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POST-2020 SAP BIO

CONSERVATION OF MARINE AND COASTAL BIODIVERSITY IN THE IONIAN SEA AND CENTRAL MEDITERRANEAN SUB-REGION BY 2030 AND BEYOND

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CONSERVATION OF MARINE AND COASTAL BIODIVERSITY IN THE IONIAN SEA AND CENTRAL MEDITERRANEAN SUB-REGION BY 2030 AND BEYOND

SUB-REGIONAL REPORT OF THE POST-2020 SAPBIO

POST-2020
SAP BIO

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

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List of Acronyms

ACCOBAMS	Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area
Barcelona Convention	The Barcelona Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean
CAMP	Coastal Area Management Programme
CBD	The Convention on Biodiversity
CITES	The Convention on International Trade in Endangered Species
CMS	The Convention on the Conservation of Migratory Species of Wild Animals
COP	Conference of the Contracting Parties
EcAp	Ecosystem Approach
EEZ	Exclusive Economic Zone
EU	The European Union
EUSAIR	EU Strategy for the Adriatic-Ionian Region
FAO	Food and Agriculture Organization
GES	Good Environmental Status
GFCM	The General Fisheries Commission for the Mediterranean (GFCM)
HAB	Harmful Algal Bloom
HCMR	Hellenic Centre for Marine Research
ICZM	Integrated Coastal Zone Management
IMAP	Integrated Monitoring and Assessment Programme
ISCM	Ionian Sea and Central Mediterranean sub-region
ISPRA	Italian National Institute for Environmental Protection and Research
IUCN	International Union for Conservation of Nature
IUU	Illegal Unregulated Unreported Fishing
MEDREGION	Support Mediterranean Member States towards the implementation of the Marine Strategy Framework Directive
MPAs	Marine Protected Areas
MSFD	Marine Strategy Framework Directive
MSP	Maritime Spatial Planning
NBSAP	National Biodiversity Strategies and Action Plan
NGOs	Non-Governmental Organisations
NIS/IAS	Non-Indigenous Species /Invasive Alien Species
PPP	Public-Private Partnerships
SAPBIO	Strategic Action Programme for the Conservation of Biological diversity in the Mediterranean Region
SDGs	Sustainable Development and Sustainable Development Goals
SPA/BD	Specially Protected Areas/ Biodiversity Protocol
SPA/RAC	Specially Protected Areas/Regional Activities Centre
UNEP/MAP	United Nation Environment Programme/ Mediterranean Action Plan
WG DIKE	Working Group on Data, Information and Knowledge Exchange of the Marine Strategy Framework Directive in the European Union.

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Introduction

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The Conference of the Contracting Parties (COP) to the Barcelona Convention have decided the elaboration of Post-2020 SAPBIO, as 15 years passed since the first adoption of the SAPBIO in 2003. The results of SAPBIO were delivered in the Barcelona Convention COP 21 (December 2019). Particular emphasis was given to species and ecosystems' current status and the new challenges for conservation policies. The Contracting Parties also considered the conclusions and recommendations issued by evaluating the SAPBIO implementation during 2004-2018.

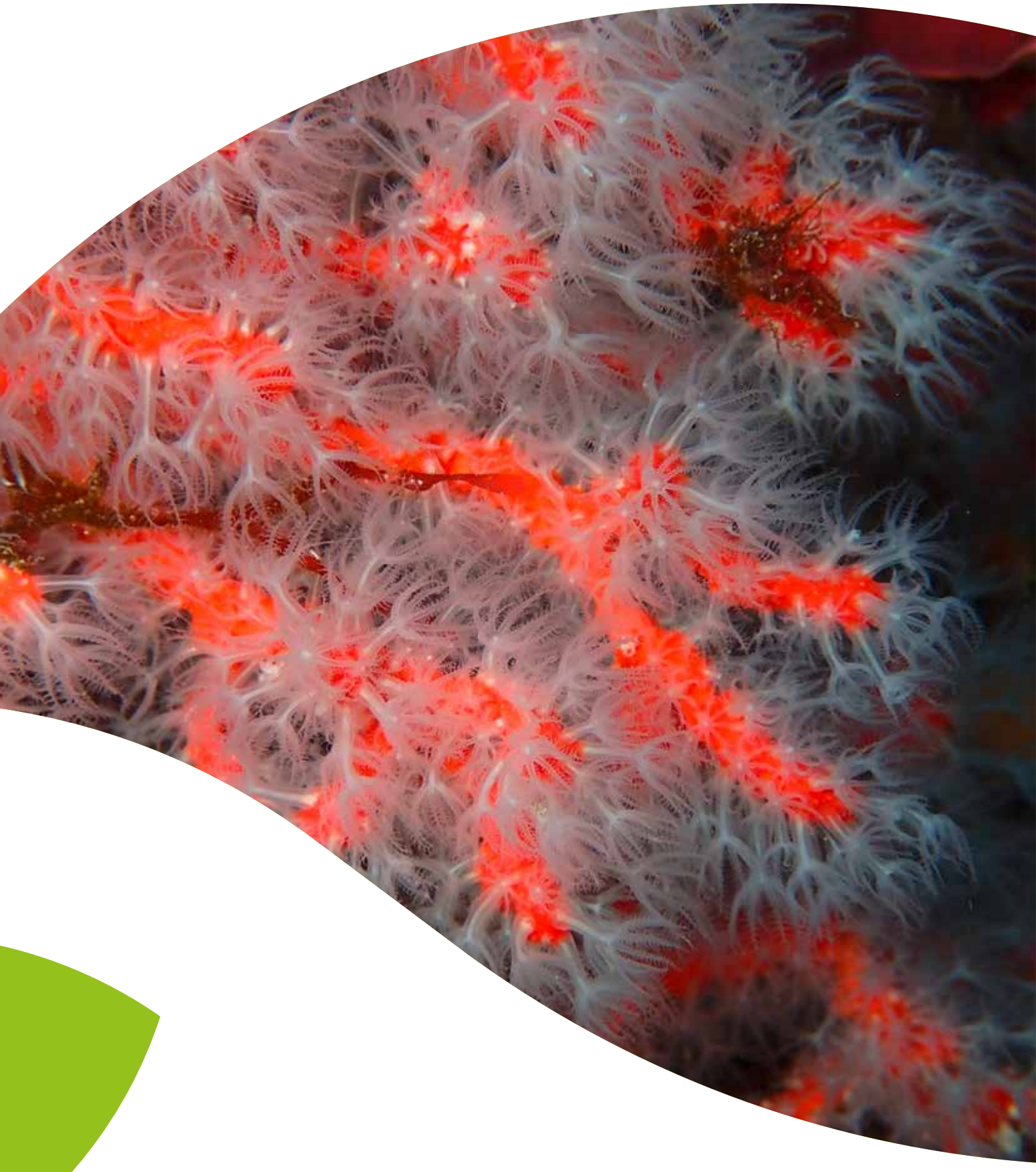
The Post-2020 SAPBIO elaboration is being conducted through a participatory approach starting at the national level (national processes) and involving the relevant authorities and other stakeholders. Sub-regional consultations will follow the national processes. The elaboration process's final stage will use the national processes' outcomes and the sub-regional consultations and compile them to craft the draft Post-2020 SAPBIO to be submitted for consideration by COP 22 in 2021.

This new version of Post 2020 SAPBIO aimed to be formulated effectively to address current and future regional and national challenges in the Mediterranean, including the Mediterranean contribution to the CBD Post-2020 Global Biodiversity Framework, and the 2030 Agenda for Sustainable Development and Sustainable Development Goals (SDGs).

The Post-2020 SAPBIO's central aim is to strengthen and streamline the implementation of the plans and strategies already adopted at the national and international level concerning biodiversity, emphasising marine and coastal biodiversity. Particular attention should be paid to the mainstreaming of biodiversity conservation into all relevant environmental policies and relevant policies for the sustainable use of marine living resources, such as fisheries, tourism and other uses of the marine and coastal environment.

This report's main objective is to identify the sub-regional priorities and orientations based on a series of diagnosis conducted at the national level in Ionian Sea and Central Mediterranean sub-region countries. These priorities are achieved through highlighting the need of integration and further harmonisation of the identified priority actions at the national level, particularly the transboundary issues such as invasive non-native species spread, effects and mitigation actions for climate change, the vision to create influential and representative network of MPAs on the sub-region and Mediterranean levels. These identified priority areas are translated into practical actions proposed by the four nations in the sub-region to achieve better marine resources conservation status and sustainable use on the basin level.

2. Methodology



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This report for the Ionian Sea and Central Mediterranean sub-region was formulated by SPA/RAC consultant, under close coordination and guidance from SPA/RAC relevant staff, and contents will be presented and discussed with the sub-region national relevant authorities/experts in a dedicated workshop that will be held in March 2021. The principal report drafting methodology was desktop-based research, by the appointed SPA/RAC consultant, with inputs on the draft from SPA/RAC staff and other inputs expected during the sub-regional workshop.

The national reports of Post-2020 SAPBIO of Greece, Italy, Libya, Malta, and Tunisia made the main backbone for this report's preparation. These reports were reviewed by respective national expert/s from each country and followed a standard template to encapsulate systematic review and analysis of current state, pressures, responses and identified needs and future priorities for each country. The national report of Greece covers the entire Greek waters, however, for the use of this report, the information on the Ionian Sea is considered, as the remaining areas are located within the Aegean-Levantine Mediterranean basin. The Italian national report was divided into three sub-reports, representing the three coastal zones of the country. In this report, the Ionian Sea and Central Mediterranean part of the document were consulted. The report from Libya collected all available information on marine and coastal biodiversity, where the longest coastline on the south of the sub-region is located. Malta's national report was received in late December 2020 with a detailed analysis of available data on the Maltese waters. For Tunisia, the country shares two regions, Central and Western Mediterranean. Therefore, the author was in close contact with the Western Mediterranean sub-region consultant. A national workshop was held in most of these countries to review the national reports' contents by relevant stakeholders' participatory approach.

In addition to the national reports, other regional and global conservation and policy documents were consulted.

3.

Key biodiversity values of the Ionian sea-central Mediterranean subregion & its current state

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3.1. Main physical characterizing features of the sub-region

The Ionian Sea and Central Mediterranean sub-region is located at the Mediterranean basin's centre between the Western Mediterranean, the Adriatic Sea and the Aegean-Levantine Sea (Figure 1). This sub-region is a transition area characterised by several small scale and mesoscale oceanographic phenomena and a great abundance of marine living resources (Coll *et al.*, 2010). The high biodiversity of this sub-region is owed to particular hydrological and geomorphological characteristics. The current subdivision of Mediterranean Sea was adopted within the framework of the EcAp process of the Barcelona Convention.

Figure 1.
Borderlines of the Ionian Sea and Central Mediterranean sub-region.

3.2. Biodiversity characteristics

Approximately 17,000 marine species and 4-18% of global marine biodiversity are present in the Mediterranean (Coll *et al.*, 2010). The Ionian Sea and Central Mediterranean sub-region is diverse in their species and habitats, located at the centre between two different sub-regions, west and east of the basin. Thanks to the particular hydrological and geomorphological characteristics, the climatic properties make it an optimal habitat for thousands of species, including several endemic species (Figure 2).

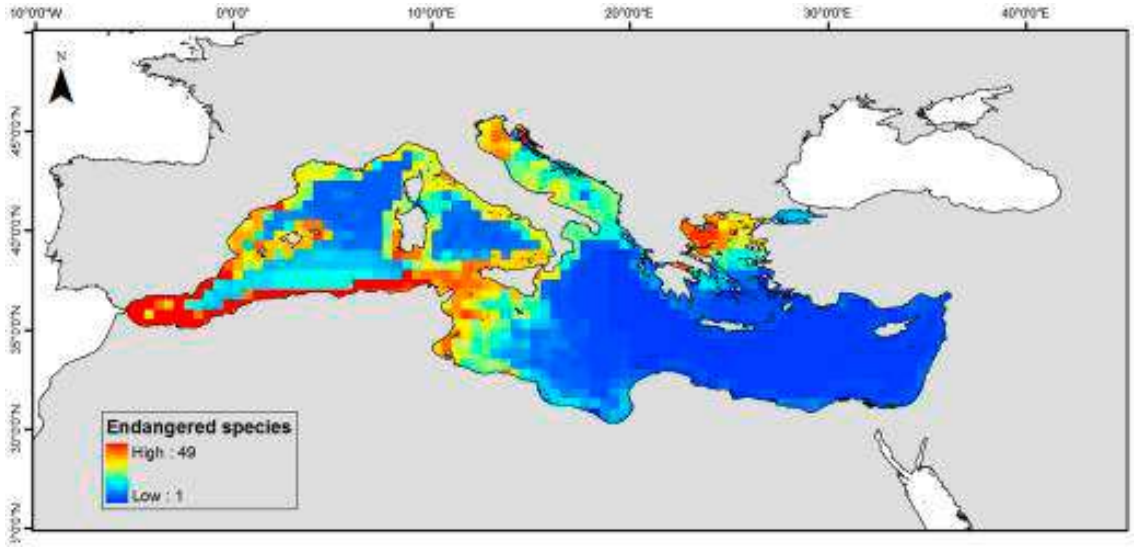

Figure 2.
Biodiversity hot spots for Mediterranean vertebrate species of particular conservation concern, 110 critically endangered, endangered, vulnerable, or near-threatened species were included, the dashed line shows the ISCM subregion (modified from Coll *et al*., 2010).

3.2.1. Phyto- and zooplankton knowledge in the sub-region

Plankton communities (Phytoplankton and zooplankton) are essential components of water column biological communities, as they are at the base of marine food webs. The status of plankton diversity can indicate water column ecosystem quality; furthermore, these communities are sensitive to anthropogenic pressures, mainly organic matter enrichment. Furthermore, Phytoplankton is the primary autotrophic components in aquatic ecosystems, responsible for almost half of global net primary production. It plays an essential role in carbon requisitioning and oxygen production in the marine ecosystem.

Baseline information on plankton in the sub-region indicated variable levels of diversity. In some sub-region areas, complete checklists of species are available for species richness. Some countries reported comprehensive data on both phytoplankton and zooplankton diversity, including species lists on both old and recent scientific survey published results and unpublished reports. Greece's data emphasised the annual cycle of plankton abundance **due to the different environmental conditions and anthropogenic effects. Greek waters are classified as regions with a bimodal dynamic, showing low biomass during late spring-summer and higher biomass up to the maxima in late fall-winter (D'Ortenzio and Ribera d'Alcala, 2009). HABs frequently occur in coastal areas of Greece, characterized by high pollution levels, restricted water mass circulation and riverine inflows, mostly related to eutrophication caused by intensive agriculture, partially treated domestic and industrial wastewaste waters and mariculture activities (Pavlidou *et al*., 2015; Dimitriou *et al*., 2015). No conclusive number of planktonic species were provided for Greece, but some species were mentioned, such as diatoms and dinoflagellates Other reports from the region, showed knowledge of species richness**, from 90-145 species (Malta), 493

species (Tunisia) and 390 species (Libya). In Italy, a two-volume guide for the identification of phytoplankton and neritic zone zooplankton was published.

Furthermore, following MSFD guidelines, Chlorophyll distribution on marine areas is used to measure plankton distribution (Figure 3). Chlorophyll mapping and seasonal density data are available in some areas of the sub-region. Eutrophication and red tide phenomenon are significant issues in several sub-regions countries, especially in some shallow bays in Greece and in the southwest (Libya and Tunisia), due to local weather conditions and accumulation of nutrients in the marine waters.

Zooplankton diversity data is limited in the subregion, and some countries reported species estimates based on limited coverage surveys, e.g. 269 species in Tunisia. **The oligotrophic character for ciliate zooplankton abundance is evident, even in coastal areas, but more than 200 mesozooplankton species have been recorded, represented mainly by copepods the highest values of abundance have been observed in spring**.

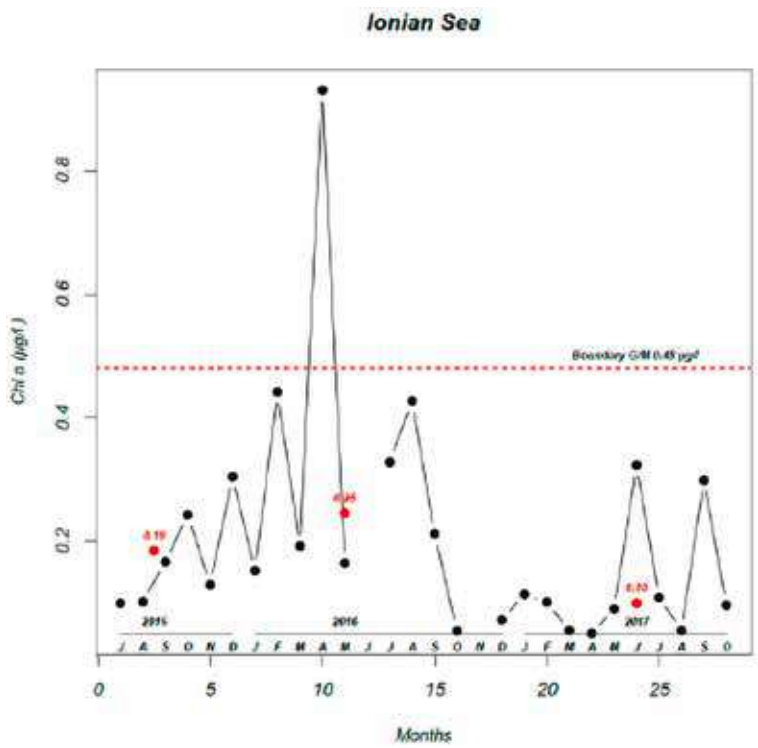

Figure 3.
Concentrations (µg/L) of Chlorophyll-a (monthly geometric averages in black and annual average in red) in the marine waters of the Ionian and Central Mediterranean Sea subregion (the Italian Waters). The dashed line represents the G/M (good/moderate) threshold value of the parameter corresponding to the Type III W Tyrrhenian type. Source: ISPRA, 2018.

3.2.2. Invertebrate bottom fauna, macro-algae and Magnoliophyta

Bottom Invertebrate fauna

Regardless of available data on invertebrate bottom fauna, lack of national monitoring and assessment of species of concern was reported across the sub-region. Italian report considered data form the SIBM manual "Protected species according to the SPA/BD Protocol (Barcelona Convention) present in Italy" (Relini and Tunesi, 2009) and, where appropriate, information coming from other sources were also reported and cited.

For some species and communities, the actual diversity in some areas of the subregion is expected to be higher (Greece), due to the diversity of several small-sized taxa (e.g. meiofauna), sessile taxa (e.g., Hydrozoa, Bryozoa), and diverse habitat types that can support exclusive species (e.g., extreme habitats) or their accessibility is not easy (e.g. Benthic Boundary Layer), or they have not been adequately studied due to lack of expertise, sampling inefficiencies, difficult access or inadequate funding. Nevertheless, in Greece, several species were first discovered in the Greek waters, but mostly from the Aegean Sea where research effort has been more intensive compared to the Ionian waters. Many of these species are endemic to a specific type locality (e.g., extreme habitats).

Some taxa are to the Mediterranean diversity; for example, 85% of Brachiopoda and 75% of Polychaeta species found in the Mediterranean are in Greek waters (Gerovasileiou & Bailly, 2016; Faulwetter *et al***., 2017).** Some species are endangered due to casual and unnecessary harvesting, while other species can be damaged by fishing gear (Trawling). Sponges and coral species are still commercially harvested across the sub-region, which push them to the over-exploited level. Some habitats such as *Posidonia* meadows have been degraded and pollution can also affect several bottom invertebrates, such as the endangered *Pinna nobilis*, which is already under the brink of extinction due to a pandemic caused by a pathogen (Zotou *et al*., 2020)). The negative impacts of invasive species expansion, such as the alga *Lophocladia lallemandii*, can affect potential food sources while invasive fish herbivores can alter the structure and dynamics of the invaded ecosystems through complex cascading effects (Dimitriadis *et al*., 2021). Some sub-region species are endemic to the sub-region.

The recent study of ca. 40 marine caves in the Greek Seas has shown that they constitute biodiversity hotspots, harbouring more than 400 species, including rare, protected, and new endemic taxa, as well as unique communities and bioconstructions (Gerovasileiou *et al***., 2015).** Some species such as the Maltese top-shell, *Stermophala nivosa*are are critically endangered (Schembri *et al*., 2007; Evans *et al*., 2011). Variousinvertebrate species are species listed in Annexes of the SPA/BD Protocol, such as the edible sea urchin *Paracentrotus lividus*, the long-spine sea urchin *Centrostephanus longispinus* and **the endemic bivalve mollusc, the fan mussel** *Pinna nobilis* **populations are under severe threat across the sub-region.**

The Date mussel, *Lithophaga lithophaga*, is another species which is known as a food source has suffered habitat loss through the years, mostly related to loss associated with illegal operations in connection with date mussel collection, where rocks are broken up to

facilitate extraction of specimens; but also due to coastal development. In Libya, regardless of the lack of comprehensive coverage of surveys along the coast, the available data shows an increase in published studies on bottom invertebrate communities, mainly sponges, molluscs and crustaceans.

The total number for benthic invertebrates is still far from being completely known, pending more surveys and studies. No assessment of threat level for either species or their habitats existed for Libya. According to the national report, in Tunisia, benthic invertebrate diversity is greater ir northern waters (Western Mediterranean) than the eastern coastline. The issue of invasive invertebrate species from the Red Sea or the Atlantic is a common concern for the sub-region.

Corallium rubrum a red coral species of historical importance in the sub-region is at favourable conservation status in the north of the sub-region (Italy). In Greece, the shallow water stocks (down to 60 m) are almost depleted, and thus professional divers are forced to harvest in greater depths (up to 130 m). In some areas in Greece, fishing was carried out in these areas throughout the closed period, possibly using illegal dragging gears **(Dounas** *et al***., 2010).** the current status of the other countries of the sub-region is lacking. Excessive commercial harvesting leads to a strong reduction of average colony dimensions and represents the greatest source of pressure on the sub-region species and the whole Mediterranean. However, the species is probably partially protected in EU waters and some north African countries. **Significant knowledge gaps remain and an urgent need for scientific research targeting red coral in the whole sub-region is apparent, aiming at a detailed investigation of the ecology, size and structure of coral populations assessing its conservation status and updating and/or implementing appropriate management and restoration measures.**

Macro-algae

The macro-algae in this sub-region range from low diversity (175 species in Libya), medium diversity in Greece (200 species) and high in Tunisia (414 species), although it is estimated that 600 species may exist, including those in the European waters of the sub-region. Rhodophyta is the most common group in the sub-region, followed by Fucophycea, Chlorophyceae and Magnoliophyta. Variability in macroalgae species data reflects both habitat characteristics at each area (country) of the sub-region and inventory effort, research, monitoring, and documentation among different sub-regions countries.

Magnoliophytes

The group is comprised mainly of three species, the widest distributed endemic *Posidonia oceanica*, the warmwater species *Cymodocea nodosa* and the lowest abundant *Zostera noltii*. Local degradation of *Cymodocea nodosa* populations have been recorded in sectors subjected to heavy pressure from human activities, this species seems to be more influenced by long-term natural fluctuations, such as variations in salinity, the action of herbivores and climate change. There is also the growing evidence that, in degraded meadows, P. oceanica may be replaced by C. nodosa (Pergent *et al.*, 2012). *Zostera noltii* grows forming not very dense meadows in a sheltered environment of lagoons and bays with superficial fine muddy sands. The species is common and does not present significant conservation

problems. The non-indigenous species *Halophila stipulacea* was reported in Greek, Libyan and Tunisian waters. Mapping of *Posidonia* meadows was and still is a priority for several States in the sub-region. Detailed maps of *Posidonia* distribution in Malta, showed that these meadows cover a total area of 64.4 km^2. In the south of the sub-region (Libya), although large areas of the continental shelf waters are Magnoliophytes meadows (mainly *Posidonia* and *Cymodocea*), surveys so far only covered two coastal lagoons of Farwa (west) and Ain Alghazala (East). Important Magnoliophyte meadow areas along the shallow continental shelf between the Tunisian border and Misurata, and the Gulf of Sirte area have never been studied. In Tunisia, similar species were reported, with the note of progressive invasive species (*Halophila stipulacea*) towards northern Tunisian waters, after being established in both the Libyan coast (Tobruk) and south-eastern Tunisia.

The Italian Ionian and Central Mediterranean Sea marine subregion is home to three species of angiosperms. Among these, *Posidonia oceanica* is the one that shows the widest distribution and a greater biomass, forming extensive meadows in the infralittoral zone, from the surface of the sea to a maximum depth of about 40 m.

The monitoring of both endemic and invasive Magnoliophytes and other marine invertebrates represents an opportunity of collaboration within the sub-region.

3.2.3. Vertebrates other than fish

Marine mammals

Thirteen species of marine mammals, eight cetaceans (dolphins and whales) and one Pinniped (the Mediterranean monk seal *Monachus monachus*) are recorded in the sub-region. **Twelve out of thirteen are included in the list of endangered or threatened species (Annex II) of the SPA/BD Protocol**. Nine species are monitored and assessed under the frameworks of the Habitat Directive, the MSFD and the Annex II species of the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean (SPA/BD Protocol, in addition to CMS, FAO-GFCM and CITES annexes (Table 1)). **In South Crete and the Ionian Sea, the observed frequency of Cuvier's beaked whale is higher compared to the rest of the Mediterranean (Frantzis and Alexiadou, 2003). Greek Seas also constitute an important habitat for sperm whales as the species is present year-round along the Hellenic Trench, most sightings being recorded from south-west Kefalonia Island south to west Peloponnese, west and south Crete. A permanent small population of common dolphin is known to inhabit Korinthiakos Gulf (subpopulation recently listed as Critically Endangered by the IUCN Red List), forming mixed-species groups with striped dolphin and showing a preference for pelagic habitats and deep water (Bearzi et al., 2011) instead of a typical coastal behaviour. Amvrakikos Gulf, where fishing is restricted for purse seiners and bottom trawlers, also hosts a resident population of bottlenose dolphins (Gonzalvo *et al*., 2015).**

The presence of the above-mentioned species has led to the formulation of Cetaceans Critical Habitats (CCH) and areas of interest for Marine Mammals (IMMAs) that can be found across the Ionian Sea as an integral part of conservation and protection efforts.

Due to the lack of comprehensive and continuous monitoring of all species, population structure and population trends of marine mammals in the sub-region are not well understood. The endangered monk seal (*Monachus monachus*) is concentrated in Greece, with an estimated population of ~300 individuals, representing 43% of its global population (Karamanlidis *et al*., 2016). The major factor favouring the survival of the monk seal in the Greek seas is the presence of suitable habitats (i.e. marine caves with internal beaches) both for resting and pupping due to the specific geomorphology of the area (Voultsiadou *et al*., 2013). Nowadays, monk seal sightings are widely distributed throughout the Aegean, and the Ionian seas and several important monk seal pupping areas have been identified (Sini *et al.*, 2017). The species was suspected to survive also in Libya, and in 2011 a young female was found entangled in fishing nets, near Ain Alghazala MPA (Alfaghi *et al.*, 2013), and the species is found in Ecologically or Biologically Significant Area (EBSA) of the south Adriatic Ionian Straight. The Mediterranean monk seal's conservation status is very poor due to the continuous decline of the Mediterranean population. Furthermore, no assessments of cetaceans' conservation status were carried out at the sub-region level, and most data is heavily dependent on the IUCN red listing process.

Table 1.

Marine Mammals species in the Ionian Sea-Central Mediterranean Sub-region.

	Species	IUCN Red List of Threatened Species (Mediterranean Category)	SPA/BD Protocol	CITES	CMS	GFCM
1.	Striped Dolphin (*Stenella colaru-alba*)	Vulnerable (VU)	Appendix II	Appendix II	Appendix II	GFCM/36/2012/2
2.	Short-beaked Common Dolphin (*Delphinus delphis*)	Endangered (EN)	Appendix II	Appendix II	Appendix II	GFCM/36/2012/2
3.	Bottlenose Dolphin(*Tursiops truncatus*)	Vulnerable (VU)	Appendix II	Appendix II	Appendix II	GFCM/36/2012/2
4.	Risso's Dolphin (*Grampus griseus*)	Data insufficient (DD)	Appendix II	Appendix II	Appendix II	GFCM/36/2012/2
5.	Cuvier's beaked whale (*Ziphius cavirostris*)	Data insufficient (DD)	Appendix II	Appendix II	Appendix II	GFCM/36/2012/2
6.	Long-finned pilot whale (*Globicephala melas*)	Data insufficient (DD)	Appendix II	Appendix II	No Listed	GFCM/36/2012/2
7.	Sperm whale (*Physeter macro-cephalus*)	Endangered	Appendix II	Appendix I	Appendix I	GFCM/36/2012/2
8.	Fin whale (*Balaenoptera physalus*)	Vulnerable (VU)	Appendix II	Appendix II	Appendix II	GFCM/36/2012/2
9.	Mediterranean monk seal (*Monachus monachus*)	Critically Endangered (CR)	Appendix I	Appendix I	Appendix I	GFCM/36/2012/2

Several threats to marine mammals are identified in the sub-region, the general threat types are shown in addition to **natural factors like disease, climatic events, and anthropogenic causes**, such as collision with ships, organochlorines contaminants, trace metals and endocrine disruptors can alter their reproductive capacity, and they may alosalso be impacted by **noise pollution and entanglement in fishing gears (Mytilineou** *et al*.**, 2019),** aquaculture activities and the reduction of prey and degradation of their habitat. In a study on collision risk assessment of ships with the endangered sperm whale along the Hellenic Trench, Greece, Frantzis *et al*., (2019) found that the overall collision risk for sperm whales would be reduced by around 70%, while a maximum of 11 nautical miles would be added to major routes and only around 5 nautical miles for the majority of ships. They also noticed that no negative impacts Will be associated with the re-routing by shipping away from sperm whale habitat and there would be additional shipping safety and environmental benefits. Other impact factors are: Morbillivirus infections and general degradation of the habitat also linked to climate change. Monitoring of marine mammal mortality is very important to understand the size of this problem. For example, a total of 1,160 individuals have been stranded in the Greek Seas between 2010 and 2019 mostly common dolphins, striped dolphins, bottlenose dolphins, sperm whales and Cuvier's beaked whales (HCMR unpublished data). For monk seal populations, threats include direct killing by humans, accidental capture in gillnets, anthropogenic disturbance in coastal sites frequented by the species and the effects of the accumulation of pollutants in the tissues. All States in this sub-region must work further to reduce those threats and seek cooperation opportunities to research and monitor these sensitive marine animals. **Large areas in Greece (where most of the species occur) remain unexplored and may host important breeding sites. Despite applied management measures (e.g., guarding and regulations in MPAs) which have led to an increase in the species' birth rate, 195 individuals have been recorded stranded along the Greek coastline during the period 2011-2019 (HCMR unpublished data).**

Marine reptiles

Five species of marine reptiles can be permanently or occasionally encountered in the sub-region. However, two of them (loggerhead sea turtle *Caretta caretta*, green turtle *Chelonia mydas*) are regularly sighted as nesting species (Figure 4) and form an isolated meta-population as a Regional Management Unit (RMUs) Wallace *et al*. 2010). A third species, the leatherback turtle *Dermochelys coriacea*) is very rare in the subregion, occasionally visit the area. This species is more common than the other two species in the western Med region from the Atlantic sub-population. These species are considered endangered or threatened (Appendix II, Barcelona Convention, 1995; Appendix II, Bern Convention, 1996, Appendix IV, European Union; IUCN Red List; Appendix I, CITES). Both Hawksbill *Eretmochelys imbricata* and Kemp's ridley turtle *Lepidochelys kempii* are considered occasional in the Mediterranean Sea. Green and loggerhead turtles are nesting in the sub-region, although nesting of Green turtle in the Ionian sea part is rare. Greece is one of the major nesting grounds for the loggerhead turtles in the Mediterranean. The monitored nesting areas in Greece host about 45% of the total Mediterranean nests, 39% of which are made in Laganas Bay (National Marine Park of Zakynthos) and 28.5% in southern Kyparissia Bay, western Peloponnese, comprising the two largest nesting aggregations of *C. caretta* in the Mediterranean (Casale *et al*., 2018). The other important nesting areas of loggerhead sea turtle are in Libya (although an accurate estimate of annual nests laid in Libya is still unknown). Nesting in Libya is

widespread, and monitoring efforts since 2005 focus on the Gulf of Sirte and Cyrenaica sandy beaches, as the country's major sea turtle nesting areas. Minor nesting sites found in Tunisia, Malta and Italy, and these sites are growing in number, but nests are counted by few tens each year in both Italy and Tunisia and less than five in Malta. This establishment of nesting in southern Italy and Malta is a return of the species to nest there, as historical data indicate these areas used to be nesting sites for turtles (Coll, *et al.*, 2010). The green turtle *Chelonia mydas* was exclusively nesting at the Eastern Mediterranean sub-region until nesting evidence was discovered in Tunisia (Jribi, personal communications), and nesting activity in Libya for this species is probable. The presence of small juvenile green turtles in Lakonikos Bay (south-western Peloponnese) suggests its importance for the development of *Chelonia mydas* (Casale *et al*., 2018 and references therein).

The status of these marine reptiles in open waters varies within the sub-region. Several studies were conducted in Italian waters, indicating important aggregation areas for specimens in the neritic phase, with the presence of both young and adults on the continental shelf between Sicily and Tunisia (Casale *et al*., 2004; 2007), while the northern Ionian Sea is a pelagic area for the growth of juveniles in an oceanic phase (Casale *et al*., 2010). Moreover, the Ionian coast of Calabria is frequented by females both in the inter-nesting phase and in the post-nesting one, making this stretch of coast an essential Italian nesting site because of the regularity of deposition and for the number of the nests, equal to about 12-27 nests per year (Mingozzi *et al*., 2016).

Post-nesting sea turtle tracking studies conducted in Libya indicate that several turtles head towards Tunisian waters for feeding and post-nesting dispersal. However, in Tunisia, the bycatch of sea turtles in the Gulf of Gabes area cause mortality for an expected significant number of turtles from the sub-region and other regions in the Mediterranean, as this area is an important feeding and wintering hotspot for both green and Loggerhead turtles. There is also an adequate level of population genetic composition of sea turtles from monitored areas in Libya, and some studies indicated that the Libyan rookery is the oldest in the Mediterranean (Culsa *et al*., 2013).

In some areas of the sub-region, national stranding networks were already established. **Approximately 6,000 strandings of sea turtles have been recorded in the Greek Seas between 2010 and 2019. Almost 90% of these strandings concern loggerhead turtles, followed by 7% of green turtles.**

Sea turtles' main threats in this sub-region and the whole Mediterranean are the deterioration of habitats, including nesting, feeding and wintering areas and key migratory corridors. Most documented threats are assessed based on nesting beach prospective. These are human use of nesting beaches, coastal development, coastal erosion and sand extraction, light pollution, beach debris, and limited human exploitation of turtle meat and eggs and the natural predation of eggs by mammalian predators, such as dogs, foxes and Jackals (Casale *et al*., 2018). Other threats include the ingestion of plastics, bycatch in trawl and longline fisheries, and collisions with boats, pollution that can impact both the species and their habitats, and the climate change effects, including beach sand temperature increase which can alter the current sex ratios (feminization of the population), loss of nesting sites due to sea-level rise, while SST increase can also alter the thermal regulation of the animals and the energy needed for migration and feeding

Despite the encouraging findings for the recovery of the Mediterranean loggerhead sea turtle population (recently upgraded from endangered to vulnerable), Greece's overall conservation status has been deemed in Greece unfavourable–bad (Article 11 of the EU Habitat Directive for Annex II, IV and V), requiring further conservation actions.

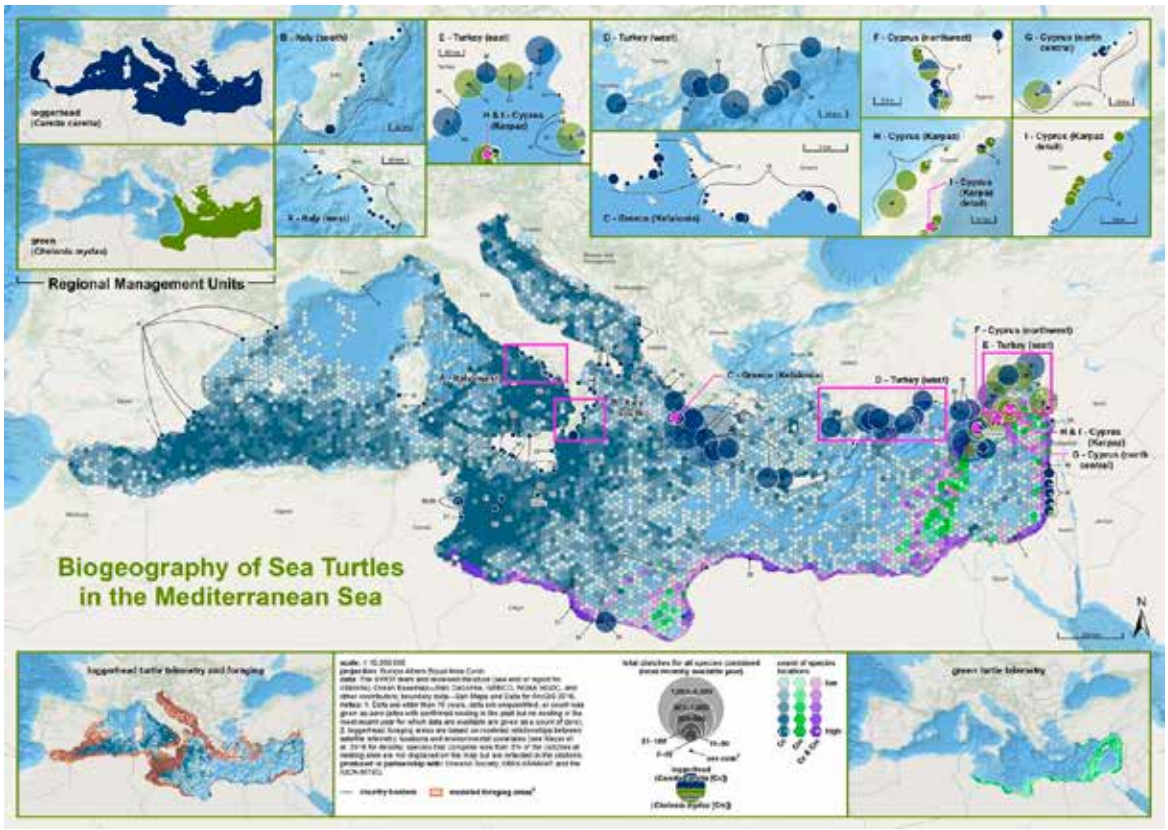

Figure 4.
Available nesting and satellite telemetry data for sea turtles in the Mediterranean Sea and modelled foraging areas for loggerhead turtles. The data include 216 nesting sites and 316 satellite tags (Hochscheid *et al*., 2019)

Marine birds

Dias *et al.* (2019) concluded that invasive species, bycatch and climate change – are the top three threats, affecting 46%, 28% and 27% of all marine bird species. Marine birds also can reflect shifts in environmental conditions in a marine environment, including those occurring due to pollution pressures by toxic chemical residues and plastics.

The number of seabird species in SPA protocol Annexe II is 25 species. These species are distributed all sub-regions areas, with some differences in breeding species from one country to another. All five national reports detailed an excellent set of information on seabird diversity and conservation status. The Sicily Channel and the Tunisian Plateau area show some of the highest productivities in the Mediterranean Sea, and it also concentrates the largest populations of seabirds, particularly of the more pelagic Procellariiforms (Scopoli's Shearwater, *Calonectris diomedea* and European Storm-petrel *Hydrobates pelagicus*)

(UNEP-MAP-RAC/SPA, 2015). *Calonectris diomedea* also concentrated in the Tyrrhenian, Ionian and Central Mediterranean Sea islands The Strofades Island group (National Marine Park of Zakynthos) in the Ionian Sea hosts the largest colony in Greece (ca. 5,550 pairs). However, no complete national population census has ever been carried out. Greece's total breeding population is estimated at ca. 8,000-11,000 pairs (Karris *et al*., 2017). The Yelkouan Shearwater is known to breed in Greece, but data on key sites and long-term regular monitoring at the major breeding colonies are scarce and patchy. The Sicilian Channel and the Island of Linosa (Sicily) hosts the most extensive Italian colony and over 60% of Italy's national population. Three seabirds are found in Malta's waters, Yelkouan shearwater *Puffinus yelkouan*, Scopoli's Shearwater, *Calonectris diomedea* and European Storm-petrel *Hydrobates pelagicus*, forming aggregations that are regularly observed in coastal waters during migrations, but also including regular breeders. Results of an EU funded project produced comprehensive datasets and maps of the distribution of those species. Results indicated the importance of Libyan and Tunisian waters as foraging areas for seabirds breeding in Malta, which implies that effective conservation of these seabirds requires sub-regional coordination and joint efforts.

In Libya, national surveys of aquatic birds during winter counts and summer breeding species monitoring revealed that 20 species of seabirds are regularly found in Libya. Among them, six species are regular breeders. Libya also hosts the whole Mediterranean breeding population of the endangered Lesser crested Tern (*Thalasseus bengalensis emigratus*), in three coastal sites. The rediscovery of these colonies resulted from a sub-regional collaboration of bird researchers from Libya, Malta, Italy and Tunisia, and presents an example of transboundary collaboration in the sub-region (Hamza *et al.*, 2017).

Not all SPA protocol species are regularly monitored in all countries of the sub-region. Some countries have regular monitoring for several species, while others lack regular monitoring and conservation measures implementation. Seabirds are also another interesting set of species that can enhance sub-region collaboration among governmental institutes and NGOs, as several seabirds share their home range or foraging range among two or more countries in the sub-region.

Singular species and habitats to the sub-region:

Strictly marine endemics or species with a very restricted distribution in the Mediterranean are few, although the five national reports showed some interesting facts for some species and habitats:

1) **The Central Mediterranean is a unique ecosystem**, as it is positioned between colder western waters and the warmer Levantine basin of the Mediterranean, making it a unique sub-region where flora and fauna of both basins co-exist. It is also the area where non-native species are established after either entering through the Suez channel or Gibraltar's strait.

2) **The Greek Seas** encompass important areas for *Caretta caretta*, marine mammals (e.g. monk seal and sperm whales), and are characterised by some of the Mediterranean Sea's deepest waters, harbouring vulnerable marine ecosystems (e.g. cold-water corals). **Marine caves are among the most iconic features of the Greek rocky coasts.**

Approximately 300 marine caves are known from the Greek Ionian coasts, but the actual number is much higher (Giakoumi *et al*., 2013).

3) **The Sicilian Channel**: presents a high exchange of water masses and organisms between the west and east Mediterranean basins, contains several vital species and habitats, including seamounts and deep-sea corals. This area also features high productivity, favourable spawning conditions for several commercially important fish species, including bluefin tuna, swordfish, anchovy, and some demersal fish species. It is also a crucial feeding area for at least 30% of the global population of Scopoli's shearwater (the Island of Linosa (Sicily) hosts the largest Italian colony of Scopoli's shearwater and over 60% of the national population), 10% of the worldwide population of the vulnerable Yelkouan shearwater colony, and a colony of the endemic Mediterranean endemic sub-species of storm-petrel. This area could also be the last relevant habitat for the critically endangered Maltese skate *Leucoraja melitensis* that seems to be mainly confined to the Sicilian Channel. Moreover, three species of angel sharks and two species of guitarfish are present here. *Charonia tritonis variegata* is present, in Italy, only in the Ionian Sea and Eastern Sicily; the wandering triton *Ranella olearia* is also a unique species in this area.

4) **The south Adriatic Ionian Strait**: This area contains critical habitats for Cuvier's beaked whales *Ziphius cavirostris*, it also shows a significant density of other megafauna listed in Annex II of SPA/BD Protocol: the giant devil ray *Mobula mobular*, striped dolphin *Stenella coeruleoalba*, Mediterranean monk seal *Monachus monachus* and loggerhead turtle *Caretta caretta*. *Naria spurca* (Linnaeus, 1758), (listed *Erosaria spurca* in Italian report) is a rare species and mainly recorded in the Ionian and Central Mediterranean Sea. This area is considered with a level of uniqueness equal to the High EBSA criteria. It has to be under attention because it presents a low level of naturalness due to high human usage levels (fishing, shipping, recreation, population pressure along the coastline, pollution).

5) **Malta**: cave mysids (Crustacea), cold-water stenothermal species *Hemimysis speluncola* in Maltese waters, threaten to be replaced by closely related species with warmer affinities *Hemimysis margale*. The Maltese top-shell, *Stermophala nivosa*, is an endemic gastropod of the Maltese Islands.

6) **Gulf of Sirte**, Libya: The whole Mediterranean breeding population and a west African sub-species of the Lesser Crested Tern *Thalasseus bengalensis emigratus* (Endangered under SPA/BD protocol), is located in Libya (Gara Island, Elba Island and Benghazi lagoon).

7) **Farwa lagoon, Libya**: showed the highest growth rate of *Posidonia* leaves in the Mediterranean region (The mean number of leaves produced annually is 9.9 against a mean value for the Mediterranean of 7.5, and the rhizome growth rate is in the order of 35.7 mm.yr^{-1} against a mean value for the Mediterranean of 7.5 mm.yr^{-1}, (Pergent *et al.*, 2002).

8) **Other natural Bays and lagoons along the Libyan coast**: These areas are critical natural habitats for *Posidonia* meadows and several endemic Mediterranean flora and fauna, and mostly still in a natural condition.

9) **The Gulf of Gabes**: This area in the southwest central Mediterranean is an important feeding and overwintering area for several marine species, such as sea turtles and seabirds, and habitat for seagrasses and algae vast meadows.

10) **Neogoniolithon brassica-florida** (encrusting *rhodobionta*) is a veneering coral community along the wave-beaten rocky coast of the Mediterranean Sea. Inlets of El-Biban lagoon in the southeast of Tunisia are a unique habitat for this species.

The "European Marine Observation and Data Network" (EMODnet) has produced a broad scale habitat online map viewer (Figure 5) by assembling point datasets and habitat distribution models from different sources (https://www.emodnet.eu/seabed-habitats). Its usefulness lies in its total coverage for the European Seas and the standardisation of habitat classification, according to the European Nature Information System (EUNIS) (Gerovasileiou *et al.*, 2019). EMODNET also displays information and maps of the MSFD broad habitat types (BHT), e.g. soft, hard and biogenic substrate types spanning from littoral to abyssal depths, for the needs of the assessment of the Good Environmental Status (GES) of benthic habitats under the MSFD. These habitats include threatened and protected EUNIS level 4+ habitats requiring additional targeted assessments and conservation and restoration measures, for example, mapping *Pinna nobilis* habitats status and planning necessary research and conservation actions.

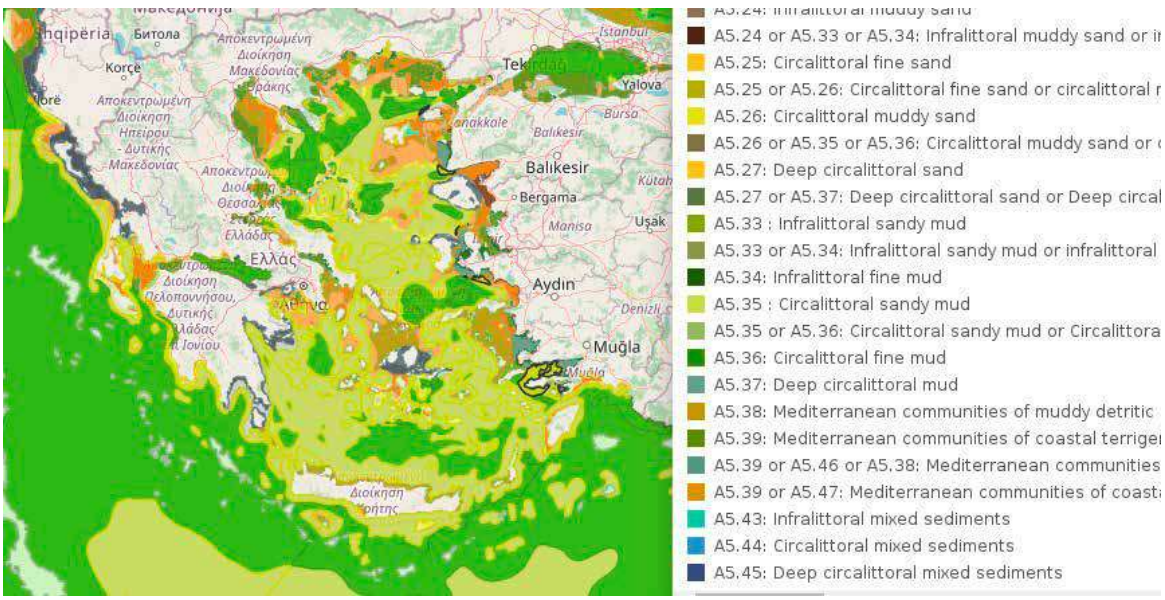

Figure 5.
Modelled distribution of seabed habitats according to the EUNIS classification system on the EMODnet Seabed Habitats map viewer (from https://www.emodnet.eu/seabed-habitats)

3.2.4. Fish, mollusc and shellfish species of commercial interest

Since the early civilisations, fishing has been a significant socio-economic activity in the central Mediterranean and Ionian Sea region. The data presented in the five national reports of this sub-region showed a high diversity of fish and shellfish species utilised commercially. Data collection of fish landings and diversity varied among countries. In Italy, there is a National Fisheries Data Collection Program, where data is collected systematically. At the same time, in Malta, an EU adopted a multiannual Community programme for the collection,

management and use of data in the fisheries sector for the period 2011-2017 was the basis of data presented. In Libya, most of the data depended on field surveys and studies rather than official statistics from the fishing sector. In Tunisia, the data derived from the National Institute of Marine Science showed an increase of 25% in catches between 2009 and 2018, but the major fish stocks suffered a decrease mainly on Tunisia's eastern waters because of overfishing. Diversity of commercially exploited fish and shellfish species varied among countries of the sub-region. In Greece, 510 species **(including elasmobranchs) have been recorded from the Greek Seas.** In Italy, there are 468 species (78% of the Mediterranean species). In Tunisia, 333 species, while Malta and Libya provided no data on total fish species. The most caught fish species are *Engraulis encrasicolus, Sardina pilchardus, Merluccius merluccius,* and *Boops boops*, followed by the invertebrates *Melicertus kerathurus* and *Octopus vulgaris.*

The sub-region states also vary in terms of fishing units and landing size numbers and types. Several fish stocks in the sub-region are shared stocks (e.g. Bluefin Tuna), and this represents an opportunity for competition and collaboration in conducting sustainable fishing in the sub-region. There is also an adequate level of data on some fish stocks' conservation status in the sub-region, which allows integrating these findings to assess the stocks on the sub-regional level in the future. The EU regulations in EU countries of the sub-region allowed more assessments and better quality of stock assessment; therefore, these protocols can be tested in the southern Mediterranean countries to integrate data on both sub-regional and regional levels.

Other species harvested and exploited commercially are four **sponge species: 'bath sponges': predominantly** *Hippospongia communis* **and** *Spongia officinalis* **and, to a lesser degree,** *S. lamella* **and** *S. zimmocca***. These species occur in most coastal benthic habitats down to approximately 100 m depth. Their exploitation has been extensive in the eastern Mediterranean (Voultsiadou** *et al.***, 2011). A gradual decline of sponge stocks has been observed after the heyday of sponge fishing throughout the first half of the 20th century in the sub-region, which further culminated with a major disease incident occurring in the late 1980s in Greece, Libya and Tunisia**. Red coral harvest status and the trend was mentioned earlier in section 3.2.2.

4.

Main threats, pressures and impacts on biodiversity

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The Ionian Sea and Central Mediterranean sub-region is located at the centre of the Mediterranean basin, and several anthropogenic activities and other pressures are present with variable levels of impact. The following is a synthesis of the main pressures and impacts, relations to specific sectors, assessment of the level/significance of pressures based on information provided at the five national reports of the sub-region and other relevant documents:

	Main Threat	Pressures	Impacts	Significance of pressure	Mitigation measures
1.	Coastal modification and construction of infrastructures	Physical loss and alteration of hydrological conditions, causing direct and indirect effects on biological components	Alteration and destruction of natural habitats important for coastal diversity communities	Medium to High in most of the sub-region countries. In others (Libya) this pressure is not a first priority because of low population count and length of coastline.	Integrated coastal zone management. Enforce the use of EIA and enforce national regulations on developers.
2.	Tourism	Establishment and running of infrastructure as well as to accommodation and recreational activities and transport can disturb sensitive marine species, which are facing changes in living conditions due to fragmentation and loss of natural habitats	1. Alteration of natural habitats due to mass tourism. Boat anchorage can negatively impact seagrass meadows and other sensitive marine habitats. 2. Speedboats can cause mortality to Humans (IT), sea turtles, smaller marine mammals and cause disturbance to seabird nesting colonies. 3. Unorganised tourism can also affect Sea turtle and seabird nesting sites. 4.Increase in tourism infrastructure can lead to higher levels of pollution. 5.Recreational fishing as tourism activity lacks rigorous controls on the composition, size and abundance of catches, 6. Tourist consumption of water, is generally much higher than the corresponding levels for local residents in an area of shrinking freshwater resources (North Africa).	Medium to High in most of the sub-region countries. The Covid-19 pandemic may help to alleviate the impacts of mass tourism. However, the level of impact cannot be evaluated within one year.	Adoption of measures that promote sustainable tourism; and ecotourism. Enforcement of national legislations and ICZM

	Main Threat	Pressures	Impacts	Significance of pressure	Mitigation measures
3.	Pollution	Land-based pollutants from industrial activities, tourism and urban growth wastewater, organic contaminants, nitrates, nutrient substances from agriculture in addition to emerging ones such as marine litter, whose impacts on marine organisms are still being studied. This in addition to ballast water and noise from ships and thermal pollution. Hydrocarbon, oil and gas exploration and production operations	Decrease coastal water quality and alteration of living communities in affected areas. Eutrophication in coastal habitats (lagoons and bays) which lead to fish mortality and impacts on fishing and tourism. Pollution can affect some rare species and habitats in the sub-region (example: the Gloiosiphoniaceae Schimmelmannia schousboei, typical of cool superficial poorly lit waters with undersea springs, and the rare species species Petrobiona massiliana, which dwells in cryptic habitats as marine caves) pollution also responsible for continuous drop in stocks of Paracentrotus lividus. Noise pollution can disturb adversely marine mammal communication system, which may lead to stress and mortality. Pollution also can cause susceptibility to morbillivirus infection in marine mammals. chronic and persistent pollution (e.g,. plastics, heavy metals, PCBs); oil pollution and ingestion of plastic litter can cause bioaccumulation in marine species and mortality. Seagrass meadows and coralligenous habitats and other native Mediterranean populations are sensitive to dumping of urban and industrial unpurified and undiluted wastewaters. Untreated ballast water, Phosphogypsum and acidic water, are still discharged at sea in some countries and cause pollution and transfer mechanism of invasive species. Thermal and chemical pollution from power and water distillations plants affects the physiological and behaviour of the marine species. CChemical and petrochemical industries represents a major source of pollution (TN, LY) PPollution of fresh water sources by wastewater and agricultural runoff (TN) Have a variety of potential impacts on the ecosystem (Piante and Ody, 2015). Offshore blocks put on the tender for hydrocarbons exploration are located off Crete and in the Ionian Sea. Both areas are of exceptional biodiversity significance (e.g., marine turtles, cetaceans, cold-water corals, vulnerable marine ecosystems, Natura 2000 sites). No specific studies related to impact from the hydrocarbon, oil and gas exploration and production operations have been conducted in the Greek waters, although mammals stranding have been related with seismic surveys for oil and gas explorations (ACCOBAMS, 2011).	Medium to High	Monitoring and assessing eutrophication, the effects of plastic pollution, anthropogenic activities on the alteration of coastal ecosystems (chemical and hydrocarbon pollution) and in particular ecosystems on the high seas Implementing EIA regulations and process for offshore oil & gas exploration and production processes. Implement seismic survey and marine noise mitigation measures during exploration and production phases.
4.	Commercial and recreational maritime traffic	Increased maritime traffic	Impact on marine mammals via collision, noise pollution polluting emissions, bballast water discharge and introduction of invasive species in the sub-region	Medium to high in the subregion	Specific measures to reduce the impact of underwater noise. Identify major migratory species routes to minimise collision events.

	Main Threat	Pressures	Impacts	Significance of pressure	Mitigation measures
5.	Noise pollution	Maritime traffic and military exercises: Maritime traffic produce the most considerable anthropogenic contribution of low-frequency continuous noise in seas (EEA, 2019). Additionally The sonar noise for military exercises is considered one of the causes of disturbance and mortality events in the sub-region	All types of man-made noise pollution can adversely affect several marine megafauna, in particular marine mammals and sea turtles are the most impacted according to the current Knowledge. Impact on fish and other species is largely unknown. See details above.	Medium to high in most of the sub-region.	The implementation of the national register on impulsive noise (range 10Hz - 10kHz) was conducted in Italy, as provided for in the Marine Strategy. Other States should aim to implement similar measures. ACCOBAMS joint register of impulsive noise promotion at the sub-regional level;
6.	Non-Indigenous Species	The Mediterranean have 800 established non-indigenous species (Tsiamis *et al*., 2018), in this sub-region some countries reported total of 265 species, mainly due its physiochemical and hydrological and geographical position of the sub-region. The voluntary and unintentional introduction of invasive alien species through ballast waters of ships, aquaculture, fouling, and imports of non-indigenous species would lead to expanding in species range due to warming temperatures, including invasive non-indigenous species (NIS), in some countries the rise of water temperature led this sub-region to the phenomenon of sub-tropicalisation of the Mediterranean.	Reduction and niche contraction of native species, replacement of native species, impact on structure and function of the ecosystem. Reduction of pre (or vegetation) mainly as native species do not have defences against novel predators. Competition for space and or/food predation or grazing. **Grazing herbivore fish in Greek waters (e.g., Siganus luridus and S. rivulatus) fund to deplete canopy-forming macroalgae (Salomidi** *et al***., 2016).** **Other invasive species such as the bivalves** *Pinctada imbricata radiata, Dendostrea cf. folium***, and** *Fulvia fragilis* **as well as the crab** *Percnon gibbesi* **are locally abundant but their impact has not been studied.** Gene pollution from invasive species to native counterparts. Reduction on indigenous species devoid of defences to new pathogens carried by the new invaders.(Main pressures and impacts of invasive alien species. Source UNEP-MAP - RAC/SPA, 2010a)	Medium to high at all sub-region.	intensifyinventories of invasive species (especially in the southern countries) and asses their impact on both national and sub-regional levels. Update inventories and species lists as new species added and some species names changes. Emphasise on the importance of quantifying ecological and economic impacts of NIS (Greece). Use the InfoMAP system App to collect data on invasive species on sub-regional level.

	Main Threat	Pressures	Impacts	Significance of pressure	Mitigation measures
7.	Fisheries (bycatch; trophic chain disruptions, IUU fishing), aquaculture	overexploitation of fish stocks, bycatch of non-target species, distribution of the food chain, several countries have IUU fishing, and the sub-region is a hotspot for this economic activity. The main indirect impact of fisheries is related to discarding; discards constitute a food source for many scavenging species including seabirds (Karris et al., 2018), fish and crustaceans, IUU fishing Offshore aquaculture Aquaculture affects the marine environment through the release of dissolved nutrients, particulate material as well as chemotherapeutants and antifouling chemicals, mostly from intensive fish farming activities, and activities established in low-hydrodynamic areas (TN) Another effect is the impact of fish escapes from maricultural cages. These escapes are associated with genetic interactions and risk of competition with wild stocks.	Commercial, artisanal and recreational fishing has a strong impact on species and habitats. There is intense pressure on Fish stocks which appear to be overfished. The high fishing pressure combined with highly impacting gears results in high levels of bycatch together with effects due to physical stress on benthic bottoms and habitats. Bycatch affects several endangered marine species in the sub-region (approx.30% seabirds, 25% of turtles in the Mediterranean and unquantified number of marine mammals lost due to bycatch in this sub-region (FAO, 2018). Elasmobranches (Sharks and Rays) are also impacted by bycatch. -impact of fishing on habitats IUU fishing is a common issue within the region, regardless of underreporting it in the national reports. Competition for Tuna fishing and other fisheries resources is increasing, especially with the lack of enforcement in the southern central Mediterranean (Libyan waters). Aquaculture is a growing activity, and can cause disturbance to the marine ecosystems where it is established, if sustainable and environmental friendly techniques are not implemented. It also contribute to spread of invasive species. In Greece results revealed negative effects of fish farming on patches of the seagrass Posidonia oceanica in shallow water by significantly reducing seagrassmorphological characteristics and productivity. Decrease of the horizontal rhizome production of the seagrass Cymodocea nodosa with the proximity to the fish farm was also found. the annual fish escapes from fish farms were estimated to be 303,066 seabream and 21,700 seabass, based on questionnaires (Jackson *et al.*, 2015).	High (bycatch) Medium (IUU fishing and aquaculture)	Implementation of training and awareness measures to reduce the mortality deriving from bycatch for non-target species. This training should aim at providinginformation on protected species, object of accidental catches, on biological characteristics and distribution, on technical and managerial measures to mitigate catches, on the methods of collecting and transmitting data concerning the species subject to bycatch Asses the current bycatch rate and hotspots of fisheries interactions with cetaceans and sea turtles, as well as other potentially impacted species in the sub-region. Further explore the size of IUU fishing and work on joint manner to enforce the fishing regulations on sub-regional level. Implement sustainable and competitive aquaculture practice in the sub-region Study the long-term impacts of nutrient escape on Posidonia meadows, and escapes of fish from aquaculture cages on wild fish species genetic variability and disease spread.
8.	Microbial pathogens and mortality events	Mass mortality of sponge colonies, fan mussel Pinna nobilis and locally Groupers due to microbial pathogens	The first evidence of mass mortality events (MMEs) in the sub-region date back to the 80's, having severely affected harvested commercial sponges, in addition, many other sessile invertebrate groups were locally affected by such events, including gorgonians, bivalves, and bryozoans.	High at all sub-region States	improved surveillance, and the development and iterative refinement of approaches to mitigate disease and its impacts.

Other emerging issues:

1) **Effects of climate change on marine and coastal biodiversity**; The Mediterranean is one of the regions most affected by climate change globally. This stressor causes increased water temperature, sea-level rise, and ocean acidification, disrupting primary

productivity and affecting the sea's whole food web. Other effects can impact water mass movements through temperature and salinity changes. Many marine species have resorted to moving to new territories, at the risk of disappearing from ecosystems disturbed by climate change. At present, some Mediterranean species are seriously threatened with extinction if the average water temperature continues to rise. The spread of non-indigenous species can also be accelerated with these effects. Other consequences related to climate change include the frequent red tide phenomenon, leading to seawater hypoxia, causing mortality to fish and other organisms. Climate change has also increased the threat of coastal erosion in some parts of the sub-region. However, the effects of climate change on biodiversity are not yet assessed. Climate change impacts are expected to increase, leading to adverse effects in coastal areas and open seas. Information on the effects of cumulative impacts is still lacking. A deeper understanding of species biological and ecological traits and their tolerance thresholds to single and cumulative climatic stressors (e.g. temperature and nutrients, pH and O2) is much needed.

Within 2021-2027, The EU will allocate a specific budget for projects aimed at preservation of nature and biodiversity, circular economy and quality of life, climate change mitigation and adaptation, and clean energy transition. Therefore the EU States within the sub-region would benefit to counteract against the consequences of climate change that affects both coastal and marine biodiversity. It would be highly beneficial if some of these funds were directed to partnership projects with the other non-EU States in the sub-region.

States in the sub-region are recommended to improve the monitoring system for climate change and its long-term effects; improve the assessment of the climate change effects on biodiversity and ecosystems; identify and quantify the synergistic consequences of climate change and anthropogenic "multiple stressors" on biodiversity loss.

2) **Human effects on open seas ecosystem alterations including on the deep sea**; Less information is known on the human effects on open seas, other than fishing impacts and pollution mega-events, such as large oil spills, that can affect both open waters and deep-sea bottoms for several decades. Some studies have been undertaken on the impacts of climate change on the accumulation of organic matter in deep-sea waters, leading to the physiological and ecological changes of deep-sea organisms, communities, and components adapted for colder temperatures lower organic matter.

   The impact of submarine communication cables and local pipelines have not yet been studied. Hydrocarbon, oil and gas exploration, and production operations have a variety of potential impacts on the ecosystem (Piante and Ody, 2015). Offshore blocks put on the tender for hydrocarbon exploration are located off most of the sub-region coasts. Several areas are of exceptional biodiversity significance (e.g., marine turtles, cetaceans, cold-water corals, vulnerable marine ecosystems, Natura 2000 sites) and may become affected by these activities. The continuation of offshore oil exploration without the developers applying recommended mitigation measures can lead to more marine mammal stranding and sea turtle mortalities.

3) **Marine litter, including microplastics**; The amount of marine litter dumped in the Mediterranean sea is increasing annually due to the increased population activities and lack of proper management of solid waste regardless of the numerous national and regional initiatives to overcome this issue. In the sub-region, national strategies and

action plans were set to control the spread of marine litter. However, these efforts are still short of achieving total control of this issue. The use of sea turtles as an indicator of marine litter pollution was adopted by the Mediterranean Action Plan in the past few years, with specific protocols. The Mediterranean States must exercise more efforts to decrease the production and control of the marine letter release from ships and land-based resources.

Microplastic pollution has been increasingly apparent in the last few years from increasing published studies across the sub-region States on status and levels of microplastic occurrence in various marine and coastal ecosystems. However, the sub-region still needs further quantification of this pollution type on both national and sub-regional levelsand tmplement specific measures to control the production, usage, within the DEEPEASTMED project, scientific research data on marine litter/human effects collected within several research projects and expeditions and a detailed review of published and grey literature was carried out to identify anthropogenic impacts in the deep eastern Mediterranean.

5.

Main responses

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A review of marine and coastal biodiversity's strengths and weaknesses, conservation activities identified at the sub-regional level through national diagnosis reports are summarised in Table 2.

Table 2.

Review of the strengths and weaknesses of marine and coastal biodiversity, conservation activities identified at the sub-regional level

Main response	Strengths	Weaknesses
Inventories, databases	All sub-region States reported national inventories of marine species (including NIS). The region reported having existing, and functional databases related to species and habitats, some of them are successful on a regional level (e.g. Mediterranean Database on Cetaceans Stranding)	Coverage of inventory in some countries is incomplete and needs to fill several existing gaps on both species and habitats (Greece, Libya and Tunisia) Several national databases need standardisation and integration on regional and sub-regional levels to harmonise data collection and management and maximise benefit (the whole sub-region)
Habitat cartography	The sub-region States conducted several habitat cartography efforts, including mapping of coralligenous habitats and wetlands (Greece and Italy), Posidonia meadows (Greece, Italy, Malta, Libya, Tunisia), fish stocks (Greece, Tunisia, Malta, Italy),	Marine habitats maps are still scarce, fragmented, and discounted in time and would benefit from a complete mapping of the most significant marine habitats to direct management measures (The 2017 Mediterranean Quality Status Report). Some states indicated mapping of habitats and species as a future need due to either lack of mapping (Libya) or incomplete mapping (Greece, Malta and Tunisia).
Monitoring, IMAP	All States reported variable levels of monitoring efforts to monitor species' status and habitats in the marine environment. EU States have their format of monitoring following EU standards, which in line with IMAP, and for other States, SPA/RAC IMAP was the primary tool for monitoring.	Some IMAP activities still need more time to reveal their results on the national level and then integrate them on regional or sub-regional levels. Monitoring efforts are linked to the availability of funds.
Restoration	National strategies for monitoring biodiversity included restoration of habitats in some States (Greece and Italy). The conservation and restoration measures related to Natura 2000 would include both EU (Greece, Italy and Malta) and non-EU areas.	The restoration concept is still not in place for several States, as it lacks necessary information on the status of its different marine species and habitats, and most of the effort directed to monitoring and inventory, while the restoration is still lacking.
Marine Protected Areas	AllStates have declared MPAs within the sub-region, with variable stages of proper management levels.	Several MPAs in the sub-region lack management plans and financial mechanisms to secure their functionality. A sub-regional analysis of the current situation is needed with mitigation measures to move forward.
Legal updates	Legal updates reported in the national reports showed some progress towards better legal protection of species and habitats for some States.	The political transition in some countries slowed down legal protection.

Main response	Strengths	Weaknesses
Institutional mandates and capacities	The sub-region has different levels of institutional organisation and capacities. The EU States in the sub-region seemed more organised and following their mandates with enough capacities.	Although the institutional mandates were not met for some States, the level of current institutional capacities is not satisfactory, especially in countries with political transitions that affected these institutes' run.
interinstitutional coordination bodies	Interinstitutional coordination is acceptable for the EU States in the sub-region, and it can play as an example for other States in the sub-region	More work on inter-institutional coordination is needed in the sub-region.
other actors-involved in conservation (science, NGOs, fishermen, business)	There is a growing number of NGOs, scientific researchers, fishermen and businesses engaged in conservation work within the sub-region,	The level of engagement of these sectors needs to be enforced, and government decisions in marine and coastal realms need to be in consultation with all stakeholders and have sound science. More is needed in some States to reach such a level.
marine biodiversity mainstreaming in other sectors	Integrated coastal zone management was implemented in several areas of the sub-region	The level of mainstreaming marine biodiversity to other sectors still needs enforcement in some areas of the sub-region.
Selected biodiversity strategies and programmes from the different countries	All States of the sub-region had their national biodiversity conservation strategies and action plans covering several species and habitats within the coastal and marine ecosystems. This, in addition to existing EU strategies that the EU States requires. International Biodiversity frameworks and the Mediterranean strategies adopted by MAP represent the primary guide for non-EU States in the region.	The effective implementation of these strategies and action plans showed variable levels of success in the sub-region. In some States, administrative obstacles and lack of long-term financial mechanisms delay such work. The overall economic situation can also lower these strategies in the governments' priority list.
communications	Communication or awareness levels increased through the public's years concerning several topics in marine and coastal biodiversity importance within the sub-region.	Decision-maker awareness is another aspect of communicating the information needed for several issues within the sub-region. Also, the maximum potential of modern tools such as social media is still underutilised.
transboundary collaboration	The national reports showed several aspects and opportunities of transboundary collaboration, from joint monitoring, capacity building, implementation of legislations, and transboundary MPAs represent an opportunity for the sanctuary of biodiversity to protect protected species and sensitive ecosystems and prevent illegal fishing at once. The close historical ties among the sub-region nations would facilitate this process.	Lack of political will to initiate the transboundary collaboration is evident. The sub-region needs to press on decision-makers to seize transboundary collaboration opportunities for better sub-regional conservation status. For example, there is a successful collaboration in security and countering illegal migration between the north and south of the sub-region. Therefore, cross-border cooperation could be facilitated on fundamental issues such as biodiversity protection, and in particular sustainable development and blue growth also in order to align environmental policy actions between States to create a standard system of governance

6.

Main gaps and challenges

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Several knowledge gaps have been identified in the sub-region. These gaps should be the target for sub-regional planning and implementation of IMAP projects. The following is a checklist of identified gaps:

1) Lack of data on soft and rocky cliffs and shore ecosystems, their characteristics, the status of their retreat and erosion and the associated impacts on human livelihoods (Whole sub-region);

2) Insufficient inventories of invasive species and their impact (Whole sub-region);

3) Limited information on the occurrence, distribution and composition of coralligenous communities (Whole sub-region);

4) A lack of monitoring of the biodiversity of deep-sea habitats (canyons, trenches, seamounts) and marine caves, and how these ecosystems affect and are affected by coastal areas (Whole sub-region);

5) Data on marine habitats and identified biodiversity hotspots are still scarce, fragmented and discounted in time and would benefit from a complete mapping of the most significant marine habitats to direct management measures (Greece, Tunisia and Libya););

6) The impact of gelatinous macro-zooplankton on the functioning of ecosystems (Italy)

7) Habitat identification for pelagic habitats and mapping processes; and the lack of shared metrics or consolidated approaches to characterise and assess the state of the pelagic habitat (Whole sub-region);

8) The impact of urbanisation and coastal development is little or poorly monitored and quantified in the southern States of the sub-region (Tunisia &Libya;

9) The impact of fishing activities (professional and recreational) on biodiversity and habitats also remains poorly documented in the sub-region's southern States (Tunisia &Libya););

10) Insufficient data (Greece, Italy, Tunisia) or lack of data (Libya) on the effects of fishing on non-target species;;

11) Lack of assessment on the short-term and long-term effects of offshore aquaculture on marine habitats (Greece, Tunisia);

12) In some states, there is a bias of data towards some areas due to logistical causes and availability of technical means (Tunisia and Libya);

13) Limited data on status and diversity of plankton, cartilaginous fishes, cetaceans and invasive species (Libya);

14) Lack of national inventory of coastal wetlands (Libya).

15) The vast majority of the knowledge refers to nesting grounds and to a lesser degree to foraging areas. A large gap of knowledge remains for the oceanic life stage and habitat use of sub-adults and adults, while even less are known for juveniles and their in-water movements and habitat use.

In general, Knowledge has significantly improved through the implementation of EU funded projects in the north of the sub-region. At the same time, in the southern areas, several gaps are still open due to limited financial (national or regional), technical and institutional capacities.

7.

Main opportunities for future transboundary collaboration

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The effective management of natural resources within the marine environment needs a set of concerted efforts at regional or sub-regional scales to reach an adequate management level. The EU marine policy, the Marine Strategy Framework Directive, the Barcelona Convention and associated Ecosystem Approach (EcAp) and the SPA Protocol all have acknowledged the need for regional cooperation in assessing, monitoring and managing the marine environment. The following is a list of transboundary issues as described in the national reports of the sub-region States:

1) The use of UNEP/MAP habitat classifications and the EcAp common indicators for assessment purposes;
2) Implementing monitoring processes in the sub-region through parameters and methodologies identified by UNEP/MAP's Integrated Monitoring and Assessment Plan.
3) The need for transboundary management of the marine litter.
4) Transboundary MPAs are rare. Only a few areas of the Mediterranean on the north coasts have such a strategic, transboundary collaboration (i.e. Pelagos sanctuary), mainly due to differences in national policies and lack of vision and political well for a transboundary collaboration in the sub-region.
5) Concerning the implementation of the MSFD, there is a need for regional and sub-regional cooperation to support the further development of the Programmes of Measures and to align the MSFD and EcAp processes further.
6) The full utilisation of the MEDREGION stakeholder platform to enhance transboundary collaboration.
7) The need to develop a blue economy, for better jobs and higher conservation of biodiversity in the sub-region, especially in the marine and maritime sectors, in harmony with the objectives of the 2030 Agenda for Sustainable Development of the United Nations Goal 14.
8) Development of a shared approach in using the sea resources via existing EU policies that enhance cooperation among Mediterranean countries (e.g., EUSAIR strategy, BLUE MED), and other platforms.
9) The sub-regional cluster's establishment to become a centre of excellence for economic activity, research and innovation within the Mediterranean.
10) The full utilisation of the European Strategy for the Adriatic and Ionian Macro-region (EUSAIR) promotes economic and social well-being within the Adriatic-Ionian Region.
11) The need to continue CAMP projects based on the Protocol on Integrated Coastal Zone Management (ICZM), to enhance cooperation among subregion States.
12) Creating and implementing shared methodologies for the protection of species and habitats.
13) The need to further understand the socio-economic aspects of biodiversity conservation within the sub-region.
14) The need to open collaboration within the sub-region so NGOs can benefit from more straightforward work using sub-regional priorities.

15) The legal protection of marine and coastal habitats is uneven between the northern and southern sub-regional States. There is a need for collaboration to develop and harmonise legislation and sub-regional collaboration to implement them, such as fisheries monitoring within the sub-region.

16) The sub-region needs an efficient and coordinated trans-national sponge fishery strategy.

17) Further development of digital facilities (e.g. databases ELNAIS, GTIS, National reporting system for marine turtles and cetaceans) employing new tools and non-disruptive technologies (e.g. Virtual Research Environments).

18) Considerable advancement and increase of Ocean Literacy (OL) in society, from education and school curricula to decision-makers and the public-at-large primarily focusing on marine biodiversity, considering priorities of the UN for supporting the implementation of SDG 14 of the 2030 Agenda for Sustainable Development.

19) Networking: joining forces, setting the essential questions, developing the National Strategy in compliance with EU and International Treaties and Conventions, linking with the relevant EU (e.g. EurOCEANS, EuroGOOS) or Mediterranean (e.g. MedPAN) networks.

20) For highly migratory species (e.g. cetaceans and turtles), international working groups (as the ones that are operating under the MEDPAN NETWORK umbrella), and data sharing platforms (for demographic data, habitat use, threats and pressures, mortality/stranding networks) should be established at the sub-regional level. These platforms can be used by scientists, conservation practitioners, marine areas managers, local authorities and citizen scientists. These working groups and advice policy-making, while data from the data-sharing platforms can assist conservation efforts and contribute to the design and implementation of effective management measures.

Common priority needs:

There is clear variability in national conservation policies, measures, plans, actions and monitoring of marine and coastal biodiversity between the north and south of the sub-region. The EU states (Greece, Italy and Malta) have a better level of national policies, measures, plans, actions, and monitoring, mainly due to their support through the EU. This includes the pan-European efforts towards updating national policies under the EU framework and fulfilling mandates by other international conventions and the availability of financial, technical and human resources and political will towards supporting sustainable development saving the environment.

In the southern States, although the national reports of Tunisia and Libya have shown a lower level of integrated and updated policies, in both countries, the political instability since 2011, lack of clear political well and the limitations of financial, human resources and technical means all have significantly contributed to the current situation. The post-2020 SAPBIO represents a vital opportunity to support these southern States to boost their conservation and sustainable development agendas. The sub-regional work with northern States represents an opportunity for collaboration for both sides of the sub-region. All needs expressed in the five national reports are summarised in Table 3.

Table 3.

The needs reported by the Ionian Sea and the Central Mediterranean States in their Post-2020 SAPBIO national reports.

	Country	Gre	Ita	Mal	Lib	Tun
Improve Knowledge	Filling important knowledge gaps, particularly those related to the state of biodiversity, through monitoring processes and research activities				marine algae, sea grass Posidonia oceanica, planktons, cartilaginous fishes and fish stock assessment	
Management	Adopt an adaptive management approach in MPAs					
Impact of fisheries	Further understand the impact of fisheries interaction with non-target species					
integration	integration of biodiversity protection tools with relevant economic and social policies and sectoral or intersectoral plans (Biodiversity Mainstreaming).					
Training	strengthening administrative capacity, through the training and awareness of political decision-makers and administrators about the importance of environmental issues and biodiversity,					
	Capacity building in monitoring techniques of species, habitats, funding and management of MPAs					
Training	Map and assess the human and institutional capacities to define capacity-building needs, gaps and priorities in the next future.					
Climate change	Understand how climate change can amplify the vulnerability of species and habitats, and how to adapt to it.					
Transboundary projects	The need for international research projects (transboundary projects)					
ecosystem services	Identification of ecosystem services and the definition of their value, also in monetary terms, is also necessary in order to identify appropriate environmental restoration activities, defining the cost-benefit ratio					

8.

Conclusions and recommendations for needed actions and sub-regional strategic orientations

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8.1. Conclusions

Ionian Sea- Central Mediterranean sub-region

The Ionian Sea and Central Mediterranean sub-region is a critical biogeographical section representing a transitional area between the Western and Aegean-Levantine sub-basins of the Mediterranean Sea. It is also an important sub-region for unique habitats and species recognised under several regional (SPA) and international conservation conventions and relevant EU directives. These species range from migratory birds, sea turtles, cetaceans, the endemic monk seal and a wealth of fish and fishers, marine traffic, trade and tourism, representing the sub-region socio-economic activities. However, regardless of the growing efforts by all sub-region States, there are still several knowledge gaps on marine and coastal biodiversity components, particularly in non-EU countries of north Africa and offshore and deep-sea habitats for all the sub-region. This sub-region is also characterised by different anthropogenic and economic activities, which pose increasing pressures on natural habitats and drive some species to extinction. These pressures were identified in the five national reports of the sub-region, the most important including climate changes, and associated stresses, fishing pressures, pollution, invasive species, and underwater noise. The political instability in some sub-region states contributed to the deteriorating state of biodiversity and natural resources management. The striking differences in conservation policies between the EU and non-EU States made it a challenging task to harmonise information between these two different natural resources governance systems, funding and policy development, and application. However, these differences may be used as a driver for better harmonisation and coordination, for north-south and south-south collaboration, to achieve Good Environmental Status, and to reach sustainable marine and coastal biodiversity management. In this regard, SPA/RAC's role is crucial to achieving such collaboration on a sub-regional level.

In the Post 2020 SAP BIO reports, countries presented some common and other individual needs to enhance marine natural resources (species and habitats), mapping, monitoring of some flagship species and capacity building.

Based on conclusions provided in the national reports on Post 2020 SAPBIO, the following is a resumed synthesis of these conclusions:

Greece. The Greek national report presented a comprehensive overview of marine life diversity and the current state of knowledge on pressures, needs, and limitations. However, baseline knowledge about specific taxa, assemblages, habitats and geographic areas is still scarce, and essential knowledge gaps pose a significant obstacle for the conservation of key and protected marine habitats and species. Several citations within the report refer to unpublished data, which incurs the need to publish research results. There is also a lack of long-term projects in selected areas covering the need for assessing natural temporal trends, response to climate change and comparisons among anthropogenic impacted vs naturally disturbed environments. Several actions are still to be taken, such as formulating an updated national marine biodiversity strategy, control of land-based pollution sources, marine litter and especially plastics, map and monitor invasive non-indigenous species (NIS),

coralligenous beds, mesophotic reefs, deep-water corals and sponges, introduction of new areas into the NATURA 2000 Network and the national Marine Protected Areas (MPAs) as well as strengthen national governance and legal frameworks.

Specific actions needed include the long-term monitoring of climate change and community changes in the Greek seas; the assignment of coralligenous beds and other bio-calcareous concretions as priority natural habitat types in the EU Habitats Directive and implement a systematic mapping and monitoring programme, which is a prerequisite for the enforcement of existing national and EU legislation for their protection; the establishment of an international research programme aiming at investigating the spatial distribution and population structure of red coral in the Greek Seas in order to assess its status and implement appropriate effective management and restorative measures; regular monitoring of mass mortality events for protected and threatened species (e.g. *Pinna nobilis*, sponges and red coral); regular monitoring of live and dead stranding events of protected species of megafauna (e.g. marine mammals and turtles) and deposition of standardized data in existing databases.

The new *EU Green Deal* including actions such as the *EU Biodiversity Strategy for 2030* aiming to put Europe's biodiversity on the path to recovery by 2030 and the 2021-2030 *UN Decade of Ocean Science for Sustainable Development* and *Decade on Ecosystem Restoration* aiming to restore degraded and destroyed ecosystems represents an opportunity for Greece and other States in the sub-region to work towards reversing those adverse pressures on marine and coastal biodiversity.

Italy. Italy provided three Post 2020 SAPBIO national reports due to its geographic position towards three sub-regions in the Mediterranean Sea. The report on Central Mediterranean was the one considered in this analysis. Italy possesses long experience in biodiversity monitoring and management. This is supported by its active involvement in EU directives and other biodiversity-related conservation initiatives and projects, which allowed a better understanding of the main components of most marine and coastal biodiversity (relative to other countries in the sub-region). However, due to various economic and other anthropogenic activities along the Italian coastline, significant pressures and impacts on marine biodiversity were highlighted, mainly related to pollution, coastal development, commercial and recreational fisheries, coastal tourism, and maritime traffic. All of these pressures became adverse when accompanying the increasing impacts of climate change. Italy has activated various monitoring campaigns in the sub-region, particularly in the context of the MSFD, which, in responding to the needs dictated by the Directive and the EU Decision 848/2017, complies well with the EcAp process and IMAP. Nevertheless, some knowledge gaps still exist.

Moreover, some of the recommendations proposed including updating of the manuals relating to the protected species of the SPA/BIO protocol and priority habitats identified in the UNEP/MAP context, also including the recent updates of the list of species contained in Annexes II and III of the SPA/BD Protocol of the Barcelona Convention as well as the updated classification of habitats of 2019; the updating of the checklists of the fauna and flora of the Italian seas, determining, where possible, particularly endangered species and identifying the singularities of the sub-region; and how to understand the cumulative effects of climatic changes better. Other recommendations included the importance of bridging the lack of cross-border management measures, managing shared resources in a better way,

and minimising common problems. The sub-region needs international solid and cross-border cooperation on fundamental issues such as biodiversity protection, particularly sustainable development and blue growth, to align environmental policy actions between States to create a standard governance system.

Malta. Malta is the smallest country in the sub-region, but it cemented its vision towards the conservation and sustainable use of the marine environment and its resources. The report showed that Malta has an overall good status of marine species and habitats, with the designation of more than 35% of Malta's waters, amounting to 4,138 km^2, as Marine Protected Areas. The implementation of EU funded projects to improve Knowledge led to enhanced data availability and quality; and adequate regulation of the exploitation of species listed in Annex III to the SPA/BD Protocol. Some pressures were present, such as the biological invasions and the need for assessing socio-economic requirements and related pathways for the introduction.

With that, more efforts are required to maintain the ongoing work and to ensure the strategic implementation of the SPA/BD Protocol towards the conservation of marine biodiversity, such as assistance on the use of modern technology in research, surveillance and monitoring, the future focus on conservation measures implementation and management plans for existing MPAs. This in light of the need to consider moving from the assessment phase to the implementation, mitigation and adaptation phases, at least where sufficient Knowledge is available. The report also emphasised the need for sub-regional cooperation and raising funds to achieve tangible results on the regional level. Malta will focus on developing its NBSAP to 2030, maintaining and enhancing effective measures in the marine environment, addressing data and knowledge gaps, and collaborating at the regional and sub-regional level and mainstreaming biodiversity into relevant sectors and policy fields.

Libya. Libya covers most of the southern side of the Central Mediterranean sub-region. It has the longest, least anthropogenically impacted coastline in the sub-region, and several aspects of marine and coastal biodiversity are still un-discovered, regardless of the progress made with the support of SPA/RAC in the past two decades. Some pressures were highlighted including the increasing trend of invasive and non-indigenous species, giving the position and physicochemical properties of the Libyan waters, pollution hotspots and potential oil spill threat, climate change, microbial pathogens and other environmental disturbances, including fishing pressure from both local and illegal, unregulated fishing by foreign vessels. The political and security situation in the country adds a burden to implement any management of natural resources. However, NGOs grew in numbers and effect, which let them take new roles in conserving biodiversity with some external funding availability. Libya declared two MPAs in 2011, and work is ongoing with the IMAP project and other initiatives to set up more MPAs and conduct broader inventories of species and habitats, especially in the Gulf of Sirte Cyrenaica provinces.

Tunisia. Tunisia covers most of the sub-region's western area (eastern coastline), while the northern coasts are included in the western Mediterranean sub-region. Although the national report provided an overview of the various research, monitoring and conservation initiatives for Tunisia's coastal and marine biodiversity, it concludes that more attention should be paid to monitoring and assessing eutrophication areas, the effects of plastic pollution, anthropogenic activities on the alteration of coastal ecosystems (chemical and

hydrocarbon pollution) and in particular ecosystems on the high seas. The lack of an adequate legal system and overlapping jurisdictions or fragmenting responsibilities were also highlighted as a concern for conservation work—low participation of all stakeholders in process decision-making and lack of sustainable and effective scientific monitoring. National funding is also low, and there is a need to integrate coastal planning and management with maritime spatial planning (MSP).

8.2. Recommendations

The present report analysed the current state of marine and coastal biodiversity in the Ionian and Central Mediterranean sub-region, with the detailed synthesis of gaps and needs listed in the five States national reports (Greece, Italy, Malta, Libya and Tunisia). Five concrete activities are proposed (Table 4), with a ranking from low to very high priority. 1. Enhancing Knowledge on marine and coastal biodiversity is the most detailed, as a reflection to the repeated calls in each national report to fill knowledge gaps, as data is the keystone for any scientific-sound conservation planning and implementation. 2. Applying mitigation measures to control anthropogenic pressures on marine and coastal biodiversity in the sub-region. 3. An effective network of marine protected areas is one area that can translate both 1 and 2 to reach Good Environmental Status 4. Capacity building, for national experts. NGOs represent an opportunity for north-south cooperation within the sub-region and the need for know-how transfer and exchange of experiences and new technologies to facilitate monitoring and conservation, with active participation from all stakeholders and targeted groups such as fishermen. The above four areas of work for the future of the sub-region will be only practical and realised with sufficient funding for those activities. Funding using existing sources from national, regional and international schemes, and seeking new opportunities of private-public partnership to finance some activities as community social responsibility of private firms towards natural resource management and communities livelihoods.The frameworks of SAPBIO, IMAP, other relevant regional strategies (EU 2030 Biodiversity Strategy, and ACCOBAMS Strategy for cetacean conservation-related activities, GFCM strategy), overarching International initiatives (CBD Post 2020 Global Biodiversity Framework) are the general framework for all proposed five areas of actions.

Table 4.

Proposal for actions in the conservation of marine and coastal biodiversity for the Ionian-Central Mediterranean Ionian-Central Mediterranean sub-region for 2030 and beyond, within the development of the Post 2020 SAPBIO Strategy

ENHANCE KNOWLEDGE ON MARINE AND COASTAL BIODIVERSITY **Objective: Expand Knowledge on biodiversity, with emphasis on priority habitats and species identified in SPA/BD Protocol and EU directives.** **Indicator of objective achievement: Satisfactory level data/knowledge to achieve 50% of GES under EcAP in implemented national assessments**							
No.	Activity	Expected results/ outputs	Relevant countries	Priority level 1	Possible sources of funding2	Link to other relevant strategies3	Possible actors4
1.1.	Fill knowledge gaps on sensitive species and habitats, including deep sea, Focus on selected threatened habitats: seagrass meadows, Red Coral communities, deep/dark habitats and offshore areas	Cartography of threatened and less known habitats and expand the coverage of these mappings whenever some mapping exists.	All Ionian-Central Mediterranean sub-region countries	Very High	IF, NF	Post-2020 Global biodiversity framework (GBD) Target 19 EU 2030 Biodiversity Strategy The European strategy for the conservation of invertebrates	International organisations, national authorities, including scientific institutions, expert NGOs and other stakeholders
1.2.	Conduct distribution and abundance surveys of priority invertebrate species with a focus on marine algae, plankton, C.rubrum, P.nobilis, L.lithophaga, particularly in the least known areas	Distribution and abundance are conducted and data is used for new assessments	All Ionian-Central Mediterranean sub-region countries. Focus on Malta (zooplankton), Libya (Plankton/ marine algae) and all region waters for C.rubrum, P.nobilis, L.lithophaga,	High	IF, NF, O	Post-2020 Global biodiversity framework (GBD) Target 19 The European strategy for the conservation of invertebrates EU 2030 Biodiversity Strategy	International organisations, national authorities, scientific institutions, expert NGOs and other stakeholders
1.3.	Improve Knowledge on abundance and distribution of marine mammals	Distribution and abundance are conducted, and data is used for new assessments	All Ionian-Central Mediterranean sub-region countries	High	IF, NF	Post-2020 Global biodiversity framework (GBD) Target 19 EU Habitats Directive (92/43/ EEC) ACCOBAMS Strategy	International organisations, national authorities, scientific 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 2030

2. IF – international Funding, NF – national funding, O – other sources, such as private funding

3. Naming of strategic documents means that there are linkages of general nature to the Post 2020 SAP BIO sub-regionally proposed actions

4 International organisations, national authorities (including experts agencies), scientific institutions, NGOs or other stakeholders involved

ENHANCE KNOWLEDGE ON MARINE AND COASTAL BIODIVERSITY Objective: Expand Knowledge on biodiversity, with emphasis on priority habitats and species identified in SPA/BD Protocol and EU directives. Indicator of objective achievement: Satisfactory level data/knowledge to achieve 50% of GES under EcAP in implemented national assessments							
No.	Activity	Expected results/ outputs	Relevant countries	Priority level 1	Possible sources of funding2	Link to other relevant strategies3	Possible actors4
1.4.	Improve Knowledge on fish stocks and sustainable fisheries	Fish stock assessments	All Ionian-Central Mediterranean sub-region countries, Focus on Libya	High	IF, NF	Post-2020 Global biodiversity framework (GBD) Target 19 EU 2030 Biodiversity Strategy 2.2.6 EU Common Fisheries Policy (CFP) GFCM strategy National priorities	National authorities, scientific institutions, expert NGOs and other stakeholders
1.5.	Continue monitoring of marine turtles and marine birds	Resulted data will contribute to establishment of new protected areas for both taxa	All Ionian-Central Mediterranean sub-region countries, with focus on Libya and Tunisia	High	IF, NF	Post-2020 Global biodiversity framework (GBD) Target 19 EU Habitats and Birds Directive Action Plan for the Conservation of Mediterranean Marines Turtles The Action Plan for the conservation of bird species listed in Annex II to the SPA/BD Protocol EU 2030 Biodiversity Strategy	International organisations, national authorities, scientific institutions, expert NGOs and other stakeholders
1.6.	Improve Knowledge on impacts and consequences of climate change on coastal and marine habitats/ species.	An updated list of impacts and mitigation measures per country	All Ionian-Central Mediterranean sub-region countries, with focus on Malta, Libya and Tunisia.	High	NF	Regional Climate Change Adaptation Framework (RCCAF) EU Strategy on Adaptation to Climate Change	International organisations, national authorities, scientific institutions, expert NGOs and other stakeholders

ENHANCE KNOWLEDGE ON MARINE AND COASTAL BIODIVERSITY **Objective: Expand Knowledge on biodiversity, with emphasis on priority habitats and species identified in SPA/BD Protocol and EU directives.** **Indicator of objective achievement: Satisfactory level data/knowledge to achieve 50% of GES under EcAP in implemented national assessments**							
No.	Activity	Expected results/ outputs	Relevant countries	Priority level 1	Possible sources of funding2	Link to other relevant strategies3	Possible actors4
1.7.	Improve transboundary data sharing mechanisms to create within the Ionian and Central Mediterranean sub-region knowledge sharing collaboration	Inventory of current data sharing abilities and prepare a report to enhance it	All Ionian-Central Mediterranean sub-region countries	Medium	IF	Post-2020 Global biodiversity framework (GBD) Target 19 EU 2030 Biodiversity Strategy ACCOBAMS Strategy	International organisations, national authorities, scientific institutions, expert NGOs and other stakeholders

RESPONDING TO COMMON PRESSURES ON BIODIVERSITY **Objective: Apply mitigation measures to control anthropogenic pressures on marine and coastal biodiversity in the Ionian-Central Mediterranean sub-region, in a participatory manner** **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
2.1	Implement Integrated coastal zone management to reduce alteration of natural coastal habitat due to coastal un-organised development	ICZM and EIA are implemented for all development activities on the coastal area, proper management tools and action plans at national and international should be formulated	All Ionian-Central Mediterranean sub-region countries	Medium to High	NF	Post-2020 Global biodiversity framework (GBD) Target 7 ICZM protocol European Marine Strategy Framework Directive	National authorities, NGOs and other stakeholders
2.2	Adopt sustainable and ecotourism to alleviate the impacts of mass tourism on natural habitats/species	More contribution of sustainable and ecotourism to tourism activities in the Ionian and Central Mediterranean sub-region, proper management tools, guidelines of good practice and action plans at national and international should be formulated	All Ionian-Central Mediterranean sub-region countries	Medium to High	IF, NF	Post-2020 Global biodiversity framework (GBD) Target 7 EU Tourism Policy EU 2030 Biodiversity Strategy (2.2.2. Bringing nature back to agricultural land)	International organisations, national authorities, scientific institutions, expert NGOs and other stakeholders

RESPONDING TO COMMON PRESSURES ON BIODIVERSITY Objective: Apply mitigation measures to control anthropogenic pressures on marine and coastal biodiversity in the Ionian-Central Mediterranean sub-region, in a participatory manner 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
2.3	Reduce the impact of land-based and at sea pollutants, and its effects on the quality of seawater and sensitive species and habitats	Land-based pollution sources are controlled and managed	All Ionian-Central Mediterranean sub-region countries	High	IF, NF	Post-2020 Global biodiversity framework (GBD) Target 6 EU 2030 Biodiversity Strategy (2.2.9. Reducing pollution) Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources and Activities The International Convention for the Prevention of Pollution from Ships	International organisations, national authorities, scientific institutions, expert NGOs and other stakeholders
2.4	Reduce the impact of maritime traffic (noise & collision) on sensitive marine species (cetacean turtles, others)	Impact of maritime traffic is reduced to acceptable levels, giving priority to areas of high risk for the species under concern	All Ionian-Central Mediterranean sub-region countries	High	IF, NF	Post-2020 Global biodiversity framework (GBD) Target 6 Marine Strategy Framework Directive. European Environmental Managements System for Maritime Transport (EMS-MT) EU 2030 Biodiversity Strategy (2.2.9. Reducing pollution) ACCOBAMS Strategy	International organisations, national authorities, scientific institutions, expert NGOs and other stakeholders

RESPONDING TO COMMON PRESSURES ON BIODIVERSITY **Objective: Apply mitigation measures to control anthropogenic pressures on marine and coastal biodiversity in the Ionian-Central Mediterranean sub-region, in a participatory manner** **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
2.5	Create an Ionian and Central Mediterranean sub-region al early warning system for monitoring of NIS and their pathways.	Monitoring system is set and functional with active cooperation between the Ionian and Central Mediterranean sub-region countries	All Ionian and Central Mediterranean sub-region countries	Very High	IF, NF	Post-2020 Global biodiversity framework (GBD) Target 5 EU 2030 Biodiversity Strategy 2.2.10. Addressing IAS Follow up the recommendations of Red-Med Bioinvasion project	International organisations, national authorities, scientific institutions, expert NGOs and other stakeholders
2.6	Take on mitigation and eradication measures for selected IAS	Actions have been taken for at least four most adverse species	All Ionian and Central Mediterranean sub-region countries	Medium	IF, NF	Post-2020 Global biodiversity framework (GBD) Target 5 EU 2030 Biodiversity Strategy 2.2.10. Addressing IAS	International organisations, national authorities, scientific institutions, expert NGOs and other stakeholders
2.7	Conduct an accurate assessment of bycatch effect on non-targeted species (sharks, rays, cetaceans, marine turtles, seabirds) and implement agreed and scientifically tested mitigation measures	The bycatch of species is eliminated or reduced to a level that allows species recovery and conservation	All Ionian and Central Mediterranean sub-region countries	High	IF, NF	Post-2020 Global biodiversity framework (GBD) Target 3 EU 2030 Biodiversity Strategy (2.2.6. Restoring the good environmental status of marine ecosystems) FAO mid-term strategy objective on reducing bycatch rates ACCOBAMS Strategy	International organisations, national authorities, scientific institutions, expert NGOs and other stakeholders

RESPONDING TO COMMON PRESSURES ON BIODIVERSITY Objective: Apply mitigation measures to control anthropogenic pressures on marine and coastal biodiversity in the Ionian-Central Mediterranean sub-region, in a participatory manner 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
2.8	Implement training and awareness measures to reduce bycatch related mortality of non-target species	By-catch awareness program is established and highlighted protected species and mitigation measures	All Ionian and Central Mediterranean sub-region countries	High	IF, NF	Post-2020 Global biodiversity framework (GBD) Target 4 FAO mid-term strategy objective on reducing bycatch rates EU 2030 Biodiversity Strategy (3.3.4. Improving Knowledge, management and skills)	International organisations, national authorities, scientific institutions, expert NGOs and other stakeholders
2.9	Control the Illegal Unregulated Unreported Fishing (IUU) in the sub-region, by mutual enforcement of fishing regulations	IUU intensity is decreased and mitigation measures are in place	All Ionian and Central Mediterranean sub-region countries	High	IF, NF	Post-2020 Global biodiversity framework (GBD) Target 4 EU 2030 Biodiversity Strategy (4.2.1. Improving Knowledge, management and skills) EU Regulation to prevent, deter and eliminate illegal, unreported and unregulated fishing (IUU)	International organisations, national authorities, scientific institutions, expert NGOs and other stakeholders
2.10.	Establish monitoring mechanism for the effects of climate change on sensitive habitats and species	Special monitoring programmes are in place, with focus on most sensitive habitats and species, easy to use and cost-effective tools for the estimation, evaluation and visualization of the impacts will provide to managers and policy makers valuable information for management and decision making towards the formulation of mitigation actions.	All Ionian and Central Mediterranean sub-region countries	Very high	IF, NF, O	Post-2020 Global biodiversity framework (GBD) Target 7 EU 2030 Biodiversity Strategy Regional Climate Change Adaptation Framework (RCCAF) EU Strategy on Adaptation to Climate Change ACCOBAMS Strategy	International organisations, national authorities, scientific institutions, expert NGOs and other stakeholders

RESPONDING TO COMMON PRESSURES ON BIODIVERSITY **Objective: Apply mitigation measures to control anthropogenic pressures on marine and coastal biodiversity in the Ionian-Central Mediterranean sub-region, in a participatory manner** **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
2.11.	Apprise the cumulative pressures and impacts in the Ionian-Central Mediterranean sub-region based on scientific Knowledge	Cumulative pressures/ impacts are assessed and mapped, high risk areas are identified and managed accordingly.	All Ionian and Central Mediterranean sub-region countries	Medium	IP, NF	Post-2020 Global biodiversity framework (GBD) EU 2030 Biodiversity Strategy	International organisations, national authorities, scientific institutions, expert NGOs and other stakeholders
2.12.	Develop and apply MSP and ICZM plans	MSP and ICZM tools are applied at least in EU countries of the Ionian and Central Mediterranean sub-region, and start testing the tools in non-EU countries	All Ionian and Central Mediterranean sub-region countries, with focus on Italy and Malta	High	IF, NF	Post-2020 Global biodiversity framework (GBD) EU 2030 Biodiversity Strategy ICZM protocol European Marine Strategy Framework Directive	International organisations, national authorities, scientific institutions, expert NGOs and other stakeholders

AN EFFECTIVE NETWORK OF MARINE PROTECTED AREAS **Objective: Improve marine protected areas representativity and reaching good biodiversity conservation status** **Indicator of objective achievement: Improved effectiveness of MPAs**							
No.	Activity	Expected results/ outputs	Relevant countries	Priority level	Possible sources of funding	Link to other relevant strategies	Possible actors
3.1.	Develop Effective system of protected areas and other effective area-based conservation measures and extend the current MPA network, with focus on the southern area of the Ionian and Central Mediterranean sub-region	New MPAs established, properly designed, effectively enforced and managed through participative processes. Long term financing is also critical while enhancing connectivity among MPAs is of high concern	Libya and Tunisia	Very high	IF, NF	Post-2020 Global biodiversity framework (GBD) Target 2 EU 2030 Biodiversity Strategy 2.1. Coherent network of protected areas EU Marine Strategy Framework Directive	International organisations, national authorities, scientific institutions, expert NGOs and other stakeholders

AN EFFECTIVE NETWORK OF MARINE PROTECTED AREAS Objective: Improve marine protected areas representativity and reaching good biodiversity conservation status Indicator of objective achievement: Improved effectiveness of MPAs							
No.	Activity	Expected results/ outputs	Relevant countries	Priority level	Possible sources of funding	Link to other relevant strategies	Possible actors
3.2.	Improve management efficiency of the present MPAs.	Management plans are developed and implemented in existing MPAs. Increase the area of marine reserves/ no-take areas.	All Ionian and Central Mediterranean sub-region countries	High	IF, NF, O	Post-2020 Global biodiversity framework (GBD) Target 2 EU 2030 Biodiversity Strategy 2.1. Coherent network of protected areas EU Marine Strategy Framework Directive	International organisations, national authorities, scientific institutions, expert NGOs and other stakeholders
3.3	Establish transboundary MPAs	At least 1-2 transboundary MPAs are established to cover the protection gap at the open sea and international waters	All Ionian and Central Mediterranean sub-region countries	Medium	IF, NF, O	Post-2020 Global biodiversity framework (GBD) Target 2 Post-2020 Global biodiversity framework (GBD) enabling mechanisms (13.d.ii) Roadmap for a comprehensive coherent network of well-managed Marine Protected Areas (MPAs) to achieve Aichi Target 11 in the Mediterranean. EU 2030 Biodiversity Strategy 2.1. Coherent network of protected areas	International organisations, national authorities, scientific institutions, expert NGOs and other stakeholders

AN EFFECTIVE NETWORK OF MARINE PROTECTED AREAS Objective: Improve marine protected areas representativity and reaching good biodiversity conservation status Indicator of objective achievement: Improved effectiveness of MPAs							
No.	Activity	Expected results/ outputs	Relevant countries	Priority level	Possible sources of funding	Link to other relevant strategies	Possible actors
3.4.	Apply adaptive management approach of MPAs, to reach effective management	Evaluation effectiveness is assessed on regular basis	All Ionian and Central Mediterranean sub-region countries	Medium	IF, NF, O	Post-2020 Global biodiversity framework (GBD) Target 2 Roadmap for a comprehensive coherent network of well-managed Marine Protected Areas (MPAs) to achieve Aichi Target 11 in the Mediterranean. EU 2030 Biodiversity Strategy 2.1. Coherent network of protected areas ACCOBAMS Strategy	International organisations, national authorities, scientific institutions, expert NGOs and other stakeholders

CAPACITY BUILDING, STAKEHOLDERS INVOLVEMENT AND NETWORKING Objective: Improve experts' capacities at the Ionian-Central Mediterranean sub-region al level and involvement of stakeholders Indicator of objective achievement: All Ionian-Central Mediterranean sub-region 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.	Conduct capacity building activities across the sub-region, focusing on NIS/IAS, other species monitoring (Sea turtles, Cetaceans, Seabirds, Seagrass), use of existing and new technologies in monitoring, law enforcement and other activities.	Increased trained number of experts Available and new technologies are used in monitoring and conservation in general	All Ionian and Central Mediterranean sub-region countries	Very high	IF, NF	Post-2020 Global biodiversity framework (GBD) EU 2030 Biodiversity Strategy 3.3.4. Improving Knowledge, education and skills Descriptor D2 "Exotic Species" of the Marine Strategy Framework Directive	International organisations, national authorities, scientific institutions, expert NGOs and other stakeholders

CAPACITY BUILDING, STAKEHOLDERS INVOLVEMENT AND NETWORKING Objective: Improve experts' capacities at the Ionian-Central Mediterranean sub-region al level and involvement of stakeholders Indicator of objective achievement: All Ionian-Central Mediterranean sub-region 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
4.2.	Involve fishermen, general public and other stakeholder in monitoring (citizen-science) and conservation activities	Citizen science projects and data collection platforms are implemented	All Ionian and Central Mediterranean sub-region countries	Medium	IP, NF	Post-2020 Global biodiversity framework (GBD) Target 19 EU 2030 Biodiversity Strategy	International organisations, national authorities, scientific institutions, expert NGOs and other stakeholders
4.3.	Establish Ionian and Central Mediterranean sub-region 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. Working groups and observatories of specialists, managers, policy makers should be formulated. Sub-regional Task Force for unusual stranding and similar events is set	All Ionian and Central Mediterranean sub-region countries	Medium	IP, NF	Post-2020 Global biodiversity framework (GBD) EU 2030 Biodiversity Strategy ACCOBAMS Strategy	International organisations, national authorities, scientific institutions, expert NGOs and other stakeholders

FINANCING

Objective: Ensure long-term funding for conservation programs

Indicator of objective achievement: Funding for most of the Post 2020 SAP BIO 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.	Develop transboundary projects with to address priority topics identified in the sub-region	Number of joint projects covering priority topics is increased	All Ionian and Central Mediterranean sub-region countries	Very high	IF, NF	Post-2020 Global biodiversity framework (GBD) Target 18 EU 2030 Biodiversity Strategy Roadmap for Marine Protected Areas in the Mediterranean: "Increasing the allocation of financial resources to establish and maintain an ecological network of effectively managed MPAs". ACCOBAMS Strategy The MedFund	International organisations, national authorities, scientific institutions, expert NGOs and other stakeholders
5.2.	Encourage Public Private Partnerships (PPP) to use funds from the business sectors and foundation to co-finance conservation		All Ionian and Central Mediterranean sub-region countries	High	NF, O	Post-2020 Global biodiversity framework (GBD) Target 18 The MedFund EU 2030 Biodiversity Strategy	International organisations, national authorities, scientific institutions, expert NGOs and other stakeholders

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UNEP/MAP-SPA/RAC (2020) Post-2020 SAP BIO Tunisia's National Contribution Document on Mediterranean Marine and Coastal Biodiversity Preservation Beyond 2020: Ecological Status, Pressures, Impacts, Their Drivers And Priority Response Fields. Pp.64.

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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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