources in the best possible way, but also to predict certain anticipated developments, thus acting more pro-actively.

f) Limited capacities

Human capacities are often limited in all institutions and organizations involved or related to conservation. To date, no precise analysis of the human and institutional capacities has been carried out, to better understand needs in terms of number of employees, lacking capacities or existence of knowledge that could be shared. However, Adriatic countries particularly pointed out the lack of expertise for priority species and habitats, such as plankton, coralligenous, and NIS. In general, there is more demand for this knowledge and expertise in the southern countries, notably Albania and Bosnia and Herzegovina. On the other hand, other Adriatic countries, have renown experts, some of whom already share their expertise with other countries (i.e., Italian and Croatian cetaceans and marine turtles experts).

g) Limited cooperation between different sectors

Cooperation between different sectors and different stakeholders is always challenging, but a need for good cooperation is very much required by the EU policies, which are most influential in the region. In practice, this is still an ongoing process.

h) Lack of MPAs representativity and weak management

Existing MPAs in the Adriatic Sea still do not cover all valuable areas, which is also very much linked to the lack of knowledge. There is also lack of more precise knowledge about habitats, species and other marine biodiversity components that are under-represented in the existing MPA network. However, there are some indications in that respect. For example, there is no Natura 2000 sites designated for conservation of marine turtles, but this is being explored through the ongoing EU LIFE EUTURTLES project.

Despite recognition of some internationally important areas offshore, this is still on paper recognition, with no conservation consideration or measures in place. Management of existing MPAs is weak or the effectiveness and efficiency is not even known or monitored.

i) Limited implementation of other conservation mechanisms and measures

Although there are legislative and institutional frameworks for implementation of other conservation mechanisms, notably MSP, ICZM, mitigation of bycatch of vulnerable species, these are still in early phases of implementation or with limited scope. Existing IAS mitigation and eradication activities are sporadic, targeting few species.

j) Lack of involvement of general public in conservation

The increase in awareness on value and wealth of marine biodiversity is important for effective conservation. In the Adriatic countries, as elsewhere in the region, there are number of activities and campaigns, targeting general public. There is also lack of promotion and active use of citizen science. These activities are sporadic and often linked to different project implemented in the region.

k) Insufficient funding

Despite already available funding, especially coming from international funds, there is still need for funding of needed conservation related activities, such as monitoring, management of MPAs and other concrete conservation actions. It should be stressed that there is insufficient funding also for the everyday operational costs.

There are some good **opportunities** favouring conservation effectiveness. Namely, there are already shifts in consumers demands, such as interest in wildlife tourism, which supports conservation of some species. There is also opportunity to change consumers habits related to use of marine plastic etc., which may result in lesser pressure on the environment. Use of existing (such as drones) and new technologies could facilitate research, monitoring and legislation enforcement. There is a good possibility to involve general public and other stakeholders in conservation, for example through citizen science actions. Different funding programmes are already available for the region, such as already mentioned MedFund, so their utilization should be improved. However, there are **challenges** outside the marine and coastal biodiversity conservation sectors which may hinder conservation endeavours. Namely, conservation is traditionally not high on the political agenda, particularly compared to other sectors, which is evident during financial recessions when allocated budgets for conservation are cut. There is increasing trend in intensity of economic sectors, which could lead to more intensive pressures and impacts on biodiversity. Climate change is the growing stressor and a reason of particular concern, particularly since it facilitates promotion of NIS, but also adds to existing other pressures on biodiversity.

Table 2.

Overview of strengths, weaknesses, opportunities and threats (SWOT), providing a snapshot of present state of marine and coastal biodiversity conservation in the Adriatic Sea

Strengths	Weaknesses
• National legislative framework for marine and coastal biodiversity is in place in majority of countries • National policies and special Adriatic level programmes, such as EUSAIR • Adriatic countries are parties to relevant international and regional agreements • Majority of countries transposed the EU environmental acquis into national legislations, others are in this process • Institutional frameworks for marine and biodiversity conservation are in place • Certain knowledge on state of biodiversity exists, particularly in the EU countries • Certain conservation mechanisms are already in place, at least to some extent (MPAs, species conservation plans, EIA, SEA, MSP, sustainable fisheries practices etc.) • Some transboundary cooperation is in place, regarding migratory species, mapping and mitigating of pressures (marine litter, underwater noise) etc. • International organizations are active in the region and contribute to conservation efforts, • Funding is already available and invested in conservation efforts, particularly EU funds, GEF etc.	• Lack of knowledge on biodiversity, particularly offshore and on some biodiversity components, such as coralligenous, dark and pelagic habitats, including knowledge on trends • Lack of knowledge on ecosystem services • Lack of knowledge on pressures and their impacts on biodiversity, such as NIS and IAS • Lack of systematic monitoring at Adriatic and national levels • Biodiversity data are either limitedly shared or scattered on different web-sites or platforms • Lack of species conservation planning • Still limited cooperation between different sectors • Lack of involvement of all general public into conservation • Still lack of certain legislation for protection of marine biodiversity in some countries (e.g. Albania, BiH) • Limited capacities, particularly of experts in the southern Adriatic (e.g. Albania, BiH) and for priority species and habitats, and NIS • National MPAs cover small percentage of marine area and they are concentrated in coastal waters • Significant offshore biodiversity valuable areas are internationally recognised, but no conservation/management measures are in place • Weak management of national MPAs and N2000 marine areas • Insufficient addressing of NIS • Limited implementation of MSP, ICZM • Insufficient funding, particularly for monitoring, MPAs management • Insufficient legislation framework in the southern Adriatic (Albania) • Lack of geospatial data that is free to access via standardized web services or geospatial data formats

Opportunities	Threats
• Change of consumers habits may contribute to reduction of some damaging products, like marine litter, particularly plastic • Increasing growth of sustainable tourism and wildlife tourism may support conservation (e.g., dolphin watching, red corals observations etc.) • Use of existing available technologies (such as use of drones and similar devices) and application of new ones facilitates conservation related activities, particularly the monitoring • Possibility to involve general public and other stakeholders, for example to promote citizen-science • EU funds and international funds (M are still available for implementation of conservation activities • Other funding possibilities and modes are available – private, private-public partnerships etc.	• Biodiversity is still not a priority on political agenda • Financial recession usually takes toll on nature conservation • Increase in intensity of already anthropogenic activities in and focussed on marine environment • Still focus on fossil fuels - expansion of oil and gas exploration, particularly in the southern Adriatic • Intensive construction in the coastal areas, both related to tourism and urbanization • Increase of marine traffic, combined with increasing raise of sea temperature (promoted to climate change) threatens to intensify introduction and establishment of NIS • Marine litter and microplastic are growing problems • Anthropogenic underwater noise is also very much present in the area • Changing of condition due to climate change can also facilitate introduction of new microbial pathogens

7. Main opportunities for future transboundary collaboration

Based on the Adriatic countries Post 2020 SAPBIO national reports and additional comments provided after the sub-regional workshop, several group of needs of joint interest could be emphasized (Table 3). Majority of the Adriatic countries pointed out the needs to enhance inventorying, mapping and monitoring of priority species and habitats (EU directives, SPA/BD Protocol) and to ensure sustainable financing for conservation activities. A need for capacity building was also more emphasized.

It should be stressed that all of identified needs have potential for transboundary cooperation. However, several needs stand out as the most relevant, as identified by majority of Adriatic countries: enhanced inventorying and monitoring of migratory species; improved institutional and human capacities (exchange of expertise), improved addressing of pressures, with emphasis on NIS/IAS and better implementation of MSP and ICZM; adequate MPA management; and above all, insurance of more sufficient financing. Some particular transboundary spatial areas have been pointed in terms of needed bilateral cooperation: Gulf of Trieste (Italy and Slovenia), Mali Ston Bay (BiH and Croatia), Jabuka/Pomo pit (Croatia and Italy) and Otranto strait (Albania and Italy).

Funding of transboundary cooperation could be continued through use of already available international and EU level funds specifically allocated for the bilateral or Adriatic Sea level cooperation. In addition, EU Member States have at the disposal so called EU Structural funds and EU Maritime and fisheries fund. However, this funding has to be supported through national funding and not only specifical funding earmarked for biodiversity. In addition, other funding possibilities should be explored, including private funds, private-public partnerships etc.

Table 3.

Overview of the needs expressed by the Adriatic countries in the 2020 national reports related to Post 2020 SAPBIO. Needs with particular (but not exclusive) potential of further future transboundary cooperation are marked as *

Country	Alb	Bos & Her	Cro	Ita	Mont	Slo
Need						
Knowledge on biodiversity						
Enhancement of inventorying, mapping and monitoring of priority habitats (EU directives and SPA/BD Protocol) at national level, such as pelagic habitats, coralligenous, seagrass (Posidonia) meadows etc.		Note: BiH needs research of marine life in general and identification of priority habitats.				Note: Inventory of biodiversity in the Gulf of Trieste is recognized as one of the needs
Enhancement of inventorying and monitoring of priority species (EU directives, SPA/BD Protocol), including migratory species (cetaceans, marine turtles, seabirds) and *Pinna nobilis**		As above				As above
Establishment of national stranding network for marine mammals and marine turtles						
Scientific research on connectivity, food-webs and eco-system processes						
IUCN Red list assessment						
Improved data availability and sharing*						

Country	Alb	Bos & Her	Cro	Ita	Mont	Slo
Assessment/mapping and understanding of ecosystem services provided by biodiversity (ecosystem services)						
Addressing specific anthropogenic pressures and impacts						
Establishment of monitoring of NIS pathways (early warning systems), IAS and concerted actions to mitigate spreading of IAS*						
Assess impacts of fisheries, with focus on bycatch of vulnerable species*						
Fully understand effects of climate change*						
Improvement of knowledge on impacts of maritime traffic*						
Map anthropogenic noise sources*						
Improvement of the marine litter management*						
Improvement of monitoring, control and surveillance in fisheries						
Improvement of knowledge on cumulative impacts*						
Better application of existing integrated conservation mechanisms and tools, with emphasis on marine spatial planning (MSP), as well as ICZM*						
Improvement of EIAs procedures						
Adequate MPA representativity and management of all PAs						
Designation of new MPAs, identification of Natura 2000 sites (non-EU countries particularly) *		BiH part of Mali Ston Bay as potential future MPA				
Improvement of MPA management and effectiveness			Incl. FRA Jabuka/ Pomo pit			
Improvement of coastal wetlands management*						
Legislation framework and conservation policies						
Improvement of legislation framework (incl. revision of protected species)						
Proclamation of legal protection of *Litophaga lithophaga*						
Development of national action plans for marine species and habitats (stony coral, marine vegetation) and species (cetaceans, marine turtles, cartilaginous fish, seabirds)						
Development of the new National Biodiversity Strategy						
Institutional and human capacity building						
Improvement of institutional and human capacities (such as expertise on certain species and habitats, capacities on MPA management etc.)*						
Cooperation between sectors and stakeholders' involvement						
Improvement of cooperation between different sectors, such as ministries responsible for nature conservation, fisheries etc.						
Improvement of stakeholders' involvement in conservation (fishermen, scientists)*						
Awareness raising						
Public awareness campaigns, targeted at general public or specific marine sectors*						
Raising awareness of fishermen						
Financing						
Stable financial resources for monitoring, MPAs and conservation actions*						

8.

Conclusions and recommendations for needed actions and subregional strategic orientations

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8.1. Conclusions

Adriatic Sea sub-region

Adriatic Sea sub-region is rich in biodiversity, with priority habitat types and species recognized both under the SPA/BD Protocol and relevant EU directives, including migratory species, such as cetaceans, marine turtles, sea birds and cartilaginous fish. However, there is still lack of or limited knowledge on biodiversity components, particularly in non- EU countries and offshore. Various anthropogenic economic activities are drivers of pressures, which intensity is even more increased due to semi-enclosure of the Sea. Although knowledge on these pressures is also limited, it appears that significant issues are climatic stressor, demersal fishing and pollution from land-based activities. NIS/IAS, marine litter and underwater noise are already present and growing. Politically, most of the Adriatic Sea coastal and marine area is a part of the EU, with non-EU candidate or potential candidate countries located in the south-eastern and southern part of the Adriatic (Albania, Montenegro and Bosnia and Herzegovina). This reflects on all aspects of biodiversity conservation. Specific Institutional and legislative framework are established at the national level or Mediterranean level, with strong affiliation to the EU policies and environmental *acquis*. Overall, experts active in the region have already substantial knowledge and skills, but there is a slight disbalance in these capacities, with experts in some fields missing, particularly in the southern Adriatic countries. There are certain conservation mechanisms already in place, notably MPAs, including areas with restricted fisheries FRA, as well as the ecosystem-based management tools MSP and ICZM, although their application has just started. Conservation efforts are supported through state budgets and international funding, particularly EU funding, as well as GEF, but despite that, this does not meet real needs. Transboundary cooperation is required for effective conservation, particularly for monitoring and conservation of migratory species, addressing of NIS/IAS, climate change, marine litter, underwater noise, as well as exchange of knowledge, expertise and functionality of MPAs. In the Post 2020 SAPBIO process, countries expressed particular needs for enhancement of inventorying, mapping and monitoring of priority species, insurance of sustainable funding and capacity building (exchange of expertise).

The proposal of actions to solve gaps and other issues affecting biodiversity is further elaborated in the section 8.2).

Down to the national level, a synthesis of conclusions from the national reports on Post 2020 SAPBIO, is given as follows:

Albania. Although Albania is smaller country, it is featured with rich marine and coastal biodiversity, which is also recognized at international level through designation or recognition of special protected areas. Industrial, residential and recreational activities and pollution are particularly affecting biodiversity. Coastal wetlands are also affected from climate change. Institutionally and resource wise (expertise, funding) there is no umbrella for the proper management of coastal and marine ecosystems, but some conservation mechanisms are in place to some extent, notably protection areas. Cooperation with neighbouring countries is good, but it needs to be improved.

Bosnia and Herzegovina. Bosnia and Herzegovina has a shortest coast in the Adriatic Sea, but little is known about biodiversity and conservation actions were not taken. This is very much linked to the complex political context and administration settings. Hence, a restart in marine and coastal biodiversity conservation is needed. Construction and marine litter, linked to tourism pose significant pressures. But there is an awareness that environment needs to be preserved, which is evident in efforts to proclaim the first MPA, which should cover more than 10% of marine area. Due to its peculiar geographical position, for effective conservation of marine and coastal areas, a strong bilateral cooperation is needed with Croatia.

Croatia. Croatia has rather diverse coastline with numerous islands. This is reflected in biodiversity of habitat types and species. Tourism is one of the most important economic activities and pressures are coming from this sector, but also related to fisheries. NIS/IAS is one of the growing issues to address. Knowledge on biodiversity is limited, particularly offshore, but still sufficient to have an idea about the state of marine environment and identify adequate conservation actions. Institutional and legislative frameworks for conservation are set, with legislation and policies aligned with the EU policy requirement. Substantial funding for conservation also comes from the EU funds. MPAs and Natura 2000 network are established in the marine area. Transboundary cooperation already exists, with focus on migratory species, marine litter, climate change, underwater noise, management of FRAs. This cooperation should be continued and enhanced, with the attention on bilateral cooperation with neighbouring countries.

Italy. Italy provides home to various marine and coastal biodiversity. Economic activities in the Adriatic are most intensive along the Italian coast. As a consequence, there are significant pressures and impacts on marine biodiversity, particularly related to tourism, maritime traffic, fisheries and agricultural activities. Climate change is important issue that needs to be addressed. Although Italy has a solid knowledge base and expertise, there are still some knowledge gaps, including the one about cumulative impacts. Institutional and legislation frameworks are set. Again, legislation and policies are in line with the EU requirements. There are numerous MPAs and coastal PAs of national and international designations, both along the northern and southern coast. Implementation of MSP and ICZM is ongoing. Transboundary cooperation already exists, but there is a strong need for further cross-borderefforts, particularly towards strengthening the Adriatic MPA network.

Montenegro. Montenegrin marine waters harbours some of the most significant habitats and species. The main pressures are coming from tourism and urbanization, affecting coastal habitats. Knowledge on biodiversity is limited, as well as on NIS/IAS. As the EU candidate country, Montenegro is intensively harmonizing its legislative framework and related conservation mechanisms with the EU policies. Establishment of the first MPAs is being prepared. ICZM strategical framework is set and needs to be put in practice. There is a need for transboundary cooperation regarding migratory species and networking of MPAs and other protected areas.

Slovenia. According to the available published data the marine biodiversity of the Slovenian coastal Sea is considered as a rather rich portion of the Adriatic Sea. Urbanization causes degradation of coastal habitats, although maritime traffic and leisure boating also contribute to degradation of marine environment. NIS/IAS are also a growing issue. Knowledge on biodiversity is good and conservation policies and deriving mechanisms and actions are

foremostly in line with the EU policies. Several coastal and MPAs are already proclaimed, with one of them recognized as wetlands of international importance. Other conservation measures need to be taken to prevent pressures related to urbanization. There is a particular need for bilateral cooperation with Italy, regarding inventorying and conservation of biodiversity, as well as mitigation of pressures on biodiversity of the Gulf of Trieste.

8.2. Recommendations

Based on analysis of present state of marine and coastal biodiversity in the Adriatic Sea sub-region, including identification of gaps and expressed needs, five objectives were identified under five main themes with clear indicators and altogether 36 more concrete proposed activities (Table 4). Majority of activities are related to addressing specific pressures on biodiversity and integrated coastal zone management. Improvement of knowledge on biodiversity is very much required, as a basis for any conservation (related) planning. In order to ensure healthy marine environment, efforts are needed to address specific anthropogenic pressures with active cooperation between all interest groups. NIS/IAS and climate change related actions are of the highest importance, followed with addressing marine litter and anthropogenic underwater noise. Implementation of ecosystem-based management tools, such as MSP and ICZM is needed. Insurance of effective conservation of areas important for biodiversity is also identified as a specific topic of interest, particularly regarding improvement of representativity in the open sea and southern Adriatic. This endeavour is in line with the EU Biodiversity Strategy's for 2030 and its target to legally protect at least 30% of the EU sea area, which should also be reflected in still negotiated Post 2020 Global Framework of the CBD. Capacity building, stakeholders' involvement networking is of high relevance in the Adriatic, with focus on exchange of expertise and promotion of use of available and new technologies to facilitate monitoring and conservation in general. All conservation related activities have to be supported through sufficient funding, which include better use of already available funds, but also seeking of new funding mechanisms, such as private-public partnership, redirection of unsustainable subsidies etc. The human power behind these actions are multilateral organizations, national authorities, scientific institutions, (expert) NGOs and other stakeholders, including general public. All the activities could be linked to the regional and global policies, with emphasis on already indicated Post 2020 Global Biodiversity Framework of the CBD, EU 2030 Biodiversity Strategy, as well as ACCOBAMS Strategy for cetacean conservation related activities.

Table 4.

Proposal of main actions for conservation of marine and coastal biodiversity in the Adriatic Sea sub-region for 2030 and beyond, as contribution to the development of the Post-2020 SAPBIO Strategy

KNOWLEDGE ON BIODIVERSITY **Objective: Improve knowledge on biodiversity, with focus on priority species and habitats (SPA/BD Protocol and EU directives)** **Indicator of objective achievement: Sufficient data/information/knowledge to assess at least 50% of GES under EcAp in implemented national assessments**							
No.	Activity	Expected results/ outputs	Relevant countries	Priority level 1	Possible sources of fund-ing2	Link to other relevant strat-egies	Possible actors3
1.1.	Carry out inventory and identify distribu-tion of priority habitat types in coastal and offshore waters, based on new research and using comparable classification and level of detail. Focus is on seagrass (Posidonia) meadows, coralligenous, photo-philic communities, deep/dark habitats and offshore area	Habitat maps at national levels is fin-ished and map for the Adriatic compiled	All Adriatic countries4	Very High	IP, NF	Post-2020 Global biodiversity framework (GBD) Target 195 EU 2030 Biodiversity Strategy6	Multilateral orga-nizations, national authorities, scien-tific institutions, expert NGOs and other stakeholders
1.2.	Carry out distribution and abundance sur-veys of priority inver-tebrate species with focus on *C.rubrum*, *P. nobilis*, *L.lithophaga*, particularly in the least known areas	Distribution and abundance research is undertaken and data used for new assessments	All Adriatic countries. Focus on BiH and Montenegrin waters for *C.rubrum*	High	IP,NF,O	Post-2020 Global biodiversity framework (GBD) Target 19 EU 2030 Biodiversity Strategy	Multilateral orga-nizations, national authorities, scien-tific institutions, expert NGOs and other stakeholders
1.3.	Carry out more detailed abundance and distribution surveys of cetaceans and marine turtles in the least known areas, such as the southern Adriatic	Distribution and abundance research is undertaken and data used for new/updated assessments	All Adriatic countries, Focus on Montenegrin and Albanian waters	High	IP,NF	Post-2020 Global biodiversity framework (GBD) Target 19 EU 2030 Biodiversity Strategy ACCOBAMS Strategy	Multilateral orga-nizations, national authorities, scien-tific institutions, expert NGOs and other stakeholders

1. Very high- immediate activity implementation, High – activity implementation until 2025, Medium-activity implementation until 2030, Low-activity implementation until 2035
2. IP – international public, NF – national funding, O – other sources, such as private funding
3. Multilateral organisations, national authorities (including experts agencies, MPA management authorities), scientific institutions, NGOs or other stakeholders involved
4. Already an ongoing activity in Croatian territorial waters and EEZ, co-funded from the EU Structural Funds
5. Post-2020 GBD document is still in under preparation and the targets are being extracted from the latest valid working version. However, this may be revised prior to the submission of final document for the adoption by the CBD COP.
6. Naming of strategic documents means that there are linkages of general nature to the Post 2020 SAPBIO sub-regionally proposed actions. But, when more clear targets/actions are being stipulated in both document, this will be specifically indicated next to the title of the particular strategic document.

KNOWLEDGE ON BIODIVERSITY Objective: Improve knowledge on biodiversity, with focus on priority species and habitats (SPA/BD Protocol and EU directives) Indicator of objective achievement: Sufficient data/information/knowledge to assess at least 50% of GES under EcAp in implemented national assessments							
No.	Activity	Expected results/ outputs	Relevant countries	Priority level 1	Possible sources of fund-ing2	Link to other relevant strat-egies	Possible actors3
1.4.	Continue monitoring of cetaceans and marine turtles at the entire Adriatic level	Aerial surveys are reg-ularly undertaken and data are used for new/ updated assessments	All Adriatic countries	High	IP,NF	Post-2020 Global biodiversity framework (GBD) Target 19 EU 2030 Biodiversity Strategy ACCOBAMS Strategy	Multilateral orga-nizations, national authorities, scien-tific institutions, expert NGOs and other stakeholders
1.5.	Carry out abundance and distribution surveys and popula-tion assessment of elasmobranch, as a basis for systematic monitoring	Distribution and abundance research is undertaken and data are used to map nursery areas and pro-pose more systematic monitoring scheme	All Adriatic countries	Medium	IP, NF, O	Post-2020 Global biodiversity framework (GBD) Target 19 EU 2030 Biodiversity Strategy	Multilateral organi-zations (particularly GFCM), national authorities, scien-tific institutions, expert NGOs and other stakeholders
1.6.	Establish functional stranding network for the entire Adriatic Sea basin and contribute with data to existing regional databases	All countries have established stranding networks and regularly update mortality trends/injured animals Mortality records are regularly filled in the MEDACES database	Albania, BiH, Montenegro	High	NF	Post-2020 Global biodiversity framework (GBD) Target 19 EU 2030 Biodiversity Strategy ACCOBAMS Strategy	National author-ities, scientific institutions, expert NGOs and other stakeholders
1.7.	Assess the status of monk-seal (*Monachus monachus*) and iden-tify suitable habitats	Status of monk seal in the Adriatic and suitable habitats are known	All Adriatic countries	High	IP, NF,O	Post-2020 Global biodiversity framework (GBD) Target 19 EU 2030 Biodiversity Strategy	Multilateral orga-nizations, national authorities, scien-tific institutions, expert NGOs and other stakeholders
1.8.	Promote scientific research of food-webs and ecosystem func-tionality in general, particularly related to GES assessment under IMAP and MSFD	Number of new scien-tific paper on the topic is increased	All Adriatic countries	Medium	IP,NF,O	Post-2020 Global biodiversity framework (GBD) Target 19 EU 2030 Biodiversity Strategy	Multilateral orga-nizations, national authorities, scien-tific institutions, expert NGOs
1.9.	Map and assess coastal and marine ecosystem services, including their eco-nomic value	Coastal and marine ecosystem services are mapped and evaluated	All Adriatic countries	Medium	IP,NF,O	Post-2020 Global biodiversity framework (GBD) EU 2030 Biodiversity Strategy	Multilateral orga-nizations, national authorities, scien-tific institutions, expert NGOs

KNOWLEDGE ON BIODIVERSITY

Objective: Improve knowledge on biodiversity, with focus on priority species and habitats (SPA/BD Protocol and EU directives)

Indicator of objective achievement: Sufficient data/information/knowledge to assess at least 50% of GES under EcAp in implemented national assessments

No.	Activity	Expected results/ outputs	Relevant countries	Priority level 1	Possible sources of fund-ing2	Link to other relevant strat-egies	Possible actors3
1.10.	Assess current data sharing and exchange practices and propose concrete improvement actions	Assessment report is prepared	All Adriatic countries	Low	IP	Post-2020 Global biodiversity framework (GBD) Target 19 EU 2030 Biodiversity Strategy ACCOBAMS Strategy	Multilateral orga-nizations, national authorities, scien-tific institutions, expert NGOs

ADDRESSING SPECIFIC PRESSURES ON BIODIVERSITY AND INTEGRATED COASTAL ZONE MANAGEMENT

Objective: Mitigate anthropogenic pressures on marine and coastal biodiversity in the Adriatic Sea, with active cooperation of all relevant stakeholders

Indicator of objective achievement: Positive trends in GES assessment under IMAP and MSFD

No.	Activity	Expected results/ outputs	Relevant coun-tries	Priority level	Possible sources of fund-ing	Link to other relevant strat-egies	Possible actors
INTERACTION WITH FISHERIES							
2.1	Assess accurately bycatch of relevant vulnerable species (cetaceans, marine turtles, cartilaginous fish) and implement acceptable mitigation techniques	Intensity of bycatch of vulnerable specie-sassessed (including hotspots) and miti-gation activities have started Cooperation between fisheries and envi-ronmental sector is improved	All Adriatic countries	High	IP, NF	Post-2020 Global biodiversity framework (GBD) Target 4 EU 2030 Biodiversity Strategy (3.3.4. Improving knowledge, management and skills) ACCOBAMS Strategy	Multilateral organi-zations (cooperation with GFCM), national authorities, scientific institutions, expert NGOs and other stakeholders
2.2.	Continue addressing the issue of discarded fishing gear and ghost nets, based on results of the already imple-mented projects (e.g. DeFish Gear project)	Map fishing gear hot spots and undertake cleaning actions	All Adriatic countries	High	IP, NF, O	Post-2020 Global biodiversity framework (GBD) Target 6 EU 2030 Biodiversity Strategy	Multilateral organi-zations (cooperation with GFCM), national authorities, scientific institutions, expert NGOs and other stakeholders

ADDRESSING SPECIFIC PRESSURES ON BIODIVERSITY AND INTEGRATED COASTAL ZONE MANAGEMENT Objective: Mitigate anthropogenic pressures on marine and coastal biodiversity in the Adriatic Sea, with active cooperation of all relevant stakeholders Indicator of objective achievement: Positive trends in GES assessment under IMAP and MSFD							
No.	Activity	Expected results/ outputs	Relevant countries	Priority level	Possible sources of funding	Link to other relevant strategies	Possible actors
NON- INDIGENOUS SPECIES							
2.3.	Assess presence and distribution of selected IAS at the Adriatic level (IAS under EU Regulation and IMAP)	Accurate map of most significant IAS in the Adriatic	All Adriatic countries	Very high	IP, NF	Post-2020 Global biodiversity framework (GBD) Target 5 EU 2030 Biodiversity Strategy 2.2.10. Addressing IAS	Multilateral organizations, national authorities, scientific institutions, expert NGOs and other stakeholders
2.4.	Establish system for monitoring of NIS and their pathways at the Adriatic level (early warning systems)	Monitoring system is set and functional with active cooperation between Adriatic countries	All Adriatic countries	Very high	IP, NF	Post-2020 Global biodiversity framework (GBD) Target 5 EU 2030 Biodiversity Strategy 2.2.10. Addressing IAS	Multilateral organizations, national authorities, scientific institutions, expert NGOs and other stakeholders
2.5.	Understand effects of the IAS on native species and ecosystem	Effects of at least most problematic IAS on native species and ecosystem are assessed (and used as input for GES assessment)	All Adriatic countries	High	IP, NF	Post-2020 Global biodiversity framework (GBD) Target 5 EU 2030 Biodiversity Strategy 2.2.10. Addressing IAS	Multilateral organizations, national authorities, scientific institutions, expert NGOs
2.6.	Identify GES thresholds for NIS/IAS in the Adriatic	GES thresholds for NIS/IAS are set and implemented in GES assessments	All Adriatic countries	High	IP, NF	Post-2020 Global biodiversity framework (GBD) (contribution to Target 5) EU 2030 Biodiversity Strategy 2.2.10. Addressing IAS	National authorities, scientific institutions, expert NGOs and other stakeholders
2.7.	Undertake mitigation, control measures and eradication, where possible, for selected, most problematic IAS	Actions have been taken for at least 3 most problematic species	All Adriatic countries	Medium	IP, NF,O	Post-2020 Global biodiversity framework (GBD) Target 5 EU 2030 Biodiversity Strategy 2.2.10. Addressing IAS	Multilateral organizations, national authorities, scientific institutions, expert NGOs and other stakeholders

ADDRESSING SPECIFIC PRESSURES ON BIODIVERSITY AND INTEGRATED COASTAL ZONE MANAGEMENT Objective: Mitigate anthropogenic pressures on marine and coastal biodiversity in the Adriatic Sea, with active cooperation of all relevant stakeholders Indicator of objective achievement: Positive trends in GES assessment under IMAP and MSFD							
No.	Activity	Expected results/ outputs	Relevant countries	Priority level	Possible sources of funding	Link to other relevant strategies	Possible actors
ADDRESSING CLIMATE CHANGE							
2.8.	Establish monitoring of effects of climate change	Special monitoring programmes are in place, with focus on most sensitive areas and species	All Adriatic countries	Very high	IP, NF,O	Post-2020 Global biodiversity framework (GBD) Target 7 EU 2030 Biodiversity Strategy ACCOBAMS Strategy	Multilateral organizations, national authorities, scientific institutions, expert NGOs and other stakeholders
MARINE LITTER							
2.9.	Identify marine litter hotspots in the Adriatic and to facilitate to clean them up (relation to activity 2.2.)	Marine litter hotspots are mapped Systematic cleaning up activities are implemented	All Adriatic countries	High	IP, NF,O	Post-2020 Global biodiversity framework (GBD) Target 6 EU 2030 Biodiversity Strategy	Multilateral organizations, national authorities, scientific institutions, expert NGOs and other stakeholders
2.10.	Further raise awareness on negative impacts of plastic waste and ghost nets	Number of public awareness campaigns and other activities increases	All Adriatic countries	High	IP, NF,O	Post-2020 Global biodiversity framework (GBD) Target 15 EU 2030 Biodiversity Strategy 2.2.9 Reducing pollution ACCOBAMS Strategy	Multilateral organizations, national authorities, scientific institutions, expert NGOs and other stakeholders
UNDERWATER NOISE							
2.11.	Further assess distribution of anthropogenic underwater noise (central and southern Adriatic), taking into account approaches and results of the SOUNDSCAPE project	Anthropogenic noise is mapped in the entire Adriatic and hotspots are identified	All Adriatic countries	High	IP, NF	Post-2020 Global biodiversity framework (GBD) Target 6 EU 2030 Biodiversity Strategy 2.2.9 Reducing pollution ACCOBAMS Strategy	Multilateral organizations, national authorities, scientific institutions, expert NGOs and other stakeholders
2.12.	Establish active cross-border cooperation to address over-exploitation and illegal trade of L.lithophaga (including legal protection in BiH)	Trade and use of L.lithophaga is decreased	All Adriatic countries	Medium	IP, NF	Post-2020 Global biodiversity framework (GBD) Target 3 EU 2030 Biodiversity Strategy	National authorities

ADDRESSING SPECIFIC PRESSURES ON BIODIVERSITY AND INTEGRATED COASTAL ZONE MANAGEMENT

Objective: Mitigate anthropogenic pressures on marine and coastal biodiversity in the Adriatic Sea, with active cooperation of all relevant stakeholders

Indicator of objective achievement: Positive trends in GES assessment under IMAP and MSFD

No.	Activity	Expected results/ outputs	Relevant countries	Priority level	Possible sources of funding	Link to other relevant strategies	Possible actors
ADDRESSING CUMULATIVE PRESSURES							
2.13.	Assess cumulative pressures and impacts in the Adriatic based on acquired knowledge	Cumulative pressures/ impacts are mapped	All Adriatic countries	Medium	IP, NF	Post-2020 Global biodiversity framework (GBD) EU 2030 Biodiversity Strategy	Multilateral organizations, national authorities, scientific institutions, expert NGOs and other stakeholders
2.14.	Develop and apply MSP and ICZM plans	MSP and ICZM tools are applied at least in northern Adriatic	All Adriatic countries, focus on Italy, Croatia and Slovenia	High	IP, NF	Post-2020 Global biodiversity framework (GBD) EU 2030 Biodiversity Strategy	Multilateral organizations, national authorities, scientific institutions, expert NGOs and other stakeholders

COHERENT NETWORK OF MARINE AND COASTAL PROTECTED AREAS

Objective: Improve representativity of marine and coastal protected areas and status of biodiversity in them

Indicator of objective achievement: Effectiveness of marine and coastal areas (MPAs) is improved

No.	Activity	Expected results/ outputs	Relevant countries	Priority level	Possible sources of funding	Link to other relevant strategies	Possible actors
3.1.	Identify gaps in representativity of habitats and species from the annexes of the SPA/ BD Protocol in the existing MPA network	Overview study is prepared	Al Adriatic countries	High	IP, NF, O	Post-2020 Global biodiversity framework (GBD) Target 2 EU 2030 Biodiversity Strategy 2.1. Coherent network of protected areas	Multilateral organizations, national authorities, scientific institutions, expert NGOs and other stakeholders
3.2.	Extend the current MPA network in the Adriatic Sea, with focus on open sea and the southern Adriatic	New MPAs are designated in the south-east and southern Adriatic	All Adriatic countries, with more focus on BiH, Montenegro and Albania	Very high	IP, NF	Post-2020 Global biodiversity framework (GBD) Target 2 EU 2030 Biodiversity Strategy 2.1. Coherent network of protected areas	Multilateral organizations, national authorities, scientific institutions, expert NGOs and other stakeholders

COHERENT NETWORK OF MARINE AND COASTAL PROTECTED AREAS Objective: Improve representativity of marine and coastal protected areas and status of biodiversity in them Indicator of objective achievement: Effectiveness of marine and coastal areas (MPAs) is improved							
No.	Activity	Expected results/ outputs	Relevant countries	Priority level	Possible sources of funding	Link to other relevant strategies	Possible actors
3.3.	Establish effective management of already established MPAs	Management plans are developed and implemented at least in all marine Natura 2000 sites/national MPAs Evaluation effectiveness is assessed on regular basis	All Adriatic countries	High	IP, NF,O	Post-2020 Global biodiversity framework (GBD) Target 2 EU 2030 Biodiversity Strategy 2.1. Coherent network of protected areas ACCOBAMS Strategy	Multilateral organizations, national authorities, scientific institutions, expert NGOs and other stakeholders
3.4.	Identify candidate OECMs and establish adequate management of existing ones, particularly FRA Jabuka/Pomo pit	Candidate OECMs are proposed Effective management is set for FRA Jabuka/ Pomo pit	All Adriatic countries, focus on Italy and Croatia for FRA	Medium	IP, NF	Post-2020 Global biodiversity framework (GBD) Target 2 EU 2030 Biodiversity Strategy 2.2. An EU Restoration Plan: restoring ecosystems across land and sea	Multilateral organizations (cooperation with GFCM), national authorities, scientific institutions, expert NGOs and other stakeholders
3.5.	Develop or update national strategies and priorities for MPA and OECM to be aligned with post -2020 Global Biodiversity Framework	New national strategic documents on priorities related to MPAs and OECM	All Adriatic countries	High	IP, NF	Post-2020 Global biodiversity framework (GBD) Target 2 EU 2030 Biodiversity Strategy 2.1. Coherent network of protected areas	Multilateral organizations, national authorities, scientific institutions, expert NGOs and other stakeholders

CAPACITY BUILDING, STAKEHOLDERS INVOLVEMENT AND NETWORKING Objective: Improve experts' capacities at the Adriatic level and involvement of stakeholders Indicator of objective achievement: All Adriatic countries have needed expertise for GES assessment under IMAP or MSFD, supported with engaged general public							
No.	Activity	Expected results/ outputs	Relevant countries	Priority level	Possible sources of funding	Link to other relevant strategies	Possible actors
4.1.	Organize joint capacity building activities and exchange knowledge on certain topics, including NIS/IAS, migratory species, use of existing and new technologies in monitoring, law enforcement and other activities.	Number of trained experts is increased Available and new technologies are used in monitoring and conservation in general	All Adriatic countries	Very high	IP, NF	Post-2020 Global biodiversity framework (GBD) EU 2030 Biodiversity Strategy 3.3.4. Improving knowledge, education and skills	Multilateral organizations, national authorities, scientific institutions, expert NGOs and other stakeholders
4.2.	Engage fishermen, general public and other stakeholder in monitoring (citizen-science) and conservation activities, including designation, management and enforcement of MPAs	Citizen science projects are implemented MPAs are managed with active participation of relevant stakeholders	All Adriatic countries	Medium	IP, NF	Post-2020 Global biodiversity framework (GBD) Target 19 EU 2030 Biodiversity Strategy	Multilateral organizations, national authorities, scientific institutions, expert NGOs, general public and other stakeholders
4.3.	Improve existing sub-regional specific networks of MPAs, such as AdriaPan	Functional AdriaPan network	All Adriatic countries	Law	IP, NF	Post-2020 Global biodiversity framework (GBD) EU 2030 Biodiversity Strategy	Multilateral organizations, national authorities, scientific institutions, expert NGOs and other stakeholders
4.4.	Establish Adriatic network of experts for priority species and habitats and specific conservation activities	Compile, publish on web and update list of active experts in the region Adriatic Task Force for unusual stranding and similar events is set	All Adriatic countries	Medium	IP, NF	Post-2020 Global biodiversity framework (GBD) EU 2030 Biodiversity Strategy ACCOBAMS Strategy	Multilateral organizations, national authorities, scientific institutions, expert NGOs and other stakeholders

FINANCING Objective: Ensure sufficient long-term funding for conservation activities Indicator of objective achievement: Funding for most of the Post 2020 SAPBIO activities ensured and activities are implemented							
No.	Activity	Expected results/ outputs	Relevant countries	Priority level	Possible sources of funding	Link to other relevant strategies	Possible actors
5.1.	Enhance implementation of national and transboundary project on different topics (using available funding, such as EU funds, GEF etc.)	Number of joint projects covering priority topics is increased	All Adriatic countries	Very high and ongoing	IP, NF	Post-2020 Global biodiversity framework (GBD) Target 18 EU 2030 Biodiversity Strategy ACCOBAMS Strategy	Multilateral organizations, national authorities, scientific institutions, expert NGOs and other stakeholders
5.2.	Investigate Public Private Partnerships (PPP) possibilities to leverage funds from the business sectors and foundation to co-finance conservation	Some PPP initiatives are implemented in practice	All Adriatic countries	High	IP, NF, O	Post-2020 Global biodiversity framework (GBD) Target 18 EU 2030 Biodiversity Strategy	Multilateral organizations, national authorities, scientific institutions, expert NGOs and other stakeholders
5.3.	Review existing subsidies which are unsustainable for biodiversity and propose solutions to redirect them into conservation actions	Unfavourable subsidies are identified and their re-direction proposed	All Adriatic countries	Medium	IP, NF, O	Post-2020 Global biodiversity framework (GBD) Target 18 EU 2030 Biodiversity Strategy	Multilateral organizations, national authorities, scientific institutions, expert NGOs 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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