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Istanbul, Türkiye, 12-15 September 2023

Agenda item 5: Specific Mattes for Consideration and Action by the Meeting, including Draft Decisions

Note by the Secretariat:

This draft decision was submitted to the MAP Focal Points Meeting from the Ecosystem Approach Coordination Group following discussions at its meeting of 11 September 2023. Annex I to the present decision presents in track change and square brackets a number of proposals received from Contracting Parties during the review timeline (i.e., by 25 August 2023), as well as comments and proposals made during the 10th EcAp Coordination Group Meeting, 11 September 2023, Istanbul, Türkiye, on Working Document UNEP/MED WG.567/5

UNEP/MAP
Athens, 2023

[Decision IG.26/3

The 2023 Mediterranean Quality Status Report and a Renewed Ecosystem Approach Policy in the Mediterranean

The Contracting Parties to the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention) and its Protocols at their 23rd Meeting,

Recalling General Assembly resolution 70/1 of 25 September 2015, entitled "Transforming our world: the 2030 Agenda for Sustainable Development",

Recalling also the United Nations General Assembly resolution 76/296 of 21 July 2022, entitled "Our ocean, our future, our responsibility",

Recalling the United Nations Environment Assembly resolution UNEP/EA.5/Res. 3 of 2 March 2022, entitled "Future of the Global Environment Outlook",

Recalling the Kunming-Montreal Global Biodiversity Framework (GBF) that was adopted during the fifteenth meeting of the Conference of the Parties to the Convention on Biological Diversity (COP 15),

Having regard to Article 12 of the Barcelona Convention and relevant articles of its Protocols addressing monitoring and assessment,

Recalling Decisions of the Contracting Parties to the Barcelona Convention related to the implementation of the Ecosystem Approach Roadmap and Integrated Monitoring and Assessment Programme, i.e. Decision IG.17/6 (COP 15), Decision IG.20/4 (COP 17), Decision IG. 21/3 (COP 18), Decision IG.22/7 (COP 19), Decision IG.23/6 (COP 20), and Decision IG.24/4 (COP 21) and their status of implementation,

Expressing appreciation for the work undertaken by the entire UNEP/MAP Barcelona Convention system, in primis the Contracting Parties, Ecosystem Approach Coordination Group, CORMON, CORESA, MAP and MAP Components Focal Points, MAP Partners, and the Secretariat including MAP Components, for the implementation of the Ecosystem Approach Roadmap,

Expressing also appreciation for the support provided through the EU-funded projects, i.e. EcAp MED III, Marine Litter MED II and IMAP-MPA, and the Bilateral Cooperation Agreement with Italy, as well as the GEF-funded MedProgramme, in the implementation of the IMAP-based national monitoring programmes and in the preparation of the Mediterranean Quality Status Report (2023 MED QSR), as well as on the implementation of Programmes of Measures/ National Action Plans at national level,

Concerned by the pressures caused by human activities on the marine and coastal environment and *acknowledging* that unsustainable consumption and production patterns are the main drivers of environmental change in the Mediterranean, as highlighted in the socioeconomic and assessment chapters of the 2023 MED QSR,

Having considered the reports of the meetings of the Ecosystem Approach Coordination Group, and the Ecosystem Approach Correspondence Groups on Pollution, Marine Litter, Biodiversity and Coast and Hydrography, the MED POL and RAC Focal Points,

1. *Take note* of the 2023 Mediterranean Quality Status Report (2023 MED QSR) as provided in the Meeting document UNEP/MED WG.567/Inf.3;

2. *Endorse* the Executive Summary of the 2023 MED QSR, as set out in Annex I to the present Decision;

3. *Endorse* the assessment criteria and threshold values as set out in Annex II to the present Decision, acknowledging their evolving nature, based on quality assured data availability and in this context, *highlight* that any regular update should allow sufficient time for negotiation and endorsement by the CORMON and the COP before the assessment phase of next Mediterranean Quality Status Report has started;

4. *Take note of* the findings of the independent evaluation of the Ecosystem Approach Roadmap, and welcome the significant progress marked in its implementation the Contracting Parties and the Secretariat including MAP Components, building on the Ecosystem Approach governance structure,

5. *Request* the Secretariat to prepare during the biennium 2024-2025, under the leadership of the Ecosystem Approach Coordination Group, a revised Ecosystem Approach Roadmap Policy, including IMAP enhancement, taking into account, but not limited to, the outcomes of the 2023 Mediterranean QSR; the findings of the independent evaluation of the implementation of the Ecosystem Approach Roadmap as set out in Annex III to the present Decision, and other related work of the Secretariat as per the CORMONs and Ecosystem Approach Coordination Group meeting conclusions, and giving due consideration to the most recent relevant developments at global and regional level, including the expected MFSD evaluation and revision, for consideration at COP 24 in Egypt;

6. *Adopt [Take note of]* the Terms of Reference for the CORMONs, CORESA and Online Working Groups [and] [taking note of] the flow of interaction between Ecosystem Approach and MAP governing bodies, as set out in Annex IV to the present Decision;

7. *Call upon* Contracting Parties to continue strengthening the monitoring and assessment capacities of the national IMAP competent laboratories and authorities, with the view to delivering and reporting quality assured data and undertake reliable related assessments with support from the Secretariat and MAP Components, considering the need to ensure uniform distribution of reported data across the entire region;

8. [*Encourages* the Secretariat, MAP Components and the Contracting Parties in enhancing synergies for the implementation of the Ecosystem Approach Policy and IMAP, with a particular focus on work undertaken at global level in the Regional Seas framework, Science Policy Interface and EU-MSFD;]

9. *Invite* the Secretariat (INFO/RAC) to further enhance the IMAP Info System by undertaking its upgrade into an advanced information system which efficiently supports assessments and ensures the validation of uploaded data, first technically and then scientifically, for potential use at various scales;

10. *Invite* Contracting Parties and donor institutions to provide financial resources for the implementation of the Ecosystem Approach Roadmap with a particular focus on IMAP implementation at national level*;*

11. *Encourage* the Contracting Parties to undertake the preparation and/or update of Programmes of Measures /National Action Plans to achieve Good Environmental Status, addressing to the extent possible in their entirety the 11 Ecological Objectives adopted under the Ecosystem Approach Roadmap in an integrated way, highlighting the obligation to streamline the requirements of the recent regulatory measures adopted by the Contracting Parties on pollution prevention and biodiversity conservation, promoting circular economy, resource efficiency, and sustainability of human activities, including emerging ones;

12. *Request* the Secretariat to provide timely and effective technical and financial support in line with the adopted UNEP/MAP Programmes of Work and Budget for the implementation of the Ecosystem Approach Roadmap, IMAP and related Programmes of Measures/National Action Plans, as well as 2023 MED QSR assessment findings*;*

13. *Call upon* the scientific community at national and regional levels to contribute to the implementation of the Ecosystem Approach Roadmap and IMAP based on their comparative

advantages and scientific knowledge and competences, with a view to further strengthening the Science Policy Interface for IMAP implementation at all levels.]

Annex I
2023 Mediterranean Quality Status Report/ Executive Summary

[2023 Mediterranean Quality Status Report/ Executive Summary

1. Introduction

1. Further to the initial assessment of the status of the marine environment provided in the first-ever Quality Status Report for the Mediterranean (2017 MED QSR,), progress was achieved by preparing the 2023 MED QSR using the findings of the Integrated Monitoring and Assessment Programme (IMAP) implemented for the period 2017-2023. Compared to the 2017 MED QSR, the 2023 MED QSR benefited from a substantive improvement in terms of thematic and spatial data coverage. However, for some Common Indicators, due to data inhomogeneity, and uneven data availability and distribution, it was not possible to obtain GES assessment. The thematic assessments were provided by applying the GES and alternative environmental assessment methodologies ensuring the combined use of (i) available quality-assured datasets reported by the Contracting Parties through the IMAP Info System and (ii) relevant scientific literature.

~~1.~~2. The present document consists of assessment findings and proposals of measures which could be considered by CPs to address the findings towards achieving/maintaining GES.

2. The Mediterranean Sea: environmental characteristics, socioeconomics:

~~2.~~3. The Mediterranean is a semi-enclosed sea located between Africa, Asia and Europe and is bordered by twenty-one countries. It is connected to the Atlantic through the Strait of Gibraltar, to the Black Sea through the Strait of Dardanelles, and to the Red Sea through Suez Canal. According to the Barcelona Convention, the Mediterranean Sea is “bounded to the West by the meridian passing through Cape Spartel lighthouse, at the entrance of the Straits of Gibraltar, and to the East by the southern limits of the Straits of the Dardanelles between Mehmetcik and Kumkale lighthouses”.

~~3.~~4. The most striking feature of the underwater geomorphology of the Mediterranean Sea is the presence of abrupt submarine canyons linking the coastal areas to the deep sea. They facilitate exchanges between coastal waters and deep waters. The presence of numerous islands is another striking characteristic of the Mediterranean. According to some reports there are about ten thousand islands in the Mediterranean, most of them are in the Aegean Sea.

~~4.~~5. The average annual sea surface temperature in the Mediterranean show strong gradients from west to east and from north to south, as well as a strong seasonal variation between 10 and 28°C, reaching 30°C in summer. The deep waters of the Mediterranean have a constant temperature around 13°C with an average salinity of 38‰. ~~The evaporation water losses are partially compensated by the rivers that flow into the Mediterranean and a surface current from the Black Sea. The main compensation of evaporation losses is provided by a continuous inflow of surface water from the Atlantic Ocean through the Strait of Gibraltar. The current it generates is the main driver of the water circulation in the Mediterranean. It flows eastward along the southern coasts of the western basin, then across the Sicily Strait and continues along the southern coasts of the eastern basin.~~

~~5.~~6. With a low amplitude of semi-diurnal tides (30-40 cm), except for the northern Adriatic and the Gulf of Gabès where it can reach up to 150 and 180 cm, respectively, the Mediterranean Sea is considered a medium microtidal sea by global ocean standards.

~~6.~~7. In terms of nutrients, the Mediterranean is among the most oligotrophic oceanic systems. The most eutrophic waters are located on the north shore in the western basin and Adriatic at the mouth of the large rivers Rhone, Ebro and Po. However, riverine nutrient inputs are relatively low, as most river systems discharging in the Mediterranean Sea are small. The main source of nutrients in the Mediterranean lies in the inflowing Atlantic surface waters at the level of the Gibraltar Strait.

~~7.~~8. Home to 17,000 species of fauna and flora representing respectively 7.5% and 18% of the world’s marine flora and fauna, the Mediterranean Sea is a hotspot of biodiversity. The species

diversity of the Mediterranean, although unevenly distributed between the eastern and western basins, is higher than in most other regions of the world, due to the geological history of this sea, its close communication with the Atlantic and its position at the junction of three continents: Europe, Asia and Africa which make it a melting pot of biodiversity.

~~8. The uniqueness of the Mediterranean biotope comes from a combination of morphological, chemical and biotic characteristics reflected by the presence of certain ecosystem building species and assemblages. The meadows formed by *Posidonia oceanica* and the bioconcretions of the coralligenous assemblages are among the most important marine ecosystems of the Mediterranean Sea.~~

9. Non-indigenous species (NIS) are increasingly present in the Mediterranean Sea generating significant changes in the fauna and flora composition, mainly in the eastern Mediterranean. The NIS in the Mediterranean Sea are linked to four main pathways of introduction: the corridors, shipping (ballast waters and hull fouling), aquaculture, and aquarium trade. Corridors are the most important pathway of introduction (33.7%) followed by shipping (29%) and aquaculture (7.1%).

10. The Mediterranean region climate is characterized by mild winters and hot and dry summers. From the West, the Atlantic Ocean regimes have a great intra-seasonal and interannual variability influences in the Mediterranean reaching mainly the northeast part of the Mediterranean land and sea, whilst the Eastern and Southern climatic regimes provide the characteristics of the southern Mediterranean areas.

11. Climate change is exacerbating already existing vulnerabilities in the Mediterranean region. In its Sixth Assessment Report, the IPCC concluded that “during the 21st century, climate change is projected to intensify throughout the region. Air and sea temperature and their extremes (notably heat waves) are likely to continue to increase more than the global average (high confidence)”. Over the last three decades, marine heatwaves (MHWs) in the Mediterranean Sea have caused mass-mortality events in various marine species, and critical losses for seafood industries. ~~The maximum intensity, frequency and duration of MHWs have all increased on average over the Mediterranean Sea since 1993. However, over the 1993–2019 period, the number of MHWs showed an inhomogeneous spatial distribution in the entire Mediterranean Sea, with a lower number of events per year in the south-eastern Mediterranean Sea and slightly more events in the western Mediterranean Sea, especially in the north-western area, as well as the Adriatic Sea.~~ In the future, MHWs may undermine many benefits and services that Mediterranean ecosystems normally provide, such as food, maintenance of biodiversity, and regulation of air quality.

12. Sea water acidification is another impact of Climate Change on the Mediterranean Sea where water surface pH has decreased by -0.08 units since the beginning of the 19th century, similar to the global ocean, with deep waters exhibiting a larger anthropogenic change in pH than the typical global ocean deep waters because ventilation is faster. Nutrient enrichment causes eutrophication and may provoke harmful and toxic algal blooms, trends which will likely increase. Harmful algal blooms may cause negative impacts on ecosystems (red-tide, mucilage production, anoxia) and may present serious economic threats for fisheries, aquaculture and tourism.

13. The Coastal and marine ecosystems of the Mediterranean provide valuable services to human well-being and are the basis for many economic sectors such as tourism, fisheries, maritime transport, etc. All of these activities modify - at least temporarily - the marine and/or coastal environment.

14. Population growth is acting in the Mediterranean as a multiplier of pressures on the coastal and marine environment. In 2021, the population of the Mediterranean countries reached 531.7 million, increasing by close to 20 million people in only 3 years between 2018 and 2021. An overall increase of 41.4% was recorded between 1990 and 2021, while decade-on-decade growth accelerated (from a rate of 12.5% between 1990 and 2000, to 13.5% between 2000 and 2010 and 17.2% for the last decade). However, decreases in population (on a year-by-year basis) have been recorded for some time

sequences or the entire period since 2000 in some of the Mediterranean countries. Some periodic population decreases during the last 20 years can be correlated with periods of conflicts and crises.

15. Human-caused pressures on the coastal and marine environment are stemming from unsustainable production and consumption patterns, and a growing population multiplies these pressures. Fluctuations of population generally impact the weight of overall pressures on the coastal and marine environment, at varying levels depending on the per capita environmental footprint.

~~16.~~ Current consumption and production patterns in the Mediterranean are characterised by high resource consumption combined with low recycling rates and unsatisfactory waste management. ~~They are unsustainable overall and lead to considerable environmental degradation in the Mediterranean region, including land take and degradation, water scarcity, noise, water and air pollution, biodiversity loss and climate change.~~

~~17.~~16. Mediterranean countries consume approximately 2.5 times more natural resources and ecological services than the region's ecosystems can provide. The gap between the Mediterranean and the world averages remained substantial: an Ecological Footprint[1] of 3.4 global hectares per capita is found in the Mediterranean, as compared to 2.8 globally in 2018.

~~18. The relationship between maritime economic activities and the Mediterranean marine and coastal environment is characterised by impact and dependence. The maritime economy can foster the development of sustainable practices for livelihoods that depend on the sea and its resources. At the same time, if not properly managed, it can have environmental impacts that cause marine and coastal ecosystem degradation and hinder achievement of good environmental status (GES). In turn, degraded marine and coastal ecosystems provide fewer economic opportunities for those activities that depend on healthy ecosystems (fisheries, tourism, etc.).~~

17. In most Mediterranean countries, the regulation of maritime activities, whether through the implementation of international legislation, compliance and enforcement is still not at the level to allow the maritime economy to make a significant contribution to a sustainable blue economy. This economic "openness" stands in contrast with the biological semi-closed character of the Mediterranean Sea (water renewal time of around 80 years). The fragmentation of policies, coupled with the lack of a national maritime transport system policy, within countries, and the lack of ratification of international maritime instruments and standards, and the associated uneven implementation, compliance and enforcement including sanction measures among countries when these countries have ratified the se instruments and standards are challenges that need to be overcome if maritime activities are to be a major pillar in a sustainable regional blue economy.

~~19.~~ Over the past 50 years (1970 – 2019), the number of international tourist arrivals (ITAs) to Mediterranean countries increased by a factor of seven: from around 58 million in 1970 (161 in 1995, 246 in 2005) to 408 million in 2019. During the past decade (2010 – 2019), a cumulative increase of ITAs to the Mediterranean countries was 43.2% and in 2019, close to one third (27.8%) of the global ITAs were recorded in the Mediterranean[2].

~~20.~~18. The ~~economic impact of tourism is strong:~~ contribution of tourism and travel to GDP has been estimated at USD 943.4 billion, with 18.4 million direct and indirect jobs across the region in 2019. However, the COVID-19 crisis halved the GDP from tourism and travel in the Mediterranean, causing a loss of 3.1 million jobs. ~~Indeed, in 2020, tourism was severely affected by COVID-19 pandemic and~~

[1] The Ecological Footprint measures how much biocapacity humans demand, and how much is available. It does not address all aspects of sustainability, nor all environmental concerns. Biocapacity is the area of productive land available to produce resources or absorb carbon dioxide waste, given current management practices. Global hectares (gha) is a unit of world-average bioproductive area, in which the Ecological Footprint and biocapacity are expressed.

[2] Data on tourism specifically related to the Mediterranean coastal region is generally not available and data presented here refers to national data (all marine façades included for countries with multiple marine façades).

~~the number of ITAs decreased by more than two thirds; a~~A moderate recovery was seen in 2021, with total number of ITAs reaching 45.5% of the 2019 level.

~~21.~~19. Agriculture is a strategic sector in most Mediterranean countries. The main impacts of agriculture on the marine environment are due to the runoff of nutrients and agrochemicals into the sea. Disaggregation of the impact from different sources of land-based pollution is difficult and there is no quantitative data concerning the effect of agriculture on the environment of the Mediterranean Sea. The runoff of inorganic nitrogen and phosphorus fertilizers leads to eutrophication, which in turn negatively impacts coastal and marine ecosystems. The runoff and infiltration of pesticides into the sea affect the marine environment at a slower pace by bioaccumulation higher up the food chain.

~~22. In 2020, fertilizer consumption in kg/ha of arable land ranged from 7 kg/ha to 473 kg/ha, with half of the Mediterranean countries being above and half of the Mediterranean countries being below the world average fertilizer consumption of 146 kg/ha of arable land.~~

~~23.~~20. Fisheries, including aquaculture, is another important economic sector in the Mediterranean where a variety of capture fishery and aquaculture techniques are employed at different scales, including industrial, semi-industrial and small-scale fisheries, as well as industrial and small-scale farming. Four out of five fishing vessels in the Mediterranean are small-scale vessels[3] which are the predominant fleet segment in all Mediterranean fishing sub-regions, in particular in the Eastern and Central Mediterranean. Another important fleet segment are trawlers and beam trawlers, accounting for 7.9% of the total, predominantly used in the Western Mediterranean and the Adriatic; purse seiners and pelagic trawlers make up 5.5% of the fleet.

~~24. The wider economic impact of fisheries along the value chain in the region, including direct and indirect as well as induced effects, is estimated to be 2.6 times the value at first sale. In the Mediterranean, revenue from small-scale fisheries makes 29% of the total; however, in some countries (e.g., Cyprus, France, Greece, Lebanon, Morocco, Slovenia), small-scale fisheries account for as much as 50% of the total revenue.~~

~~25.~~ According to FAO, total employment onboard fishing vessels in the Mediterranean was near 202,000 in 2018. Approximately one third of these jobs are linked to fishing in the Western and Eastern Mediterranean sub-regions; the Central Mediterranean accounts for 24% of the total number of jobs, and the Adriatic Sea sub-region for 9%. ~~Estimates from previous analyses (for example by the World Bank, FAO and WorldFish) suggest that non-vessel-based jobs employ almost 2.5 times as many people as those onboard vessels. On average, employment onboard fishing vessels represents around 0.1% of total coastal populations.~~

~~26.~~21. Total marine aquaculture production (including Türkiye's Black Sea production) approached one million (994,623) tonnes in 2020 with average annual growth rates of 6.8% and a cumulative increase of around 90% between 2010 and 2020. Marine aquaculture output was not negatively affected by the COVID-19 pandemic: production in 2020 increased by 13.2% compared to 2019.

~~27.~~22. Other economic activities (maritime transport, oil and gas activities, underwater cables and pipelines, etc.) can function independently from the state of the marine environment while generating heavy impacts to the marine environment. The Mediterranean Sea being located at the crossroads of three major maritime crossings[4] constitutes an important transit and trans-shipment area for international shipping, as well as a realm for Mediterranean seaborne traffic (movement between a

[3] Including small-scale vessels 0–12 m with engines using passive gear; polyvalent vessels 6–12 m; and small-scale vessels 0–12 m without engines using passive gear. Polyvalent vessels are all vessels using more than one gear type, with a combination of passive and active types of gear, none of which are used for more than 50 percent of the time at sea during the year.

[4] Strait of Gibraltar, opening into the Atlantic Ocean and the Americas; the Suez Canal, a major shipping gateway which connects to Southeast Asia via the Red Sea; and the Dardanelles Strait, leading to the Black Sea and Eastern Europe/Central Asia.

Mediterranean port and a port outside the Mediterranean) and short sea shipping activities between Mediterranean ports. Despite covering less than 1% of the world's oceans, the Mediterranean Sea accounted for more than a fifth (21-22%) of global shipping activity measured by the annual number of port calls, and around 9% of the annual container port throughput in recent years. The Western Mediterranean and the Aegean-Levantine Sea are the busiest parts of the basin.

~~28.~~23. The Mediterranean region is facing crucial challenges linked to the use of natural resources, in particular water, as well as energy products.

~~29.~~24. The total primary energy demand in the Mediterranean equalled 1,021 Mtoe[5] in 2018 and 1,030 Mtoe in 2019, with an overall increase of around 45% compared to 1990. In 2020, a decrease of around 9% was recorded due to the effects of the COVID-19 pandemic, bringing primary energy demand down to 938 Mtoe. Shares of coal and oil in the total primary energy demand had a downward trend over the past three decades. The most significant uptake of renewables has been recorded in power generation, while the share of renewable sources is still very low in end-use sectors, especially in industry and transport. In 2020, renewable energy technologies made up 43% (686 GW) of the total power generation capacity, deployed predominantly in the North Mediterranean countries. Nevertheless, the development of renewable capacity was very fast in the South and East where it nearly tripled over the period 2005 – 2020.

~~30.~~25. The Mediterranean region is recognised as one of the most water-challenged regions in the world. The pre-existing water scarcity is being aggravated by population growth, urbanization, growing food and energy demands, pollution, and climate change. According to FAO, total freshwater withdrawals in the Mediterranean countries were at the level of 290 billion m^3 in 2019 with irrigated agriculture as the most water-demanding sector accounting for nearly 80% in most of the south and east Mediterranean countries. Besides freshwater withdrawals, a total of 6.6 billion m^3 of treated wastewater is used across the region, and desalination of sea water is developing[6] in many countries on all rims of the Mediterranean.

~~31.~~26. The 2023 MED QSR provides an analysis of the main socio-economic components that influence the Mediterranean coastal and marine environment , based on available data from a number of different sources, such as UN system, other international organisations, and relevant scientific articles. However, the absence of a comprehensive monitoring system of socio-economic characteristics and of the sustainability of economic activities makes it difficult to establish clear links between the quality status of the Mediterranean Sea and the social and economic pillars of sustainable development. While information on demographic, economic and employment has been collected, literature review did not adequately inform the level of environmental and social sustainability of human activities that impact the coastal and marine environment. A knowledge gap remains in measuring to what extent human activities are compatible or in line with the objective of achieving GES and clear sustainability indicators of human activities are generally lacking.

3. UNEP/MAP-Barcelona Convention: Vision, Goals, and Ecological Objectives

~~32.~~27. The regional cooperation for the Mediterranean Sea started in 1975 when the Mediterranean Action Plan (MAP) was launched as the first Regional Seas Programme within the framework of the United Nations Environment Programme (UNEP). A year later, in 1976, the countries bordering the Mediterranean adopted the Convention for the Protection of the Mediterranean Sea Against Pollution (Barcelona Convention), thus providing MAP with a legal basis constituting a framework allowing the

[5] Million tons of oil equivalent.
[6] Desalination is the process of removing salts from water. A by-product of this process is toxic brine which can degrade coastal and marine ecosystems unless treated. For every litre of potable water produced, about 1.5 litres of liquid polluted with chlorine and copper are created in most desalination processes. The toxic brine depletes oxygen and impacts organisms along the food chain when released into the sea. Desalination also comes with a high energy demand. Using renewable energy sources for desalination can be an option to mitigate carbon emissions stemming from desalination.

Contracting Parties to unite their efforts for the preservation of the Mediterranean Sea as a common heritage of the peoples of the region.

~~33.~~28. Following a first period during which the efforts within MAP were mainly oriented to address pollution issues, the action under the Barcelona Convention has evolved towards a broader approach aimed at protecting and enhancing the Region's marine and coastal environment in line with a sustainable development vision. In this context, building on the global momentum created by the landmark 1992 Rio Conference, the MAP Coordinating Unit facilitated a consultation process that led to the adoption by the Contracting Parties, in June 1995, of the Action Plan for the Protection of the Marine Environment and the Sustainable Development of the Coastal Areas of the Mediterranean (MAP Phase II) and the amended Barcelona Convention, renamed "Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean".

~~34.~~29. The alignment with the Sustainable Development orientation was reinforced in 2016 when the Barcelona Convention Contracting Parties adopted the Mediterranean Strategy for Sustainable Development (MSSD) 2016-2025. The MSSD provides an integrative policy framework and a strategic guiding document for all stakeholders and partners to translate the 2030 Agenda for Sustainable Development at the regional, sub regional and national levels. The Strategy is built around the following vision: A prosperous and peaceful Mediterranean region in which people enjoy a high quality of life and where sustainable development takes place within the carrying capacity of healthy ecosystems. This is achieved through common objectives, strong involvement of all stakeholders, cooperation, solidarity, equity and participatory governance. Thirty-four indicators have been agreed in relation to the following six objectives:

a. Ensuring sustainable development in marine and coastal areas
b. Promoting resource management, food production and food security through sustainable forms of rural development
c. Planning and managing sustainable Mediterranean cities
d. Addressing climate change as a priority issue for the Mediterranean
e. Transition towards a green and blue economy
f. Improving governance in support of sustainable Development

~~35.~~30. In 2021, the Contracting Parties adopted the UNEP/MAP Medium-Term Strategy 2022-2027 (MTS) (Decision IG.25/1, COP22, Antalya, Türkiye)as a key strategic framework for the development and implementation of the Programmes of Work of UNEP/MAP. It aims at achieving transformational change and substantial progress in the implementation of the Barcelona Convention and its Protocols, also providing a regional contribution to relevant Global processes[7].

~~36.~~31. Today, the legal and institutional framework put in place over the years by the Contracting Parties to the Barcelona Convention have become an efficient cooperation instrument to which all the riparian countries adhere, despite the challenging geopolitical circumstances prevailing in the region. By adopting, in 2021, the UNEP/MAP Medium-Term Strategy (MTS 2022-2027), the Contracting Parties to the Barcelona Convention and its Protocols, agreed to orient their collaboration during the period 2022-2027 towards the following vision: "*Progress towards a healthy, clean, sustainable and climate resilient Mediterranean Sea and Coast with productive and biologically diverse marine and coastal ecosystems, where the 2030 Agenda for sustainable development and its SDGs are achieved through the effective implementation of the Barcelona Convention, its Protocols and the Mediterranean Strategy for Sustainable Development for the benefit of people and nature*". To this end, the Contracting Parties decided to further strengthen their collaboration to reach a dual long-term goal:

a) the achievement and maintenance of Good Environmental Status (GES) of the

[7] In particular the 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs), the UN Decade on Ecosystem Restoration, the UN Decade of Ocean Science for Sustainable Development and the UNEP's Medium-Term Strategy 2022-2025, approved at UNEA-5 in February 2021.

Mediterranean Sea and Coast, and

b) achieving sustainable development through the SDGs and living in harmony with nature.

~~37.~~32. In 2012, the Contracting Parties adopted 11 Mediterranean Ecological Objectives (EO) to achieve good environmental status (GES).

4. Assessment Findings, Key Messages and Measures:

Ecological Objective 5 (EO5): Human-induced eutrophication is prevented, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algal blooms and oxygen deficiency in bottom waters
Common Indicator 13: Concentration of key nutrients in water column.
Common Indicator 14: Chlorophyll-a concentration in water column.

Ecological Objective 9 (EO9): Contaminants cause no significant impact on coastal and marine ecosystems and human health
Common Indicator 17: Concentration of key harmful contaminants measured in the relevant matrix (biota, sediment, seawater).
Common Indicator 18: Level of pollution effects of key contaminants where a cause and effect relationship has been established.
Common Indicator 19: Occurrence, origin (where possible), extent of acute pollution events (e.g. slicks from oil, oil products and hazardous substances), and their impact on biota affected by this pollution.
Common Indicator 20: Actual levels of contaminants that have been detected and number of contaminants which have exceeded maximum regulatory levels in commonly consumed seafood.
Common Indicator 21: Percentage of intestinal enterococci concentration measurements within established standards.

Ecological Objective 11 (EO11): Noise from human activities cause no significant impact on marine and coastal ecosystems
Candidate Indicator 26: Proportion of days and geographical distribution where loud, low, and mid-frequency impulsive sounds exceed levels that are likely to entail significant impact on marine animals
Candidate Indicator 27: Levels of continuous low frequency sounds with the use of models as Appropriate.

The Aegean – Levantine Sea Sub-region

Aegean Sea Sub-division

~~38.~~33. **EO 5 - CI 13 (DIN – Dissolved inorganic nitrogen and TP – total phosphorus) and CI 14 (Chla – Chlorophyll a):** Available literature indicates the presence of drivers and pressures with impacts related to eutrophication in the two areas found in non-good status in the present assessment, i.e., in the 1 non-good status subSAUs out of 16 subSAUs, as elaborated in 3.1.3. The non-good status in the Izmir province is related to the Izmir Bay and the southern coast of the province. Drivers that could impact eutrophication are: i) urban wastewater discharge, although many treatment plants were put into operation; ii) agriculture; iii) riverine discharge: Küçük, Menderes, Bakırçay and Gediz rivers, as the most important rivers of the Aegean Region. The main tributary of the Gediz River ,and the main streams feeding it, are considered to be under pressure in terms of point and diffuse pollution; iv) tourism; v) port operations: Izmir Port is the largest port in Turkeye after Mersin Port and vi) aquaculture. There are 66 fish farms, and 8 mussel farms operating on the coasts of İzmir province. In addition, available literature indicates the presence of drivers and pressures with impacts related to eutrophication in other areas of the AEGS which were classified in non-good status in the present assessment (see below assessment findings), for example, the Saronikos Gulf and Elfesis Bay, with

extensive urbanization, industry and port activities and the Thermaikos Gulf impacted by agricultural discharges from the heavily polluted Axios River, and fish and shellfish mariculture.

~~39.~~34. **EO 9 – CI 17 (TM, Σ_{16}PAHs, Σ_5PAHs and Σ_7PCBs in sediments):** Using CHASE+, the AEGS was classified as in-GES for TM in sediments when the contribution of the two very limited affected areas (Elfesis Bay and inner Saronikos Gulf and area near Aliaga and Yenisakran) were not taken into account (see below assessment findings). It was not possible to classify the AEGS sub-division for Σ_{16} PAHs due to insufficient data while for Σ_5 the AEGS was classified as non-GES. It was not possible to classify the AEGS regarding Σ_7 PCBs in sediments due to insufficient data.

~~40.~~35. Regarding TM in sediments, one of the very limited non-GES area was the Elfsis Bay/ inner Saronikos Gulf. Drivers and pressures in the area are extensive urbanization (metropolitan areas of Athens), Port activities and maritime traffic (Piraeus port), Industries located in the coastal area of the Elefsis Bay, such as oil refineries, steel and cement industries, and shipyards, Discharges of wastewater treatment plant. TM pollution decreased from 1999 to 2018 in some areas due to environmental policy enforcement combined with technological improvements by big industrial polluters (Karageorgis et al., 2020 and references therein). A second limited non-GES area was near Aliaga and Yenisakran. Possible drivers and pressures are port operations, industry, tourism and agriculture Further to input provided by Turkiye, the possible drives and pressures are mapped in the expanded area of the Balıkesir district and the Izmir province, where stations were classified as non-GES in this assessment. Those include: i) Urban waste water pressure due to increased population during the touristic summer seasons; ii) Port operations: Izmir Port is the largest port in Turkiye after Mersin Port; iii) Aquaculture is also present at some locations along the coast; iv) Agriculture also generates some pressures; v) Riverine inputs where the main streams generate pressures in terms of point and diffuse pollution.

~~41.~~36. It was not possible to classify the AEGS Sub-division regarding data for Σ16 PAHs in sediment due to insufficient data. There are indications that the offshore zone is in GES while the enclosed areas might be found as non-GES. Regarding Σ5 PAHs in sediments, the AEGS was classified as non-GES. The same limited areas classified as non-GES for TM in sediments are also non-GES for Σ5 PAHs, with the same drivers and pressures as for TM. Additional stations were found non-GES in the northern and central part of the AEGS, mainly in enclosed areas that are more sensitive to land-based sources pollutants.

~~42.~~37. The AEGS Sub-division could not be classified regarding assessment of Σ_7 PCBs in **sediments** due to lack of data. An affected, non-GES area was identified in the coast around Aliaga, Yenisakran and Candarli, as for TM. Possible drivers and pressures are port operations, industry, tourism and agriculture.

~~43.~~38. IMPACTS. No data on biota were available for the AEGS. Drivers and pressures that can impact biota were found in the AEGS.

~~44.~~39. **CI 18 - Level of pollution effects of key contaminants where a cause-and-effect relationship has been established:** Although drivers that could exert pressure and cause impact on CI 18, were identified in the AEGS, no data were available at IMAP-IS to check for impacts in biota. Only two relevant studies in the scientific literature reported data on biomarkers in the AEGS, both for Türkiye. Both showed indications of possible effect of TM and/or pesticides on the molluscs *Mytilus galloprovincialis* and *T. decussatus* collected from Homa Lagoon (Aegean Sea) and in the fish *M. barbatus, B. boops and T. trachurus* collected off the coast of Türkiye.

~~45.~~40. **CI 20 - Actual levels of contaminants that have been detected and number of contaminants which have exceeded maximum regulatory levels in commonly consumed seafood:** See DPSIR assessment for the LEVS sub-division.

~~46.~~41. **CI 21 - Percentage of intestinal enterococci concentration measurements within established standards:** See DPSIR assessment for the LEVS Sub-division.

Levantine Sea Sub-division

~~47.~~42. **EO5 - CI 13 (DIN – Dissolved inorganic nitrogen and TP – total phosphorus) and CI 14 EO5 - CI 13 (DIN – Dissolved inorganic nitrogen and TP (Chla – Chlorophyll a):** Drivers that could impact CIs 13 and 14 are present in the LEVS: Agriculture, Tourism and maritime activities, Coastal urbanization, Sewage discharge, Seawater Desalination, Ports operation and maritime traffic, gas and oil exploration.

~~48.~~43. The complete GES assessment of the AEL Sub-region for CIs 13 and 14 was impossible given the lack of quality-assured, homogenous data that prevented the application of both EQR and simplified EQR assessment methodologies. Therefore, at this stage of 2023 MED QSR preparation, the assessment of eutrophication was performed by evaluating data only for Chl*a* available from the remote sensing COPERNICUS data by applying the simplified G/M comparison assessment methodology (see below assessment findings). The assessment results show that all evaluated assessment zones can be considered in good status regarding satellite derived Chl*a*.

~~49.~~44. Detailed examination showed that only 1 out of 18 SAUs, in the open waters (OW), was classified in non-good status. The SAU is located in the easternmost part of the southern Levantine Sea. The drivers and pressures in this SAU that could impact CI 14 are related to the area being one of the most densely populated areas in the world. Moreover, untreated or partially treated wastewater are discharged along the shoreline, polluting the coastal zone.

~~50.~~45. **EO 9 – CI 17 (TM in sediments and biota, Σ_{16}PAHs, Σ_5PAHs and Σ_7PCBs in sediments):** Using CHASE+, the northern and eastern (NE) LEVS was classified as in-GES for TM in sediments, when the contribution of the two very limited affected areas (off Haifa and off Beirut, see below see below assessment findings) were not taken into account. No assessment could be performed for the southern LEVS as no data were available. The NE LEVS was in-GES for Σ_{16} PAHs in sediments in Israel, Greece and Lebanon and in-GES for Σ_5 PAHs in sediments in Israel, Greece and Türkiye. The LEVS could not be classified based on assessment of Σ_7 PCBs in sediments due to lack of data and their uneven spatial distribution.

~~51.~~46. Regarding TM in sediments, non-GES stations were identified across the NE LEVS as follows: 1) In Israel, Northern Haifa Bay was non-GES (moderate status) and the main element contributing to this classification was Hg. The area is known to be still contaminated by legacy Hg, a pressure resulting from industry driver by ways of contaminated wastewater discharge. Even though there was a vast improvement following pollution abatement measures, the area is still contaminated; 2) In Lebanon, the main area in non-GES (moderate and poor) was off Beirut, in particular the Dora region, followed by area in the North Lebanon, with Cd and Hg concentrations contributing equally to the moderate classification. In Beirut, the drivers contributing to the pressures and state of the coast are urban development and industry, discharge of wastewater through marine outfalls and by riverine discharge of the Beirut River. In addition, dumpsites are present in the Dora region. Tripoli, in northern Lebanon, is known for its artisanal fishing and boat maintenance activities, the latter a driver for TM introduction.

~~52.~~47. Stations in moderate status regarding TM in sediments were found in Cyprus in Larnaka Bay, off Zygi and in Chrisochou Bay Possible drivers are maritime activities and port operations among others. In Greece, two stations were found in moderate status (Koufonisi (S. Crete), Kastelorizo), with Pb and Cd concentrations contributing to this classification. Possible drivers are maritime activities and traffic, and fishing. In Türkiye, 4 stations were classified as in moderate status: Akkuyu, Taşucu, Anamur, Göksu River mouth. Possible drivers are agriculture, marine activities, riverine discharge.

~~53.~~48. Although the areas with data for Σ_{16} PAH in sediments were overall characterized as in-GES, two geographically limited areas with non-GES status were identified. In Israel, at stations close to the locations of drilled wells for gas exploration. The driver was defined as maritime activities, offshore platforms of gas exploration. In Lebanon, off in Beirut. The same drivers contributing to the status of TM in sediments apply also for Σ_{16} PAH.

~~54.~~49. The LEVS sub-division could not be classified based on assessment of Σ_7 PCBs in sediments due to lack of data and their uneven spatial distribution. The Dora region off Beirut was affected with possible drivers similar to TM in sediments: urban development and industry, discharge of wastewater through marine outfalls and by riverine discharge of the Beirut River.

~~55.~~50. IMPACTS. Although drivers and pressures and non-GES statuses were identified for the CI 17 in the LEVS, essentially no impact was detected in the environmental status classification fish and the NE LEVS was classified as in-GES for TM in *M. barbatus*. The only non-GES station (1 out of 15) in poor status was located off Paphos, Cyprus and this classification was due to the concentration of Hg. No data were available for TM in sediments in this area. It should be emphasized, that concentrations not in-GES do not necessarily imply a biotic effect.

~~56.~~51. **CI 18- Level of pollution effects of key contaminants where a cause and effect relationship has been established:** Although drivers that could exert pressure and cause impact on CI18, were identified in the LEVS, no data were available at IMAP-IS to check for impacts in biota. Only two relevant studies in the scientific literature reported data on biomarkers in the LEVS. Both showed indications of possible effect of TM on various biomarkers in the mussel *Ruditapes* decussatus from Port Said (Egypt) and in the fish *M. barbatus, B. boops and T. trachurus* off the coast of Türkiye.

~~57.~~52. **CI 20 - Actual levels of contaminants that have been detected and number of contaminants which have exceeded maximum regulatory levels in commonly consumed seafood:** The CI 20 DPSIR analysis was performed at the level of the entire AEL Sub-region due to the lack of data for the separate analysis of LEVS and AEGS Sub-divisions. Drivers that could exert pressure and cause impact on CI 20 were detected in the AEL. The examination of CI 17 results showed no impact on biota in the LEVS and while no data were reported for biota in the AEGS. In addition, data reported to IMAP-IS for CI 17 for biota in the LEVS were examined based on the concentration limits for the regulated contaminants in the EU, concentrations higher than those used for the CI 17 assessment. No impact was detected on CI 20.

~~58.~~53. Out of the 23 studies found in the literature for the AEL, 87% reported concentrations of TM and organic contaminants below the concentration limits for the regulated contaminants in the EU, 4% reported concentrations above the limits but without risk to human health and 9% reported concentrations above the limits for the regulated contaminants with probable risk to human health.

~~59.~~54. **CI 21 - Percentage of intestinal enterococci concentration measurements within established standards:** The CI21 DPSIR analysis was performed at the level of the entire AEL Sub-region due to the lack of data for the separate analysis of LEVS and AEGS Sub-divisions. Drivers that could exert pressure and cause impact on CI 21 are present in the AEL, among them: Urban coastal development, Tourism, sporting and recreational activities; ports and maritime works, maritime activities. However, data were available only for Israel (2021) and Lebanon in 2019-2021 in the LEVS. All stations in Israel were in excellent category. In Lebanon, 4 out of 38 stations were classified in bad category, all in the Beirut area. Possible drivers are urban development and industry, discharge of wastewater through marine outfalls and by riverine discharge.

The Adriatic Sea Sub-region

~~60.~~55. **EO 5 – CI 13 (DIN – Dissolved inorganic nitrogen and TP – total phosphorus) and CI 14 (Chla – Chlorophyll a):** The detailed status assessment results show that all the SAUs achieve GES conditions (high and good status). For all three parameters, the results show that all SAUs and sub-

SAUs are in GES. The only exceptions are the results for TP in a part of CAS in the Italian offshore coast (Abruzzo region), and the TP on the SAS coastal and offshore zones (Apulia region), that were classified in moderate status. The Abruzzo and Apulia regions were identified as having aquaculture and coastal and maritime tourism. Both drivers were identified as high impact to CIs 13 and 14. Nutrients might be introduced to the area causing pressure and have the possibility to cause eutrophication and impact habitats and biodiversity. In the case of moderate status for TP, it was a localized effect, not affecting the overall assessment status and all SAUs fall under the GES status (high, good). A natural process of nitrogen limitation in the area and subsequent accumulation of phosphorus may be an additional explanation to the moderate assessment. Although the two drivers, aquaculture and coastal and maritime tourism, are present in other areas of the Adriatic Sea, they did not impact CI 13 nor CI 14, as represented by the available data.

~~61.~~56. **EO 9 – CI 17 (TM in sediments and biota, Σ_{16}PAHs in sediments and Σ_7PCBs in sediments and biota):** Overall, the aggregation of the chemical parameters data per SAU in the Adriatic Sub-region classified 80% of the SAUs as in GES (High or Good status), and 20% of the SAUs as non-GES under moderate status.

~~62.~~57. The detailed status assessment results per contaminant per SAU at the 1st level of assessment (no aggregation or integration) showed that in most cases (80% of SAUs) GES conditions are achieved; 9% of the SAUs are classified in moderate status, 6% in poor status and 5% in bad status.

~~63.~~58. For the sediment matrix, the highest contamination is observed from PCBs, PAHs and Hg resulting in non-GES status for 60%, 57% and 27 % of the sub-SAUs, respectively. For the mussels matrix, the highest contamination is observed from PCBs which results in 39% of sub-SAUs in non-GES status.

~~64.~~59. In the NAS, 19% of sub-SAUs are classified as non-GES. The most affected sub-SAUs in the NAS are HRO-0313-BAZ, HRO-0412-PULP and HRO-0423-RILP in Croatia; Emiglia-Romana', 'Fruili-Venezia-Giulia-1' and 'Veneto-1' in Italy. Also, offshore SAUs IT-NAS-O and MAD-Sl-MRU-12 are affected. The NAS subdivision suffers from Hg contamination (moderate status) in sediments and mussels and PCBs (poor status) contamination in sediments.

~~65.~~60. In the CAS, 12% of the SAUs are classified as non-GES. The most affected sub-SAUs are HRO-0313-KASP, HRO-0313-KZ, HRO-0423-KOR in Croatia. The CAS sub-division suffers from Hg (poor status) and PCBs (moderate status) contamination in mussels.

~~66.~~61. In the SAS, 22 % of the SAUs are classified as non-GES. The most affected SAUs are HRO-0313-ZUC, HRO-0423-MOP and HRO-0313-ZUC in Croatia; and MNE-1-N, MNE-1-C, MNE-1-S, MNE-Kotor, in Montenegro which are found in poor or bad conditions regarding several contaminants. The SAS sub-division is affected by Pb (moderate status) and PCBs (moderate status) contamination in mussels.

~~67.~~62. The main drivers that could put pressure on TM in sediments are industry (waste discharge and dumping of waste), tourism (litter, domestic waste water discharge), ports and maritime works (accidental discharges, dredging), shipping traffic (accidental discharges, solid waste disposal). Shipping traffic is extensive in the Adriatic Sea. Dumping area for dredging in Emilia Romagna was also identified.

~~68.~~63. In the southern Adriatic Sea, Albania's coast and offshore SAUs are non-GES concerning Hg in sediments. In Montenegro, Hg, Pb, Σ_{16}PAHs and Σ_7PCBs in sediments were classified as non-GES in the central coastal SAU as well in the Kotor Bay. The project GEF (*Global Environment Facility):* Adriatic Implementation of the Ecosystem Approach in the Adriatic Sea through Marine Spatial Planning, examined in detail the DPSIR elements for Albania and Montenegro marine environment. Those support the results of the NEAT assessment achieved with IMAP monitoring data. In Albania, about 15% of the coastline is urbanized, and tourism is increasing (drivers and pressure). Status. The initial assessment of pollution shows established significant concentrations of mercury and

organochlorinated compounds in some of the assessed areas on the northern and central coast (status). In Montenegro, about 32.5% of the coastline is urbanized, while tourism consists mainly beach goers. Nearshore activities, such as shipyards and ports are also of concern (drivers and pressures). Status. The preliminary assessment of pollution shows higher concentration of contaminants in the coastal area, particularly in Boka Kotorska Bay. The levels of some contaminants exceed the established limit, specifically legacy pollutants such as heavy metals and organohalogen compounds in sediments.

~~69.~~64. IMPACTS. Although drivers and pressures and non-GES statuses were identified for CI 17 in the Adriatic Sea, a few impacts were detected in the environmental status classification of the biota. Moreover, the non-GES status of a contaminant in the biota usually did not correspond to a non-GES status for the contaminant in sediment in the same sub-SAU. In the NAS, sub-SAUs for biota were in non-GES status for Hg and PCBs, with no corresponding non-GES status in the sediment or no data for PCBs in sediments. In 3 instances there was a correspondence between non-GES status for Hg in biota and sediment. In several sub-SAUs, Pb in sediments were non-GES while in-GES in biota. In the CAS there was no correspondence between the status of the sediments and the status of the biota. In the SAS, for 2 sub-SAUs, non-GES status for Pb in sediments corresponds to non-GES status for Pb in biota.

~~70.~~65. **CI 18 - Level of pollution effects of key contaminants where a cause and effect relationship has been established:** Although drivers, that could exert pressure and cause impact on CI 18, were identified in the Adriatic Sea, no data were available at IMAP-IS to check for impacts in biota. One study from the scientific literature reported impact of PAHs on some of the biomarkers measured in the specimens of the fish *Mullus barbatus* collected in an important fishery area in the North Adriatic Sea coming from Rimini to Ancona at a depth of 70 m (Frapiccini et al. 2020).

~~71.~~66. **CI 20 - Actual levels of contaminants that have been detected and number of contaminants which have exceeded maximum regulatory levels in commonly consumed seafood:** Drivers that could exert pressure and cause impact on CI 20 were detected in the Adriatic Sea Sub-region. The examination of CI 17 results showed no impact on biota. In additions, data reported to IMAP-IS for CI 17 for biota were examined based on the concentration limits for the regulated contaminants in the EU, concentrations higher than those used for the CI 17 assessment. No impact was detected on CI 20.

~~72.~~67. Out of the 25 studies found in the literature, 80% reported concentrations of TM and organic contaminants below the concentration limits for the regulated contaminants in the EU, and 8% reported concentrations above the limits but without risk to human health. Possible impact was detected in 12% of the studies that reported concentrations above the limits for the regulated contaminants with probable risk to human health.

~~73.~~68. **CI 21 - Percentage of intestinal enterococci concentration measurements within established standards:** Drivers that could exert pressure and cause impact on CI21 were detected in the Adriatic Sea, and among them the following: Tourism, sporting and recreational activities; ports and maritime works, maritime activities. However, essentially no impact was detected. Most of the bathing waters in the Adriatic were in the excellent and good GES classifications. A small percentage of bathing waters were classified as poor: 1.7% in Italy and 3.5% in Albania.

The Central Mediterranean Sea Sub-region

~~74.~~69. **EO 5 - CI 13 (DIN – Dissolved inorganic nitrogen and TP – total phosphorus) and CI 14 (Chla – Chlorophyll a):** The complete GES assessment of the CEN Sub-region for CIs 13 and 14 was impossible given the lack of quality-assured, homogenous data that prevented the application of both EQR and simplified EQR assessment methodologies. Therefore, the assessment of eutrophication was performed by applying the simplified G/M comparison assessment for evaluation of Chl *a* available from the remote sensing COPERNICUS data (see below assessment findings).

~~75.~~70.The assessment results show that despite the good status assigned to the assessment zones, the 7 out of 36 sub-SAUs are in the good status i.e., GREA, GREAMB, GREPAT, LBY_E, LBY_W, LBY_W; TUN_B in the Eastern and the Southern parts of the CEN Sub-region.

~~76.~~71.The subSAUs in Greece are located in Bays as are Ambracian Gulf (GREAMB), with pressure mainly from agriculture and Gulf of Patras (GREPAT) with pressures that include harbor operations, industries and agriculture. The more Northern subSAU (GREA) is probably influenced by the local sources of pollution (Igumenitsa port and intense aquaculture).

~~77.~~72.Along the Lybian coast, the influenced marine waters are in the western part of Libyan OW (subSAU LBYW), influenced by waters coming from the Gulf of Gabes where human activities contributed to the impact of eutrophication and by the city of Tripoli; in the eastern part of CW (subSAU LBYE). Several pressures that cause impacts of eutrophication are present in the Gulf of Gabes i.e., the subSAU TUNB located in CW: i) Large hurban center, ii) untreated domestic discharges, iii) industrial discharges, among them phosphogypsum, iv) agrochemical industry, v) agriculture.

~~78.~~73.**EO 9 – CI 17 (TM, Σ16PAHs, and Σ5PAHs in sediments)**: It was not possible to classify the Sub-region based on the CHASE+ application due to very limited available data and they uneven areal distribution in the CEN. The assessment was performed by station. Most of the stations were in-GES with respect to TM in sediments. Stations with non-GES status for Σ_{16}PAHs and Σ_{5}PAHs in sediments were identified.

~~79.~~74.Non-GES stations regarding Σ_{5}PAHs in sediments were located at the north-eastern and south-eastern part of Malta, in particular at the Port il- Kbir off Valetta and at the Operational Wied Ghammieq. Drivers and pressures in these areas are industrial plants and marine traffic. Non-GES stations were also located at the in the Gulf of Patras, Gulf or Corinth and in Kerkyraiki.

~~80.~~75.IMPACTS. Drivers and pressures and non-GES statuses were identified for the CI17 in the CEN. However, there were almost no data for contaminants in biota in the CEN. Eight samples of *M. galloprovincialis* were in-GES for TM and 5 samples of *M. barbatus* were classified as non-GES for Hg.

~~81.~~76.**CI 18 - Level of pollution effects of key contaminants where a cause and effect relationship has been established:** Although drivers that could exert pressure and cause impact on CI18, were identified in the CEN, no data were available at IMAP-IS to check for impacts in biota.

~~82.~~77.Examination of the scientific literature on the impact of pollution on biota biomarkers in the CEN found 5 studies for Tunisia and 1 from Italy. Drivers and pressures reported in the studies, encompassed the whole range of them: domestic and industrial discharges, agricultural and riverine runoff, fisheries, harbor and marina utilization, maritime activities, tourism. Studies demonstrated that, in addition to anthropogenic stressors, biomarker responses were influenced also by seasonality, tissue analyzed, spawning status, and on species identity.
~~83.~~78.It should be emphasized that the studies used different biomarkers, with different biota species, measuring in different tissues, and different methodologies. The biomarkers studied were not listed by IMAP, and if listed, not analyzed in the organ or tissue as required by IMAP. Most of the studies measured various biomarkers in the same station, with some showing an effect and others not. All the studies below reported an impact on some of the biomarkers. Therefore, the text below addresses only the areas and species studied, and possible specific drivers, if available, with the knowledge that impact was detected in some of the biomarkers.

~~84.~~79.Tunisia. One mesocosm experiment was performed in Mytilus spp. exposed to sediment contaminated by PAH and TM collected from the Zarzis area, while the effects of hydrocarbons were studied in the mollusc *Ruditapes decussatus* collected from the southern Lagoon of Tunis. The effect of TM on the mollusc *Patella caerulea* was studied in specimens collected from 4 sites in the CEN.

The effect of microplastic ingestion was studied in the fish *Serranus scriba* collected from 6 sites along the Tunisian coast (Zitouni et al. 2020) and on the seaworm *Hediste diversicolor* collected from 8 sites along the Tunisian coast .

~~85.~~80. Italy. The effect of plastic ingestion was studies in the fish *Trachurus trachurus* collected for the Sicily straits.

~~86.~~81. **CI 20 - Actual levels of contaminants that have been detected and number of contaminants which have exceeded maximum regulatory levels in commonly consumed seafood:** Drivers that could exert pressure and cause impact on CI 20 were detected in the CEN. TM data were present for Hg in 5 specimens of *M. barbatus* in IMAP-IS. The concentrations were higher than the thresholds for CI17 but lower than the limits for the regulated Hg in the EU. No studies were found in the literature.

~~87.~~82. **CI 21 - Percentage of intestinal enterococci concentration measurements within established standards.** Drivers that could exert pressure and cause impact on CI 21 are present in the CEN, among them: Urban coastal development, Tourism, sporting and recreational activities; ports and maritime works, maritime activities. No data were available for CI 21 in IMAP-IS.

The Western Mediterranean Sea Sub-region

~~88.~~83. **EO5 – CI 13 (DIN – Dissolved inorganic nitrogen and TP – total phosphorus) and CI 14 (Chl*a* – Chlorophyll a):** The complete GES assessment of the WMS Sub-region for CIs 13 and 14 was impossible given the lack of quality-assured, homogenous data that prevented the application of both EQR and simplified EQR assessment methodologies. Therefore, the assessment of Common Indicator 14: Chl *a* was undertaken in the three Sub-divisions of the Western Mediterranean Sub-region as follows: i) in the Central Sub-division of the Mediterranean Sea Sub-region (CWMS): the Waters of France and the Southern part of the Central CWMS; the Alboran (ALB) and the Levantine Balearic (LEV-BAL) Sub-division: the Waters of Spain by applying the Simplified G/M comparison assessment methodology on the satellite-derived Chl *a* data; and ii) the Tyrrhenian Sea Sub-division and part of the CWMS: the Waters of Italy by applying both the Simplified G/M comparison assessment methodology on the satellite-derived Chl *a* data and the simplified EQR assessment methodology on *in situ* measured Chl a data.

~~89.~~84. Despite the good status assigned to the assessment zones, the assessment findings indicate some sub-SAUs in non-good status. The present assessment of the waters of Spain (see below assessment findings) showed there are 8 out of 70 subSAUs which are non-good status (the evaluation was performed on 70 out of 149 SubSAUs), and which are located close to the Mar Menor; in the Segura River mouth; near Valencia; close to the Ebro River mouth; one area close to the French border; and on the Mallorca Island in the Alcudia Gulf. There is a slight difference between the thresholds calculated from the satellite-derived data used for the present assessment and the assessment criteria calculated from *in situ* measurements (see below assessment findings), which resulted in the regional assessment findings which do not fully match the eutrophication evaluation performed by Spain by applying the assessment criteria calculated from *in situ* measurements. In the waters of Italy, there are 9 out of 54 subSAUs that are in non-good status, and they are located as follows: in front of the Arno River mouth; in front of the Tiber River mouth; close to the Napoli urban agglomeration and SW part of Sardinia Island. In the waters of France, there is 1 subSAU (Golfe de Porto Vecchio) out of the 46 SubSAU in non-good status. For four subSAUs located in the FRD_E Assessment Zone and two in the Corsica Island assessment zone (FRE), the assessment was reconsidered as in good status. In fact, a discrepancy that appeared between the national and sub-regional assessments was addressed further to the justification provided by France which is based on i) the presence of WT I in water body DC04; ii) the presence of WT IIIW in water bodies DC06A; DC07I; DC08B; EC01C; EC04B and DC04; iii) the specific national knowledge of the local hydrological and environmental conditions. Among these 6 water masses, four are located in the FRD-E assessment zone namely DC04 (Golfe de Fos), DC06A (Petite Rade de Marseille), DC07I (Cap de L'estéral – Cap de Brégançon) and DC08B (Ouest Fréjus-Saint Raphaël). Two water masses are located in Corsica Island (FRE) and correspond to EC04B

(Golfe D'Ajaccio) and EC01C (Golfe de Saint Florent). Water mass DC04 (Golfe de Fos) is a highly modified water mass characterised by a high spatial heterogeneity in chl *a* distribution. For other water masses (DC06A, DC07I and DC08B; EF04B and EC01C in Corsica), hydrodynamic studies revealed a very low annual renewal of water masses thus explaining slight accumulation of low phytoplankton biomass levels.

~~90.~~85. The below findings derived from literature sources support the assessment findings as presented in assessment findings which indicate a few spatial assessment units in non-good status[8]. Drivers and pressures with impacts on eutrophication are found in the WMS[9]. The Spanish Mediterranean coastal zone may be affected by eutrophication mainly due to anthropogenic pressures, like agriculture (e.g., in Ebro Delta, rice field cultivation covers up to 65% of the area resulting in outputs of inorganic nutrients to nearby bays through drainage channels and the IMAP sub-SAUs ES100MSPFC32 in the vicinity was likely non-GES), but also by aquaculture, tourism, construction of harbors, intense urbanization, and industrialization. In French Mediterranean coast, the Gulf of Lion is one of the most historically known areas as influenced by natural and anthropogenic inputs of nutrients, receiving a large inputs of rural, urbanized, and industrialized discharges through the Rhone River. However, all sub-SAUs in the area were classified as in good status. The northern coasts of the Balearic Archipelago may be affected by the productivity imported from the Gulf of Lion, showing slightly higher concentration in the offshore north-eastern waters. Indeed, IMAP sub-SAU ES110MSPFMAMCp02 on the Mallorca Island in the Alcudia Gulf was classified as likely non-GES.

~~91.~~86. The Italian Western Mediterranean coast may be affected by riverine discharge e,g., the Arno river (subSAUs ITCWTCD and ITOWTCDoff Livorno), and the Tiber River (sub-SAUs ITCWLZ and ITOWLZC, Rome), as well as by the extensive population, tourism, port operations and industries, like the area of Naples (sub-SAUs ITOWCMC, ITOWCMD, ITCWCMC and ITCWCMD).

~~92.~~87. The Mediterranean Sea hosts around 400 coastal lagoons covering a surface of over 640 000 ha, that are important drivers for regional economies by way of fisheries, aquaculture, tourism. recreation and increased urbanization. One example of a well-studied lagoon is the Mar Menor located in the region of Murcia. The drivers and pressures on Mar Menor include tourism and agriculture along its shoreline and drainage area. In the present assessment the IMAP subSAU. ES070MSPF010300030, located close to the Mar Menor and IMAP subSAU ES080MSPFC017 located near the Segura River mouth were classified in non-good status. In addition, the area of the Gulf of Oristano in western Sardinia, is connected to the Cabras lagoon and may be influence by it (sub-SAU ITCWSDWB).
~~93.~~88. The present regional assessment using satellite-derived Chl *a* classified in non-good status one sub SAU EC03B close to Golfe de Porto Vecchio, located along the northern part of Corsica coast. As elaborated in the assessment findings, the assignment of non-good status can be explained in the context of the low number of pixels integrated into the assessment based on the use of the satellite-derived data along with the water properties complexified with sediment resuspension resulted in the uncertain computation of the mean Chl-a values. Additionally, the enclosed feature of the Gulf of Porto Vecchio with very low water renewal contributes to relatively high Chl concentrations observed in the area[10].

~~94.~~89. Mariculture is also well developed in Italian waters, for example off Genoa and in the Gulf of Follonica, the latter south of Livorno that was classified in non-good status in the present assessment (subSAUs ITCWTCD and ITOWTCD).

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[8] The present assessment undertaken at the regional level, by using the satellite-derived Chl *a* data, indicates also weakened status in a few assessment areas along the coast of France, however, national authorities found that some regional assessment findings do not fully match the national assessments based on the use of *in situ* measurements. A presence of non-optimal matching of the regional and national assessments was also expressed by the authorities of Spain.
[9] Agriculture (runoff and riverine discharge), industry (land based sources; industrial wastewater discharge), aquaculture (coastal shellfish and fish farming activities), coastal urbanization and tourism (domestic wastewater discharge), seawater desalination, ports and maritime operations (dredging).
[10] Giret O., Mayot H., Porcheray C., Salou K., Le Bourhis K. (2023). Bilan des schémas régionaux de développement de l'aquaculture marine. Cerema – DIRM Méditerranée. 38 p.

~~95.~~90. Although the non-good status was not found in the present assessment of the Southern part of the CWMS, it must be recognized that the assessment was impossible at the level of the finest spatial assessment units (subSAUs) due to the absence of finer water bodies delineation and related water typology characterization as for other Sub-divisions in the WMS. Given a less confidential assessment in this part of the WMS, some specific examples of drivers and pressures were mapped from the scientific literature. The Oran harbor (Algeria) which receives the discharge of wastewater, while the Ghazaouet harbor is exposed to chemicals coming mainly from industrial activities. In addition, the high rate of urbanization around the harbor contributes to anthropogenic contamination. Algeria also has seawater desalination plants along its shoreline such as the Bousfer desalination plant in Oran Bay and the Beni Saf desalination plant.

~~96.~~91. **EO 9 - CI 17 (TM in sediments and biota (*M. galloprovincialis)* (ALBS); TM, Σ_{16}PAHs and Σ_7PCBs in sediments and biota (TYRS); TM, Σ_{16}PAHs and Σ_7PCBs in sediments and biota (CWMS)):** The assessment was conducted using NEAT in the ALBS and the TYRS Sub-divisions. A simplified application of NEAT (1st level, without any further spatial integration) was applied to the CWMS. Data were available only for some SAUs for the northern coast sub-division (Spain, France, Italy). No data were available for the southern CWMS coast (Algeria and Tunisia). The WMS assessment was made for the coastal zone, as 91% of data were coastal.

~~97.~~92. Overall, the Alboran Sea (ALBS) and the Tyrrhenian Sea (TYRS) were classified as in GES, in good status regarding all available parameters and SAUs. In the Central Western Mediterranean (CWMS) Sub-division, 6 out of 7 SAUs were classified in high or good statuses and one SAU was classified as non-GES, in moderate status regarding all available parameters.

~~98.~~93. A detailed examination of these classifications is presented here-below.

~~99.~~94. ALBS. The ALBS Sub-division was in GES (high and good statuses) for TM in sediments and for Cd and Pb in biota, and non-GES (moderate status) for Hg in biota sampled along the Spanish coast. In addition, off Morocco, one SAU was in moderate status for Cd in sediments and one in moderate status for Pb in sediments.

~~100.~~95. TYRS. The TYRS Sub-division was in GES (high and good statuses) for TM, Σ_{16}PAHs and Σ_7PCBs in sediments and biota. For the Italian coast several non-GES parameters were identified for some SAUs, as follows: one SAU was in moderate status regarding Cd and Hg in sediments, one SAU in moderate status for Cd in sediments and in poor status for Hg in sediments, and one SAU in moderate status for Cd and Σ_7PCBs.

~~101.~~96. CWMS. Non-GES SAUs for several parameters were identified in the CWMS sub-division as follows: One SAU with moderate Pb in sediment in Spain; in France, one SAU with poor status of Hg in sediments, moderate status for Cd and Hg in biota and poor status for Σ_{16}PAHs in biota; 2 SAUs with poor and moderate statuses for Σ_{16}PAHs in biota; in Italy, one SAU with moderate status for Cd in sediment and poor status for Σ_{16}PAHs and Σ_7PCBs in sediments.

~~102.~~97. Drivers and pressures are found in the WMS: Large Ports and maritime traffic, Coastal urbanization, Tourism, Riverine discharge, Agriculture and aquaculture, Desalination. Some specific examples for drivers and pressures can be found in the scientific literature.

~~103.~~98. IMPACTS. Drivers and pressures and non-GES statuses were identified for CI17 in the WMS however, essentially no impact was detected in the environmental status classification of biota. In the CWMS, for France, moderate status was found for Hg and Pb in biota, at the same SAU with poor status for Hg in the sediment. In addition, moderate and poor statuses were assigned to Σ_{16}PAHs in biota in three SAUs. No concentration of Σ_{16}PAHs in sediment were reported. In the ALBS, for Spain, Hg in biota was in moderate classification. No concentration was reported for Hg in the

sediment. It should be emphasized, that concentrations not in-GES do not necessarily imply a biotic effect.

~~104.~~99. **CI 18 - Level of pollution effects of key contaminants where a cause and effect relationship has been established:** Although drivers that could exert pressure and cause impact on CI18, were identified in the WMS, no data were available at IMAP-IS to check for impacts in biota.

~~105.~~100. Examination of the scientific literature on the impact of pollution on biota biomarkers in the WMS found 4 relevant studies from Algeria, 2 from Italy, 5 from Spain and 4 from Tunisia. Drivers and pressures reported in the studies, encompassed the whole range of them: domestic and industrial discharges, agricultural and riverine runoff, fisheries, harbor and marina utilization, maritime activities, tourism. Studies demonstrated that, in addition to anthropogenic stressors, biomarker responses were influenced also by seasonality, tissue analyzed, spawning status, and on species identity.

~~106.~~101. It should be emphasized that the studies used different biomarkers, with different biota species, measuring in different tissues, and different methodologies. The biomarkers studied were not listed by IMAP, and if listed, not analyzed in the organ or tissue as required by IMAP. Most of the studies measured various biomarkers in the same station, with some showing an effect and others not. All the studies below reported an impact on some of the biomarkers. Therefore, the text below addresses only the areas and species studied, and possible specific drivers, if available, with the knowledge that impact was detected in some of the biomarkers.

~~107.~~102. Algeria: Mussel *Donax trunculus* from Annaba Bay, from 2 impacted sites (Sidi Salem and Echatt) and one reference site (El Battah); fish, *Mullus barbatus* from two impacted sites (Oran, Ghazaouet) and a control site (Kristel), along the Algerian west coast; mussel *Perna perna* transplanted to three sites in the Gulf of Annaba; mussel *Patella rustica* from four sites (3 affected and one reference) off the Bousfer desalination plant (Oran Bay, Algeria).

~~108.~~103. Italy: Fish *Parablennius Sanguinolentus* collected from the port of Bagnara Calabra on the western Calabrian coast of Italy and from a reference site, Jancuia Cove. Stressor – pesticides; mussel, *Mytilus galloprovincialis*, and fish, *Mullus barbatus, Pagellus erythrinus* and *Diplodus vulgaris*, from different stations at the Bay of Pozzuoli, within the Gulf of Naples. Stressors: TM and PAHs.

~~109.~~104. Spain: Three studies conducted near Integrated Multi-Trophic Aquaculture cages in Palma de Majorca as possible driver: two with *Mytilus galloprovincialis*, and one with the fish *Sparus aurata*. In addition, fish, *Seriola dumerili* collected around the Pityusic Islands, (Eivissa and Formentera; Balearic Islands); and European anchovy (*Engraulis encrasicolus*) collected at three areas off Catalonia (Spain): Barcelona, Tarragona and Blanes.

~~110.~~105. Tunisia: Scallop *Flexopecten glaber* were collected from the entrance to the Bizerte Lagoon and a site located near Menzel Abderrahmen, contaminated by inputs from the surrounded industrial manufactories and urban agglomerations; polychaete *Perinereis cultrifera* collected from the port of Rades and the Punic port of Carthage, S2; fish *Serranus scriba* were sampled from 6 sites along the Tunisian coast (2 WMS and 4 CEN). Stressor, microplastic ingestion as a potential vector for the transmission of adsorbed environmental chemicals to marine organisms; seaworm (*Hediste diversicolor)* from eight sites along the Tunisian coasts (2 WMS and 6 CEN), affected by different anthropogenic stresses. Stressor analyzed – microplastic ingestion.

~~111.~~106. **CI 20 - Actual levels of contaminants that have been detected and number of contaminants which have exceeded maximum regulatory levels in commonly consumed seafood:** Drivers that could exert pressure and cause impact on CI 20 were detected in the Western Mediterranean Sea. The examination of CI 17 results showed no impact on biota. In additions, data reported to IMAP-IS for CI 17 for biota were examined based on the concentration limits for the

regulated contaminants in the EU, concentrations higher than those used for the CI17 assessment. No impact was detected on CI-20.

~~112.~~107. Out of the 37 studies found in the literature, 78% reported concentrations of TM and organic contaminants below the concentration limits for the regulated contaminants in the EU and 11% reported concentrations above the limits but without risk to human health. Possible impact was detected in 11% of the studies that reported concentrations above the limits for the regulated contaminants with probable risk to human health.

~~113.~~108. **CI 21 - Percentage of intestinal enterococci concentration measurements within established standards**: Drivers that could exert pressure and cause impact on CI 21 were detected in the Western Mediterranean Sea, and among them the following: Tourism, sporting and recreational activities; ports and maritime works, maritime activities. However, essentially no impact was detected. Most of the bathing waters in Spain, France and Italy were in the excellent and good GES classifications. A small percentage of bathing waters were classified as poor category: 0.1% in Spain, 1% in France, 1.7% in Italy. In Morocco, 20 out of 1**31** stations (1**5**%) were classified as in bad status. Data were not available for Algeria and Tunisia.

Measures and actions required to achieve GES for EO5 and EO9

The knowledge gaps common to IMAP Ecological Objectives 5 and 9

~~114.~~109. There was a vast improvement in the spatial coverage of data reported for IMAP Pollution Common Indicators into IMAP IS since the last 2017 MED QSR. However, data availability is characterized by significant data inhomogeneity, and uneven data distribution along the Mediterranean region, with areas with satisfactory data availability and with areas for which only a few or no data were reported. The following key observations pertain to specific IMAP Pollution Common Indicators:

a) CIs 13&14. The data most lacking are for total phosphorous. Data for all mandatory parameters i.e., the concentration of ammonium, nitrite, nitrate, total nitrogen, orthophosphate, total phosphorus, orthosilicate and chlorophyll a, temperature, salinity, dissolved oxygen and water transparency (Secchi depth), are needed for the Central Mediterranean Sea Sub-region (CEN); the southern part of the Levantine Sea, the sub-division of the Aegean-Levantine Sea Sub-region; and the southern part of the Central part of the Western Mediterranean Sea Sub-region (WMS) which are underrepresented in the IMAP database.
b) CI 17. The data most lacking were for organic contaminants in sediments and biota for all four Mediterranean Sub-regions, followed by trace metals in biota *(M. galloprovincialis and M. barbatus)*. As well as for CIs 13&14, data for all the parameters of CI 17 are needed for the CEN Sub-region; the southern part of the LEVS sub-division; and the southern part of the Central part of the Western Mediterranean Sea (CWMS) sub-division.
c) CI 18. No data were available in IMAP IS for the preparation of the 2023 MED QSR. Therefore, no improvement in the assessment of CI 18 was achieved since the 2017 MED QSR, and the GES assessment was impossible within the preparation of the 2023 MED QSR. Instead, the assessment was performed based on bibliographic studies, as in the 2017 MED QSR, using newer available scientific literature i.e., the studies on biomarkers in the Mediterranean Sea since 2016. It should also be emphasized that data from studies could not be compared to BACs and EACs values as agreed for CI 18 by Decisions IG.22/7 (COP 19) and IG.23/6 (COP 20) as they were not measured in the specific tissue of *M. galloprovincialis*. Moreover, comparison among the bibliographic studies was mostly impossible. This is due to using different biomarkers, with different biota species, using different tissues, and different methodologies. The confounding factors that hinder environmental status assessment i.e., species, gender, maturation status, season, and temperature were re-confirmed as found in the 2017 MED QSR. In addition, an inherent bias exists in publications toward studies showing an

effect. Authors and journals do not usually publish studies showing the lack of effect or response.

d) CI 20. No data were available in IMAP IS to undertake GES CI 20 assessment within the preparation of the 2023 MED QSR. Therefore, the environmental assessment could only be performed by combining the two approaches: i) assessment of the status based on data reported to IMAP IS for CI 17 contaminants in biota, and ii) assessment of the present status based on bibliographic studies, following the same approach applied for preparation of the 2017 MED QSR; however, by using newer available scientific literature. It should also be recognized that due to the lack of data, the rule was not set for assigning the GES/non-GES to the areas assessed further to the use of the EU maximum levels for certain contaminants in foodstuffs, approved as the assessment criteria for CI 20.
e) CI 21. Very limited data were available in IMAP IS to undertake GES CI 21 assessment within the preparation of the 2023 MED QSR. Most of the data were available through EEA and not through IMAP IS.

~~115.~~110. The policy measures to address the common knowledge gaps:

a) Increase of data availability and capacity building programmes to address the knowledge and technical gaps of national IMAP Pollution competent laboratories. In this context, the assessment of the capacities of national IMAP Pollution competent laboratories should continue as a biennial effort aimed at gradual improvement of their performances with a view of reaching optimal compliance of data processing and reporting. To this end, a thorough mapping of the specific needs of each CP should be performed with the view of developing and implementing a tailored capacity building process and optimising financial support.
b) Further harmonize laboratories' performance in line with the IMAP Monitoring Guidelines in order to increase the representativeness and accuracy of the analytical results for generation of quality-assured monitoring data;
c) Improve availability of appropriate analytical equipment to strengthen technical capacities of national IMAP Pollution competent laboratories;
d) Increase consistency of biota sampling along with the application of Quality Assurance measures;
e) Increase accessibility to quality assurance tools, such as inter-laboratory comparisons (ILCs), proficiency tests (PTs), or certified reference materials (CRMs), and ensure overall support and capacity building in a coordinated manner with supporting institutions and laboratories (e.g., organization of training courses and proficiency testing for legacy and emerging contaminants (e.g., metals and organics)).
f) Improve DPSIR analysis: DPSIR analysis needs to be improved by supporting the CPs to regularly provide relevant information and share the knowledge which in principle may be ensured by i) reporting information on DPSIR, along with national monitoring data, and compatibly with data reporting for National Action Plans` indicators; ii) ensuring assistance of the local experts, through the CPs, regarding the identification of specific DPs and their impacts; and iii) complementing DPSIR information reporting with data from the scientific literature and national reports.
g) Monitor the effectiveness of the technical and policy measures for areas class classified as likely non-GES or non-GES.
h) Optimally address the impacts of DPs and tailor the responses within the regional plans and national action plans to the needs of continual improvement of the marine environment status.

The general measures to prevent and abate pollution towards the good environmental status of the Mediterranean:

~~116.~~111. Pollution prevention needs to be encouraged instead of environmental remediation. This could be achieved by reducing and eliminating the use and discharge of known harmful substances, regulating the emergence of new substances with mandatory environmental and social impact

assessments, recycling and using biodegradable green compounds, along with planning emergency responses in case of accidental pollution events.

~~117.~~112. Identification of legacy pollutants[11] in the environment is needed, whereby it should be ensured that they are not currently being introduced into the environment. While the mitigation of current pollutants entails measures at the source of pollution, the mitigation of legacy pollutants takes place *in situ*. The latter includes the study of transport and distribution of pollutants in the environment, the use of technologies for pollutants removal from the environment, and bioremediation.

~~118.~~113. Strengthened use of the Best available technology (BAT) is needed to prevent and control pollution, along with the Best environmental Practice (BEP) to support the most appropriate combination of environmental control measures and strategies to prevent and control pollution.

~~119.~~114. Transition to the blue economy needs to support the sustainable use of ocean resources for economic growth, improved livelihoods, and jobs while preserving the health of the ocean ecosystem.

~~120.~~115. Move towards the circular economy and sustainability needs to support the achievement of zero pollution through recycling. It entails markets that give incentives to reusing products, rather than disposing and then extracting new resources. Major changes in production and consumption patterns are needed, with a focus on climate change concerns, biodiversity protection and ecosystem restoration.

~~121.~~116. **Regional policy integration is of utmost importance since marine pollution has no borders, and therefore strengthening regional cooperation is necessary, advocating common environmental policies.**

The specific measures to prevent and abate pollution towards the good environmental status of the Mediterranean:

~~122.~~117. Aquaculture. There are several strategies and guidelines developed by FAO to assist a sustainable growth for aquaculture sector, including the Ecosystem-based Approach to Fisheries and Aquaculture aiming to assist and set limits for aquaculture production given the environmental limits and social acceptability of sector. In this context it is recommended to apply the following key three principles of the FAO/GFCM strategy:

a) Aquaculture development and management should take account the full range of ecosystem functions and services and should not threaten the sustained delivery of these to society;
b) Aquaculture should improve human well-being and equity for all relevant stakeholders; and
c) Aquaculture should be developed in the context of other sectors, policies and goals. In this regard, UNEP/MAP-MED POL is preparing a Regional Plan for Aquaculture Management for adoption by COP 23 advocating the below measures.

~~123.~~118. Nutrient reduction, of relevance to addressing several DPs, should follow a more cyclic approach to produce, use and treat nutrients in treatment plants, where recycling and reuse are enhanced instead of environmental discharge. This is true for nitrogen and in particular for phosphorus, which has finite reserves in the environment. Policy and regulatory instruments could include more strict regulation of nutrient removal from wastewater, mandatory nutrient management plans in agriculture, and enhanced regulation of manure.

~~124.~~119. Tourism and Coastal urbanization. Measures should focus on the improvement of waste treatment, sustainable management of coastal areas to reduce disruption of coastal ecosystems,

[11] Legacy pollutants are substances that remain in the environment long after they were introduced and after pollution abatement measures were applied or their use was banned.

investment in habitat conservation and restoration to provide ecosystem services, along with implementation of the ICZM tools. Sustainable tourism and urbanization require monitoring and decision-making feedback, improvement of communal infrastructure, environmental coastal spatial and marine spatial planning, as well as the optimal environmental impact assessments, carrying capacity, adaptation to impacts of climate changes, etc.

~~125.~~120. Industry. Measures should focus on the improvement of waste treatment and on upgrade of the industry to the use of BAT and BEP. In addition, resources should be used in the context of a circular economy, with the reduction, reuse and recycling of waste, and shifting towards the production and use of greener substances.

~~126.~~121. Agriculture. Responses to the impacts of agriculture are difficult to manage because of the diffusive i.e. non-point sources introduction of nutrients and agrochemicals into the marine environment. Responses should include the management of river runoffs, the reduction of the use of toxic and bio accumulative agrochemicals, the transition to greener fertilizers and biodegradable pesticides and organic farming.

~~127.~~122. Marine traffic and marine and port operations. The responses should focus on improving the technology of ships and ports operations and of ports infrastructure. Use of BAT and BEP to ensure effective onboard and port pollution control facilities, to prevent accidental discharges and spillages. Specifically, for marine traffic, the designation of restricted areas for anchorage and protection of sensitive areas are encouraged. Implementation of the measures related to the designation of the Mediterranean Sea as a Sulphur emission control area (SECA) is expected to generate significant benefits in both pollution reduction and ecosystem protection. However, the introduction of exhaust gas cleaning systems EGCS – scrubbers on ships in the Mediterranean, as alternative abatement technology for air emission of Sulphur region, may generate a new stream of shipping liquid wastes, in which metals and PAH discharges dominate from ships, that is the chemical air pollution transferred and transformed into marine pollution. This is because the use of open- loop EGCS on ships might be conflicting with Article 195 of United Nations Convention on the Law of the Sea UNCLOS i.e., "duty not to transfer damage or hazards or transform one type of pollution into another" (UNCLOS 1994), whereas scrubber-equipped vessels accept to transfer and to transform air pollution into marine pollution~~may generate a new stream of shipping liquid wastes, in which metals and PAH discharges dominate from ships, that is the chemical pollution transferred~~ .

The technical measures specifically related to the knowledge gaps identified for IMAP Common Indicators of Ecological Objectives 5 and 9

123. In addition to the above policy and technical measures that are common at the level of IMAP Pollution and Marine Litter Cluster, the specific knowledge gaps were identified per individual Common Indicators and therefore the specific technical measures are proposed as provided here below.

Common Indicators 13 and 14

Improve the availability of the assessment criteria for CIs 13 and 14:

124. Upon setting the reference conditions and boundary values for DIN and TP in the Adriatic Sea Sub-region, actions need to be undertaken to improve the availability of the assessment criteria for nutrients in the AEL, the CEN and the WMS Sub-regions. To that purpose three continuous years of monitoring need to be provided with a minimum monthly frequency for Water types I and II and bimonthly to seasonal for Type III. It should also be noted that other supporting parameters (i.e., temperature, salinity and dissolved oxygen) need to be available for defining the water typology.

Further update of the assessment criteria for CI 14 should be undertaken as appropriate. The specific knowledge needs to be also built regarding the use of statistical tools for data validation and calculation of the assessment criteria.

Improve the GES assessment:

125. Further to the above elaborated common measures, the GES assessment for CIs 13 & 14 needs to be also improved, including the use of the remote sensing and modelling tools to complement in situ monitoring and adding additional sub-indicator i.e., the satellite-derived Chla data for GES assessment.

Upgrade present policy measures:

~~128.~~126. For the development of the adaptive eutrophication management strategies, the following specific actions should also be undertaken:

- Extend the scope of research and monitoring programs to characterize the effects of eutrophication;
- Implement regulations to mitigate inputs of nutrient to the marine environment, such as standards, technology requirements, or pollution caps for various sectors.
- Preserve and restore natural ecosystems that capture and cycle nutrients.

Common Indicator 17

Update of Environmental Assessment Criteria (EACs):

127. In order to update EACs, the methodology, as detailed in the European Commission Guidance Document (2018) and in Long et al. (1995), should be considered. This entails the creation of a database of scientific literature which elaborates where adverse biological effects, or no effect, are presented in conjunction with chemical data, in the environment and biota, at the same site and time. Briefly, those include but are not limited to sediment toxicity tests, aquatic toxicity tests in conjunction with equilibrium partitioning (EqP) and field, and mesocosm studies. The literature would then be analysed by experts and conclusions drawn. Laboratory results on biomarkers (CI18) are also important for the derivation of the EAC values. The emphasis should be given to the Mediterranean Sea biota species.

Undertake regular updates of Sub-regional and regional Background Concentrations (BCs) and Background Assessment Criteria (BACs):

128. As more data will be submitted to IMAP IS, the Sub-regional and regional BCs should be updated. It is proposed to undertake their regular updates at least 2 years prior to the QSRs preparation. This will allow for sufficient time to analyse the data, detect data gaps and ensure the submission of missing data, to perform a more robust update of the criteria for reliable assessments.

129. The methodology for BACs calculation should be revised and updated. BACs are calculated from BCs by applying the multiplication factors. Due to the lack of Mediterranean data, UNEP/MAP adopted the pragmatic methodology used by OSPAR[12]. Therefore, the precision of monitoring per CP should be calculated and used to set the multiplication factors specific for the Mediterranean.

Improve the GES assessment:

[12] OSPAR calculated the ratio between BAC and BC (the multiplication factor) from known parameters. The pragmatic approach used in order to have 90% probability of concluding that concentration is below provided for BAC, BAC = BC exp (3.18 CV), where CV is the precision of the monitoring program (per determinant and matrix). In the case of OSPAR, temporal monitoring data from the UK National Marine Monitoring Programme was considered.

130. Revision of IMAP needs to support the improvement of the good environmental status assessment and contribute to a more robust analysis, and facilitate integration and aggregation of CI 17 with other CIs and EOs, by undertaking the following priority actions:

- Update list of priority pollutants. Measurements of known contaminants of concern, such as As and Cu, and emerging contaminants of concern, such as pharmaceuticals and flame retardants should be considered for inclusion in the IMAP Pollution monitoring. This process should follow the initial steps undertaken in 2019[13]. The updated List of Priority Contaminants could provide the basis for a prioritization of substances to be further included in the IMAP Guidance Factsheets related to Ecological Objective 9, and complement presently agreed mandatory or recommended substances for CIs 17 and 20. The decision on which contaminant to add should be based on pilot studies checking the probability of their presence in the Mediterranean Sea sub-regions.
- Extend the list of commonly agreed IMAP Pollution mandatory species. Species, other than species (M. galloprovincialis and M. barbatus) presently mandatory, should be added to the IMAP list. The species should be chosen based on their presence in the Sub-regions and their relevance as pollution indicators, which in turn will allow for an improved environmental assessment. Harmonization of the use of different species in different Sub-regions needs to be followed by setting the criteria (BCs and BACs) specific to each species.
- Utilize tools to perform Environmental Risk Analysis, to integrate chemical and biological data, as elaborated here-below for CI 18.
- Revise sediments` temporal monitoring requirements. For hot spot stations, the monitoring should remain every year or 2 years, while for other stations, the monitoring once or twice during the 6-year cycle should be considered.
- Harmonize national efforts regarding contaminants monitoring. As a minimum, it is necessary to ensure that every CP reports all mandatory parameters in mandatory matrixes, including the wet weight for mussels, LOD or LOQ values, the grain size of samples for sediments, and spatial and temporal monitoring requirements. The significant differences among the countries in terms of LOD and LOQ values, as well as differences among the areas of monitoring in the same CP, need to be analyzed and drivers of the unsatisfactory analytical performance identified.

Common Indicator 18

Ensure the GES assessment for CI 18:

131. Revision of IMAP needs to support the good environmental status assessment for CI 18 and facilitate its integration and aggregation with other CIs and EOs, by undertaking the following priority actions:

- Review and update the list of CI 18 biomarkers, along with the monitoring species;
- Review and update, as appropriate, the assessment criteria as adopted by Decisions IG.22/7 (COP 19) and IG.23/6 (COP 20), as well as the assessment methodologies;
- Further to the initial work undertaken in 2021[14] towards the development of the Biomonitoring related to IMAP CI 18, the following further actions should be tested:
    i) An application of new biomarkers should be explored to support the strengthening of CI 18 monitoring and assessment.
    ii) Use of the Environmental Risk Analysis should be provided by combing the chemical and ecotoxicological data, to support the evaluation of the risk

[13] UNEP/MED WG.463/Inf.4. The List of Priority Contaminants under MAP/Barcelona Convention within the MED POL Monitoring Programme and IMAP have been revised according the latest lists of priority contaminants development in the EU region and internationally and shows no major changes compared to other RSCs.
[14] UNEP/MED WG.492/6

related to marine organisms exposed to contaminated waters and sediments. It should result in objective risk values which allow national and regional policymakers and environmental managers to decide on the actions to decrease marine contamination, or to remediate a polluted area.

Common Indicator 19

Improve quantity and quality of data for CI 19

- REMPEC to continue soliciting the submission of the report on incidents and spills from the Countries, underlining the importance to make use of the latest version of the Data Dictionary and Data Standard (DD&DS) prepared by REMPEC jointly with INFORAC and providing to any extent possible all the data required in DD&DS, including estimation of quantity and volume of oil or other substances released.
- -The Countries to start collecting data on impacts on biota with reference to the above-mentioned updated version of DD&DS for CI 19.
- -The UNEP/MAP – REMPEC to align the definition of the minimum threshold for reporting with the one used under other regional sea conventions and in the framework of MSFD.
- -UNEP/MAP - REMPEC to continue to integrate newly available Lloyds data in MEDGIS-MAR database. UNEP/MAP - REMPEC to prepare a comprehensive, integrated database, considering also old data, based on these two databases, cross-checking and resolving data duplication and inconsistencies.
- UNEP/MAP - REMPEC to continue acquiring information and understanding about CleanSeaNet dataset and assessing the feasibility to integrate CleanSeaNet data for the Mediterranean in MEGIS-MAR.

Improve the GES assessment of CI 19

- The definition of "acute pollution events" is highly debated under the Marine Strategy Framework Directive and other Regional Sea Programmes and Agreements, in particular the Bonn agreement. It remains a complex issue for which consensus has yet to be reached.
- Additional work should be undertaken by UNEP/MAP - REMPEC and the Contracting Parties to define operational criteria for the identification of acute pollution events. An integrated and escalating approach should be adopted, considering, among others, factors like the spilled volume, the nature of the spilled product(s), the proximity and sensitivity of threatened areas and/or human activities, the environmental conditions (i.e. evidence of an environmental impact), and the need for response operations.
- Based on data collected on impacts on biota, UNEP/MAP - REMPEC and the Contracting Parties should work towards the definition of assessment criteria for CI 19 including biota as component, if possible, in coordination with other regional sea conventions.

Common Indicator 20

Ensure the GES assessment for CI 20:

132. A multidisciplinary approach will be needed to ensure GES assessment for CI 20 by undertaking the following priority actions:

- Agree on the maximal percentage of detected regulated contaminants exceeding regulatory limits in seafood, above which non-GES needs to be assigned to the area assessed;
- Incorporate the risk assessments to human health from consumption of seafood by calculating the estimated daily intake (EDI), the target hazard quotient (THQ), the total health risk (HI), and the cancer risk, among others;
- Incorporate into the overall evaluation the suite of contaminants analyzed, together with other factors such as synergy among contaminants, and temporal and spatial scales.

- Harmonize the choice of species among the CPs, whereby data from national reports on seafood safety and cooperation with national health authorities should be used to complement data reporting to IMAP IS;
- Examine and coordinate monitoring protocols, risk-based approaches, analytical testing, and assessment methodologies between the CPs; the national food safety authorities; research organisations and/or environmental agencies;
- Determine the applicability of CI 20 beyond food consumer protection and public health, although it intuitively reflects the health status of the marine environment in terms of delivery of benefits (e.g., fisheries industry).

Common Indicator 21

Improve the GES assessment for CI 21:

133. An optimal GES assessment for CI 21 needs to be strengthened by optimal data reporting which will ensure the confidence of the assessment. At least, 16 data points for 4 consecutive bathing seasons are needed for the application of the uniform assessment methodology across the Mediterranean; therefore, increasing the comparability and consistency of the assessment findings.

Candidate Common Indicators 26 & 27

Improve underwater noise data quality and availability

134. For the improvement of underwater noise data quality and availability, the following specific actions should be undertaken by the Parties:

- A contribution should be provided to the ACCOBAMS regional register for impulsive noise sources, especially by sharing national data, along with the development of a cooperation mechanism to identify the source of long-distance underwater noise in order to address its long-distance effects;
- Reporting noise generating military activities is needed to provide an actual and precise assessment reflecting the real situation;
- An alternative approach needs to be tested by applying specific assessments for species and their habitats. For such an exercise, Important Marine Mammal Areas (IMMA) could be used as defined habitats.

135. Implement International and Regional management measures to reduce underwater noise:

I. Further to the above there is a need to implement measures to prevent, reduce, and mitigate underwater noise emissions, taking into account well developed guidance (e.g. CMS, IMO, Oceans, ACCOBAMS, etc), including the following:

a) Promote the application of vessel speed reductions by supporting for example ship speed limits in the proposed North-Western Mediterranean Particularly Sensitive Sea Areas (PSSA);
b) Address the issue of anthropogenic noise in the marine environment, including cumulative effects;
c) Integrate the issue of anthropogenic noise in management plans for marine protected areas and avoid or minimize producing noise in MPAs, and in areas containing critical habitat of cetaceans likely to be affected by man-made noise;
d) Apply the precautionary approach and envisage the appropriate mitigation measures, including a provision of expert review by specialists and a provision of the action to be taken if unusual events, such as atypical mass strandings, occur;
e) Support NETCCOBAMS that would be a crucial tool for monitoring a compliance of the agreed measures, such as vessel speed, mapping temporal and geographical distribution and abundance of whales with comparable data on shipping routes and densities.

~~129.~~136. Apply Best Available Technologies and Best Environmental Practices:

II. For marine traffic, the following noise related technologies and BATs should be applied:

a) Minimize cavitation, e.g., better maintenance and optimizing the propeller design;
b) Slow steaming or reduce ship speed;
c) Implement underwater noise management plans developed for individual vessels.

III. For seismic air gun surveys, the following technologies and BATs should be applied:

a) Quieting technologies, and controlled sound source, like Marine Vibroseis, tailor-made to the specific environmental conditions and without the damaging sharp rise time of air guns;
b) Mitigation measures (avoiding sensitive areas and times and not proceeding in conditions of poor visibility, such as at night).”

Ecological Objective 10 (EO10) on Marine litter (Marine litter does not adversely affect the coastal and marine environment)
Common Indicator 22: Trends in the amount of litter washed ashore and/or deposited on coastlines
Common Indicator 23: Trends in the amount of litter in the water column including microplastics and on the seafloor

Common Indicator 22: Trends in the amount of litter washed ashore and/or deposited on coastlines

~~130.~~137. According to the available data and information in relation to the Trends in the amount of litter washed ashore and/or deposited on coastlines (IMAP EO10 CI22), only 16% of the monitored beaches achieve GES, 79% do not achieve GES of which 29% fall into the poor status class and 25% in to the bad one. The most commonly found marine litter items in the Mediterranean are Plastic/polystyrene pieces (2.5 cm – 50 cm), followed by cigarette butts and filters, and plastic caps and lids. These 3 items account for approximately 60% of the recorded marine litter.

Common Indicator 23: Trends in the amount of litter in the water column including microplastics and on the seafloor

~~131.~~138. The assessment regarding Floating Marine Litter (IMAP EO10 CI23) revealed that almost all stations (99%) that have been monitored do not achieve GES, and most of them fall into the poor (44 %) and bad (49 %) status classes. The Mediterranean region and its subregions suffer from elevated microplastics concentrations in surface waters, reaching up to 100 times and 1000 times higher than the IMAP TV and the Average floating microplastics concentration on the Mediterranean Sea surface is found equal to 0.36 ± 1.9 items/m2. The most recorded categories of floating microplastics are Sheets (37%), followed by Filaments (30%), Pellets (21%), Fragments (7%), Foam (4%), and Granules (1%).

~~132.~~139. The data provided by the ACCOBAMS Aerial Survey Initiative (ASI) regarding floating mega-litter showed that during the summer 2018 only 20% of the Mediterranean was free of floating mega-litter. The estimated presence probability was highest in the central and western Mediterranean, in the Tyrrhenian, northern Ionian, and Adriatic Seas and in the Gulf of Gabes (> 80%). The lowest presence probabilities occurred in the Levantine basin, in the southern Ionian Sea and in the Gulf of Lion (< 50%).

~~133.~~140. The ASI data showed also an average encounter rate of 0.8 mega-debris per km, ranging between 0 and 111 litter items per km. The total number of floating mega-litter was estimated at 2.9 million items (80% confidence interval was 2.7 to 3.1 million) and average density 1.5±0.1 items per km2. More than two thirds of the recorded items were identified as plastics (68.5%; e.g., plastic bags, bottles, tarpaulins, palettes, inflatable beach toys, etc.), while 1.7% were fishery debris and 1.9% were anthropogenic wood-trash. The remaining quarter (27.9%) was anthropogenic mega-litter of an undetermined nature.

~~134.~~141. For the Seafloor Marine litter component of the IMAP EO10 CI23, the majority (88%) of the seafloor stations monitored do not achieve GES, and most of them fall into the poor and bad status classes (23% and 53% respectively). The average seafloor litter concentration on the Mediterranean coastline is found equal to 570 ± 2,588 items/km2. Up to 10% of the total recorded marine litter is represented by fisheries related items: Synthetic ropes/strapping bands (39%), Fishing nets (polymers) (27%) and Fishing lines (polymers) (25%).

Measures and actions required to maintain/achieve GES EO10

142. A number of measures are proposed to address the assessment findings, including for knowledge gaps as well as for tailored action for specific marine litter items and sources.

~~135.~~143. Monitoring and assessment should be further linked and connected with the implementation of measures. Specific and well-elaborated findings can provide the basis for the implementation of targeted measures.

~~136.~~144. Although the presence of marine litter in the Mediterranean is variable, tackling few items may yield promising and encouraging results pertinent to the health status of the marine and coastal environment.

~~137.~~145. Cigarette butts and filters are predominant in the Mediterranean beaches and primarily require a behavioral change along with the implementation of strong anti-smoking policies and measures, including a strengthen communication campaign linking the damage in human health with the damage in the marine environment. Cigarette filters do not contain only plastic, but also a cocktail of toxic substances (e.g., arsenic, lead, nicotine and pesticides, etc.) for which their effects in the marine biota and the marine environment still are unknown. The engagement of the cigarette companies in this process is of great importance, including their potential inclusion in a "polluters-pay" principle.

~~138.~~146. The vast presence of plastic bottles being documented by the third main item on the Mediterranean beaches, comprising of plastic caps and lids, the introduction of sound alternatives and incentivizing the use of re-use caps could be among the possible options. Strengthening recycling and Extended Producer Responsibility schemes, targeted and tailored to tackle plastic bottles are also part of the solution, including the minimization of the small-sized bottles (<0.5 litters) which are easier to escape in the marine and coastal environment.

~~139.~~147. Microplastics of various types and shapes are escaping into the marine and coastal environment through wastewater treatment plants (WWTP). The Regional Plan on Sewage Sludge Management gives particular attention to the presence and effective management of microplastics on Pharmaceuticals and Personal Care Products (PPCP) (e.g., lotions, soaps, facial and body scrubs and toothpaste) being present in sewage sludge and proposes methods for reduction at the source as provided hereunder:

a) Regulatory approvals for new products potentially harmful to the environment to be introduced for most/all of personal care materials or detergents. However, the said measure may be difficult to be applied for medication products.
b) Education on the correct use of substances containing drugs, and especially the use of the right dose without excess, including ecolabels to raise awareness of ecological impacts of PPCPs.
c) Encouraging the return of unused or expired pharmaceuticals to specific collection points; and
d) Subjecting wastewater originating from pharmaceutical industries, hospitals or healthcare centres to regulations that limit the concentration of organic pollutants in their effluents.

~~140.~~148. Wastewater treatment plants are essentially taking the microplastics out of the wastewater and concentrating them in the sludge. Therefore, sludge management is of great importance for microplastic removal. Controls should be exercised however on the subsequent use of sludge. Measures that can contribute toward reducing sewage concentrations of microplastics include:

a) Bans on single-use plastics and microplastics in personal care and cosmetic products;
b) Behavior changes and campaigns to reduce the use of such products;
c) Certain textile designs can reduce microfibre generation during washing;
d) Development of household-based systems to prevent microplastics from being released into sewer lines or directly into the environment; and
e) Incineration of sewage sludge to avoid soil and water contamination by microplastics. Care should be exercised however to monitor and regulate pollutants in air emissions with a view to minimise these emissions as much as possible.

~~141.~~149. As rivers in most of the cases is the final repository of litter coming from the various land-based sources the application of measures on land are very relevant for the control and effective management of litter in riverine systems. A Conceptual flow of plastic from production to consumption, waste management and leakage into the environment (i.e., land, rivers and ocean), including possible points of action for policies should be considered. Minimizing leakage on land will subsequently minimize the riverine inputs deriving from wind and rain transportation, as well as from direct dumping and sewerage, and will further reduce the amount of plastics (incl. microplastics) entering the ocean.

~~142.~~150. Storm water is an important contributor of riverine inputs of marine litter especially for the Mediterranean where seasonal, on several occasions extreme, weather events take place such as flash floods. A more systematic approach should be also offered when developing urban storm water management plans. Those plans typically address how urban storm water quantity and quality should be managed to protect ecological, social/cultural, and economic values. Urban storm water management plans are used to assist decision making to ensure that remedial measures (structural and non-structural) in existing developed areas are undertaken in a cost-effective, integrated and coordinated manner, and that decisions in relation to areas of new expansion (including redevelopment) are made with the implications for storm water impacts taken into account in order to achieve the quality goals for water bodies.

~~143.~~151. In addition, it would be valuable to close the knowledge gaps by gathering comparable information across the Mediterranean on the extent of storm water overflows from combined collection systems, which should include inventory of the locations of overflow structures, inventory of functioning of the overflow structures, inventory of sewage storage capacity structures (e.g. starting with agglomerations of more than 100,000 p.e.), with the aim of acquiring better understanding of the occurrence of storm water overflows and their impacts on the quality of receiving water bodies.

~~144.~~152. Promoting Sustainable Urban Drainage Systems (SUDS) is another measure which aims to minimize the impervious cover by promoting infiltration, ponding, and harvesting of storm water runoff. Furthermore, in this decentralized management approach, storm water runoff and pollution are primarily controlled by measures located near the source to strive towards well-integrated measures that perform multiple functions, including flood protection, pollution removal and groundwater recharge, as well as recreation, biodiversity and urban aesthetics.

~~145.~~153. Although most of the marine litter in the Mediterranean region originates from land-based sources, studies confirmed that ship-originated litter are found at sites under major shipping routes and lost fishing gear are also recognized as an important source of marine litter in the region.

~~146.~~154. Through the updated Regional Plan on Marine Litter Management in the Mediterranean, the Contracting Parties of the Barcelona Convention have set measures and a timetable to be implemented in relation to sea-based sources of marine litter, especially related to the establishment of best practices to create incentives for fishing vessels to retrieve derelict fishing gear, collect other items of marine litter, and deliver it to port reception facilities. It also presents incentives to the delivering of waste in port reception facilities such as the non-special fee system.

~~147.~~155. In the past years, considerable attention has been brought to the scale of abandoned, lost and discarded fishing gear (ALDFG), the impacts on the marine environment through ghost fishing, and possible measures for reducing its occurrence like the FAO Voluntary Guidelines on the Marking of Fishing Gear. Given that aquaculture now supplies over half the seafood produced worldwide, it is considered of great importance that this issue is also examined at farm level, especially given the continued expansion of global aquaculture development.

~~148.~~156. Measures targeting specifically on aquaculture farming should focus on overall recommendations and to propose measures scoping to reduce marine litter from aquaculture, block the relevant pathways to the marine environment and reduce the contribution to marine plastic pollution

by aquaculture. Moreover, a second level of measures should be introduced touching upon the specific requirements and standards to be applied on a mandatory basis for aquaculture practices.

~~149.~~157. Measures that can contribute to reduced generation of marine litter from aquaculture include the following:

a) Replace to the extent possible plastic infrastructure components with other of physical nature.
b) Use higher density plastics (e.g., Polyethylene terephthalate (PET) or Ultra-high molecular weight polyethylene (UHMWPE)) which are more resistant to fragmentation, UV-irradiation.
c) Reduce single-use plastic with the introduction of relevant alternatives and invest in developing recovery, cleaning and re-distribution schemes.
d) Minimize the use of plastic types with low levels of recyclability.
e) Reduce to the extent possible the use of equipment consisting of different types of plastic (i.e., different lifespan and different approach for collection and recycling).
f) Ensure to the extent possible that all packaging is reusable or recyclable.
g) Reduce to the extent possible packaging and over-packaging to minimize packaging waste.
h) Develop awareness raising trainings for aquaculture staff similar to those offered from the shipping sector (e.g., HELMEPA).
i) Reduce to the extent possible the use of single-use plastics and establish relevant policies;
j) Minimize the use of plastic types with low levels of recyclability;
k) Reduce to the extent possible the use of equipment consisting of different types of plastic (i.e., different lifespan and different approach for collection and recycling).

~~150.~~158. Moreover, aquaculture should ideally apply a circular approach planning considering the whole life cycle of the used equipment. High procurement standards should be introduced, especially when dealing with purchasing of equipment, packaging, polystyrene boxes and other types of consumables and equipment.

~~151.~~159. The IMO's Marine Environment Protection Committee (MEPC) recently adopted its strategy to address marine plastic litter from ships with substantial actions to reduce marine plastic litter from, fishing vessels; shipping, and improve the effectiveness of port reception and facilities and treatment in reducing marine plastic litter. The strategy also aims to achieve further outcomes, including enhanced public awareness, education and seafarer training; improved understanding of the contribution of ships to marine plastic litter; improve the understanding of the regulatory framework associated with marine plastic litter from ships; strengthened international cooperation; targeted technical cooperation and capacity-building.

~~152.~~160. Under the Mediterranean Strategy for the Prevention of, Preparedness, and Response to Marine Pollution from Ships (2022-2031) in its common strategy also addresses the prevention and reduction of litter, in particular plastics entering the marine environment from ships thought the fully implementation of the IMO Action Plan and the UNEP/MAP updated Regional Plan on Marine Litter Management in the Mediterranean.

~~153.~~161. When facing plastic pollution at large, the following measures or aspects can be also considered:

a) Introducing a number of prevention elements/measures at regional, sub-regional and national levels, having a focus to minimize the production, use and consumption of plastics (especially of single-use plastics), as well as to minimize their leakage into the marine and coastal environment (so, before the introduction of effect/impact);
b) Revising of the current legal framework of the Mediterranean Countries at the National level (e.g., updated/new National Action Plans and/or Programmes of Measures) and development of data base on the production and consumption of plastic products at the national level;
c) Development of compulsory, legally binging EPR systems for priority products (e.g., food and beverage packaging);

d) Progressive minimum recycled content in priority products;
e) Reduction targets in production and consumption of virgin plastic feedstock;
f) Promote behavioral change for achieving sustainable consumption patterns and increase rates of separation, collection, and recycling;
g) Develop mandatory requirements with the industry with a focus on specific, priority single-use plastic items (e.g., information on the composition of plastics on the market and even standards to ease the recycling of certain single-use plastic products);
h) Strengthen the acceptance criteria of the plastics for admission to the organized landfill, facilitating the recycling, reducing plastic disposal at organized landfills, and solicitating and promoting the separation, and recycling at sub-national level (i.e., municipalities, cities, or agglomerations);
i) Minimize the introduction of incentivized interventions, and rather focus on structural changes at governance/national administration, industry, and society levels.

~~154.~~162. The legally binding Regional Plan on Marine Litter Management in the Mediterranean was introduced in 2013 (Decision IG.21/7, COP18); entered into force in 2014; and updated in COP 22 (Antalya, Turkey, 7-10 December 2022; Decision IG.25/9) to further reflect global and regional agenda relevant to marine litter management.

~~155.~~163. The Updated Regional Plan on Marine Litter Management includes stronger links to global agenda, i.e. the United Nations Environmental Assembly (UNEA) Resolutions on marine plastic litter, microplastics and single-use plastic products pollution; UNEP marine litter partnerships and initiatives like the Global Partnership on Marine Litter (GPML) and the Clean Seas Campaign; the IMO Action Plan to Address Marine Plastic Litter from Ships; the Basel Convention - Plastic Waste Partnership (PWP); as well as the EU Policies on Marine Litter and Plastic.

Ecological Objective 1 (EO 1) (Biological diversity is maintained or enhanced. The quality and occurrence of coastal and marine habitats and the distribution and abundance of coastal and marine species are in line with prevailing physiographic, hydrographic, geographic and climatic conditions):

Common Indicator 1: Habitat distributional range
Common Indicator 2: Condition of the habitat's typical species and communities

~~156.~~164. The seabed and its benthic habitats are a key component of the Mediterranean's marine ecosystem. It holds a high diversity of marine communities and species and provides a range of essential ecosystem services including provision of seafood, natural coastal protection and carbon sequestration. For the assessment in relation to the IMAP EO1 CI1 and CI2 (Habitat distribution and condition), given that distribution maps are available for three key habitats (Coralligenous, Maerl/rhodoliths and Posidonia oceanica meadows) in a limited number of countries, it is only possible to present a preliminary approach to seabed habitat assessments for the 2023 Med QSR. This is done at a broad scale and with a focus on assessing the extent of pressures, as a proxy for impacts on habitats. However, according to the available data and information, the seabed is under severe pressure in the coastal zone where extensive stretches of coast have lost their natural marine habitat through the building of coastal infrastructure and sea defences. Offshore, down to depths of 1000m, the most wide-spread and extensive damage to seabed habitats comes from bottom fishing using trawls and dredges. Below this depth, these fishing practices are banned, thereby providing protection to sensitive deep-sea habitats throughout the Mediterranean. However, as the habitats are generally distributed throughout the Mediterranean (north to south, east to west), it is considered unlikely that distributional range will vary at the Mediterranean Sea scale.

Measures and actions required to maintain/achieve GES for EO1 Common Indicators 1 and 2

~~157.~~165. Although the knowledge base and assessment methodologies are under rapid development, systematic assessment of seabed habitats for the Mediterranean Sea is still at an early stage of development. Therefore, given the limited data availability regarding the distribution of habitats, the main measures and actions proposed here are about improvements in the availability of data:

a) Habitat maps – these provide the fundamental basis for habitat assessments and need to be further improved in quality and accuracy. The EUSeaMap full coverage map of broad habitat types relies on the quality of the underlying input data, especially on seabed substrates, and needs to be improved across much of the region. Countries should be encouraged to contribute mapping data to help improve the region-wide seabed mapping;
b) Activities and pressures – the mapping of pressures, using activities as a basis, provides a good means to assess the wider seabed of the region. These data are generally more easily (and cheaply) collected than direct observational data of the seabed, offering a more cost-effective means to undertake assessments. Further, such data are important for management of pressures (i.e., reducing pressures in areas to help achieved GES) and for marine spatial planning; further data collection is needed, particularly in the south and east, to provide an even coverage across the Mediterranean. The current region-wide datasets of activities and pressures (from the EEA/ETC-ICM) are at a 10km-by-10km grid resolution – for use in relation to seabed assessments, the data need to be prepared at a finer resolution;
c) Monitoring data on the state of the seabed – the traditional collection of direct observations of the seabed (e.g., through video and sampling) remains an important aspect of data collection programmes, providing a means to validate pressure data to assess seabed habitat condition. Monitoring programmes are costly and need to be focused on the needs of assessment and measures to ensure good value. To facilitate pan-regional assessments, the monitoring data need to be compatible between countries, following specified data standards; further data collection is needed, particularly in the south and east, to provide an even coverage across the Mediterranean;

d) Pressure-state interactions – there is continued need for study of pressure-state interactions, both at research level and through state assessments, to improve confidence in use of pressure data (such as a proxy for broad-scale state assessments);
e) Climate change – the effects of climate change on the seabed and its communities need to be better understood; of particular importance is assessment of the carbon storage capacity of marine habitats and the contribution this makes to mitigation of climate change effects; the importance of shallow vegetated habitats, such as Posidonia oceanica meadows, for blue carbon is often highlighted, but the carbon sequestration capacity of the much more extensive soft sediment habitats of the shelf zone and its disruption by physical disturbance pressures is ultimately a more important knowledge gap;
f) Assessment methods – further work is needed to develop specific indicators (or test existing indicators available in other regions) for use with the monitoring data, and to bring the assessment methods to a fully operational level. Based on these methods, Contracting Parties need to agree threshold values to provide a clear means to assess the extent to which GES has been achieved;
g) Assessment results – the availability of seabed assessment results, including visualisation of the extent of GES in each part of the region, provides an important output that demonstrates the work of the IMAP and Contracting Parties, stimulates improvements and helps direct actions towards achieving GES.

CI3: Species distributional range (related to marine mammals, seabirds, marine reptiles)
CI4: Population abundance of selected species(related to marine mammals, seabirds, marine reptiles)
CI5: Population demographic characteristics (body size or age class structure, sex ratio, fecundity rates, survival/mortality rates related to marine mammals, seabirds, marine reptiles)

~~158.~~166. For the **Monk Seal**, one of the flag species of the Mediterranean, the current assessment of the status in relation to (CI3, CI4 and CI5), provides insight into both the strengths and limitations of the species across the Mediterranean basin. Most recent data shared by experts, through the survey conducted to produce this assessment, indicate that the species continues to breed in its known breeding zones and there is a moderate expansion of the specie's range. The present assessment concluded that for CI3-distribution, GES has not been achieved for all Group B countries (where no monk seal breeding is reported, but repeated sightings were reported), while it has been achieved for most of the Group A countries (countries, where monk seal breeding has been reported after year 2010). However, the lack of a baseline estimates for monk seal population abundance (CI4), makes difficult to validate the (likely) expansion of the species reported in recent years.

~~159.~~167. Concerning the Monk Seal Population demographic characteristics (CI5), various types of data need to be gathered to enable accurate description of Mediterranean monk seal population demographics. Key demographic data and survivorship are logistically difficult to determine, requiring access to the seals in remote locations and long-term uninterrupted monitoring to build individual historical series.

~~160.~~168. The Mediterranean Sea harbours 25 **cetaceans'** species, which are subjects to various human pressures, which reflects on their conservation status. At the present moment, it is not possible to assess whether cetaceans' populations achieved Good Environmental Status (GES) under the EcAp/IMAP framework, since baseline/reference values for the GES assessment were only recently defined, thanks to the data gathered by the ACCOBAMS Survey Initiative in summers 2018 and 2019. However, the 2018 - 2021 IUCN Red-List Assessment shows that the most of cetacean populations in the Mediterranean Sea are significantly threatened, apart from the wide-spread species, such as common bottlenose dolphin (*Tursiops truncatus*) and striped dolphin (*Stenella coeruleoalba*), the status of which has improved since mid-2000.

~~161.~~169. **Seabirds** sensu lato form a crucial component of the region's marine biodiversity and ecosystem with many of the relevant taxa being endemic or near endemic in the Mediterranean. Mostly situated on top of marine food webs, these highly mobile organisms come to land to breed,

thus contributing to nutrient exchange between marine and coastal areas, by linking sea and land. The integrated Good Environmental Status (GES) of EO1 of three Common Indicators related to seabirds (CI3, CI4 and CI5) reveals that for many populations of various species GES is reached, when taking a modern baseline approach. However, the data quality currently prevents a truly quantitative integrated GES assessment across the entire region. Furthermore, specifically some of the endemic taxa which are of conservation concern, currently appear to fail to reach GES targets, at least in some of the CIs. These species are facing multiple pressures at land and at sea, seabirds from different functional ecological groups in the region act as indicators and serve as sentinels for the health of the Mediterranean Ecosystem.

~~162.~~170. Combining the findings of this assessment regarding **marine turtles** with literature on research and conservation actions taking place in the Mediterranean, marine turtle can be considered as meeting GES in relation to CI3, CI4 and CI5. Indeed, distribution of turtles across the Mediterranean (CI3) is increasing in loggerhead nesting outside their traditional range. Similarly, green turtle distribution at sea is deemed to be expanding. Nesting levels, a basic proxy for population abundance (CI4), are stable or increasing at all major nesting sites where recent data have been reported and nesting is occurring where there was previously none. At the breeding areas, available data suggest that hatchling sex ratios (CI5) are in favourable condition. This is the one demographic characteristic that is likely to be impacted by climate change, but it is also one that can be adequately monitored and if required mitigated against. However, there are fundamental gaps in monitoring and data reporting for turtles in marine habitats. Monitoring methods and data reporting require standardisation across all CPs. Further research is required for better understanding of turtle populations and improving their conservation status.

Measures and actions required to maintain/achieve GES for EO1 Common Indicators 3, 4 and 5

~~163.~~171. For Monk Seal:

a) Since GES has not been achieved in relation to CI3-distribution, for all Group B countries, while it has been achieved by Group A countries except for Cyprus. Therefore, actions dedicated to facilitating the widespread distribution of the species in all Group B countries and Cyprus should be a priority. Such actions should include not only the set-up of a good monitoring network but also the protection of key habitats for the species and the reduction of any potential threats (e.g., intentional killings, tourism disturbance).
b) When looking at Mediterranean monk seal population abundance (CI4), the lack of a baseline estimates makes difficult to validate the (likely) expansion of the species reported in recent years. Based on the reported information by regional experts, it seems that most (rough) population estimates come mainly from the minimum photo-identified individuals. However, an approach using pup-multipliers method may be taken as a new way forward for reliable abundance estimates. A common strategy for producing population estimates should be agreed on to be able to compare information among researchers.
c) Considering that Monk Seal photo-identification is a widespread practice across the region, the creation and implementation of a data-sharing platform would offer great potential to establish reliably information on movements and home range establishment. Such initiative is currently in the portfolio of actions to be supported by the Monk Seal Alliance.
d) Data reported by regional experts manifests the difficulty to study the population demographic characteristics (CI5). Since key demographic data and survivorship are logistically difficult to determine, new actions should focus on providing opportunities for long-term uninterrupted monitoring to allow building individual historical series, key to assess basic demographic trends. New technologies, combined with the long-term regular use of more traditional methods (e.g., individual tags and photo-identification) may shed light on these aspects.
e) Recommended topics for research:
    i. Distribution
    ii. Abundance
    iii. Pup production

iv. Movements
v. Foraging areas

f) Recommended Conservation Measures:
   i. Protect critical pupping habitat
   ii. Regulate human activities
   iii. Improvement of surveillance
   iv. Habitat restoration

g) Management and Law Enforcement measures:
   i. Regulation of Fishing activities
   ii. Public education and awareness
   iii. Management of tourism
   iv. Reduce anthropogenic mortality

~~164.~~172. For Cetaceans:

a) Understanding and addressing pressures/state of cetaceans' linkages:
   i. Continue the work on definition of pressures/cetaceans' interaction hotspots; particularly extension of anthropogenic noise/cetaceans' hotspots analysis to maritime traffic and identification of marine litter/cetaceans' hotspots.
   ii. Intensify efforts to improve knowledge on interrelations between climate change and cetaceans, including identification of sensitive cetaceans' species and monitoring of their state related to climate change.
   iii. Continue efforts in data collection and processing regarding the ship strikes, in cooperation with international organisations on marine traffic, notably IMO and ACCOBAMS.
   iv. Develop techniques and models to assess cumulative/synergistic effects of pressures and impacts on cetaceans, including underwater anthropogenic noise, chemicals, marine litter, climate change and emerging pathogens, taking into consideration the existing recommendations (such as from the 2021 IWC Intersessional Workshop "Pollution 2025" etc).
   v. Intensify efforts to implement the existing pressures' mitigation tools, such as guidelines and best practices already developed in the scope of UNEP/MAP, ACCOBAMS and IWC.

b) GES assessment Methodological issues:
   i. Reformulate GES definitions and linked GES assessment elements under CI5, as proposed in the 21WG.514/Inf.11, notably to shift human induced mortality assessment to CI12 and focus on actual population demographic characteristics (sex ration, calf productivity etc).
   ii. Define GES assessment criteria, particularly baseline/reference and threshold values, for CI5, as soon as sufficient data is collected/available. Possibly select representative pilot areas where adequate data could be collected on regular bases.
   iii. Invest efforts in further quantification of thresholds for CI3.
   iv. Encourage sub-regional level of cooperation between countries in reviewing and adjusting GES assessment criteria.

c) Data collection and availability for CI3 and CI4:
   i. Replicate and conduct regularly regional synoptic surveys and complement with other monitoring efforts.
   ii. Promote and support research of cetaceans in the southern Mediterranean.

d) Data collection and availability for CI5:
   i. At the national level (or where possible at sub-regional level), establish or ensure functioning of the stranding networks, with the particular support of regional agreements/organisations (SPA/RAC, ACCOBAMS) in the segment of capacity building and application of new technologies.
   ii. Regularly submit national strandings data to MEDACES, including information on causes of mortality.

iii. Upgrade MEDACES and ensure MEDACES data availability and easy accessibility (in standard spatial GIS format) via MEDACES website.
iv. Intensify research efforts on population genetics, taking into account the ongoing work by other relevant organisations.

~~165.~~173. For Sea birds:

a) Collection of quantitative monitoring data at national level should be promoted to allow assessments that reflect the impact of pressures on local populations. Indeed, for the current assessment cycle, the data that was made available was patchy, heterogenous, and limited for a robust GES assessment of all indicator species for the three CIs across subregions. It is believed that the IMAP Infosystem will facilitate data reporting and improve efficiency and comparability for monitoring and GES assessments of future cycles.
b) The lack of representative, comparable subsamples distributed equally across the subregions remains being one of the major challenges for an integrated assessment of the status of marine avifauna in the region, to achieve a robust GES assessment, monitoring data between two cycles should be made fully comparable. This requires monitoring a certain number of same or representative populations as prolonged time series at the finest spatial scale practical.
c) In order to improve the representativeness of monitoring samples, coordinated monitoring within subdivisions or subregions would further improve overall GES assessments. Mid-winter count data made available by IWC for this assessment cycle as well as transboundary counts of Mediterranean Shag roosts in the Adriatic are good examples highlighting useful outcomes of coordinated and synchronised monitoring efforts.
d) Enabling coordinated efforts and achieving standardised monitoring at the local level also requires regular transfer of know-how and calibration of monitoring methods within subdivisions, subregions or across the region. Finally, harmonisation between different assessment programmes such as MSFD can be further improved for a more efficient assessment of GES in the Mediterranean.
e) Quantifying GES for seabird populations in the Mediterranean remains challenging. Seabirds are highly mobile organisms and therefore a robust analysis of their state requires transboundary monitoring. Ensuring communication and information exchange between different assessment programmes and sea conventions within the region and for migratory species which leave the Mediterranean also other seas can help overcome this challenge.
f) The majority of seabird species in the Mediterranean form metapopulations with discrete local breeding colonies. Without better understanding the demographic connectivity between these colonies, deciding on a meaningful spatial scale at which GES should be assessed remains to some extent arbitrary. Therefore, closing such knowledge gaps will be pivotal for the finetuning of monitoring programmes and for successful GES assessments in the future.
g) Currently, a strong bias remains in the amount of monitoring data available for the different aspects in the life cycle of the majority of Mediterranean seabirds. This bias means that there is insufficient knowledge regarding the non-breeding season and the periods the birds spend out at sea, often far away from the breeding grounds. To reduce this bias, it is recommended that future assessment cycles increase the effort of monitoring the birds away from the colonies, by means of increased colour ringing and ring-reading, tracking programmes and counts at bottlenecks.

~~166.~~174. For marine reptiles:

a) The competent authority in each CP needs to understand the data reporting requirements and which entity is undertaking specific monitoring actions. Through doing this it can identify gaps in data acquisition resulting from lack of fieldwork in necessary sites, gaps in reporting at sites where monitoring is carried out and identify entities that could be tasked with additional field monitoring at currently unmonitored sites. In terms of progressing towards adequate reporting, the simplest first step to take is to ensure data from all existing monitoring programmes are collected and reported in a standardised manner. The next most simple

change is that in locations where monitoring programs exist, but collection of certain data is lacking, the programs should be adapted to acquire this sought-after information and analyse and report it as required.

b) It is recommended that each CP has in place some oversight or coordination mechanism to ensure all required monitoring activities are carried out. The coordinator could be a governmental body, scientific institution, or non-governmental organisation, with the important remit that they know what work is being carried out and have the competency to collect and synthesise the information adequately for each six-yearly Mediterranean Quality Status Report.

c) This IMAP reporting framework, a requirement of all riparian Mediterranean states does not exist in isolation but coincides with other international reporting requirements such as those for the EU Habitats Directive and its Marine Strategy Framework Directive (MSFD). There is much overlap and synergy between these programs, which means data collected if collected in adequately rigorous manner can be used multiple times and not only for the IMAP. Of note is the recently published article highlighting progress towards a common approach for assessing marine turtle population status at European level within the MSFD, which should be considered when designing and coordinating marine turtle monitoring strategies. The resulting economy of scale lessens the burden on competent authorities as suitable coordinated actions obviate the need to repeat work and simplifies the analysis process.

d) Research priorities for marine turtles in the Mediterranean:
    i. Set up long-term in-water monitoring programmes in key foraging areas for assessing sea turtle abundance and trends.
    ii. Assess distribution and level of nesting activity in Libya.
    iii. Quantify bycatch (especially in small-scale fisheries), rates and intentional killings in associated mortality key foraging areas and migratory pathways.
    iv. Understand how climate change might impact sex ratios, geographical range, and phenology.
    v. Estimate/improve estimates of demographic parameters.
    vi. Improve population abundance estimates.
    vii. Assess the movement patterns of adults from key rookeries.
    viii. Identify development habitats of post-hatchling and small turtles, and dispersal and settlement patterns.
    ix. Assess the movement patterns of juveniles.
    x. Develop and test new bycatch reduction methods.

e) `Conservation priorities for marine turtles in the Mediterranean:
    i. Year-round protection of key feeding and wintering grounds.
    ii. Continue current conservation methods at nesting areas (in situ protection, relocations, light management, etc.).
    iii. Educate fishermen on on-board sea turtle handling best practices.
    iv. Seasonal protection of main migratory corridors.
    v. Implement TED in bottom trawlers.
    vi. Trans-boundary large MPA in the Adriatic.
    vii. Implement LED lights in set nets.

Ecological Objective 2 (EO 2) (Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystem):

Common Indicator 6: Trends in abundance, temporal occurrence, and spatial distribution of non-indigenous species, particularly invasive, non-indigenous species, notably in risk areas

~~167.~~175. The results of this assessment regarding EO2 (Non-indigenous species, CI6) indicate that for the past 15-20 years new NIS introduction rates have been relatively stable in the West Mediterranean and the Adriatic, slightly but not statistically significantly increasing in the East Mediterranean but increasing in the Central Mediterranean. However, even if the rate is staying constant the total (cumulative) number of NIS in the basin is increasing steadily, with corridors and shipping the main pathways responsible.

~~168.~~176. At the same time, there has been a notable increase in research effort and reporting, spurred by both policy requirements but also scientific interest coupled with citizen science initiatives, particularly in the southern Mediterranean. Consequently, clear interpretation of these trends is hampered by the lack of long-term standardised monitoring data, as it is not possible to disentangle the confounding effects of differential recording efforts spatially and temporally from real changes in pathway pressure or vector management.

~~169.~~177. Nevertheless, a number of invasive, high-impact NIS have displayed an increased geographic expansion in the last decade or so, which can be deduced even behind the “noise” of increased detection and reporting. NIS species of warm affinities with long-range pelagic dispersal appear to have been favoured by climate change and increased seawater temperatures to penetrate the cooler regions of the Mediterranean, secondary anthropogenic dispersal however still plays an important role in the spread of the more sedentary species.

~~170.~~178. NIS species of warm affinities with long-range pelagic dispersal appear to have been favoured by climate change and increased seawater temperatures to penetrate the cooler regions of the Mediterranean, secondary anthropogenic dispersal however still plays an important role in the spread of the more sedentary species.

Measures and actions required to maintain/achieve GES for EO2 Common Indicator 6

~~171.~~179. With regards to suitable data availability, the majority of the CPs have developed, and many are already implementing IMAP-compliant monitoring programmes. Furthermore, the IMAP Data and Information System is operational and has already started receiving NIS data, such that standardised time series are anticipated to be available for the next assessment cycle. This should make possible the formal quantification of abundance and spatial distribution changes and increase our confidence in the assessment of trends in temporal occurrence. If CPs have not already initiated the process, IMAP can assist in co-ordinating the development of priority NIS lists for monitoring of abundance through risk analysis and risk assessment. Early detection and early warning systems can be informed by regularly updating the spatial distribution information entered into MAMIAS and the IMAP Info System.

~~172.~~180. Threshold values for trends in temporal occurrence have not been set yet but methodologies and approaches are under discussion through regional co-operation. Quantifying/modelling pathway pressure can assist in specifying quantitative targets (percentage reduction) by introduction pathway. Importantly, all these methodological steps need to be adapted for GES assessment at the national level. The effect of reporting lags on new NIS data and trends analysis in this assessment was circumvented by not using the data of the last 3 years (2018-2020), however it would be beneficial to adopt a commonly agreed methodology to deal with this issue in order to avoid loss of information.

~~173.~~181. Next important steps for GES assessment of NIS include the elaboration of the remaining aspects of CI6 that relate to impacts, by further developing assessment criteria and quantitative targets

for the most vulnerable/important species and habitats at risk. This is work that ideally should be co-ordinated with the implementation of EO1 Common Indicators CI1 and CI2 and EO6 on sea floor integrity.

~~174.~~182. Besides methodological considerations with regards to IMAP and the assessment of GES, working towards achieving GES requires actions to mitigate and reduce invasion pressure, especially coordinated actions by all the states. Towards that effect, the draft updated Action Plan concerning NIS has already taken consideration the Mediterranean NIS baselines and the results of the MedQSR2023, such that in its proposed actions there is emphasis on preventative measures, including encouraging and facilitating CPs to strengthen their legislative and institutional framework in order to systematically risk assess and manage pathways, as well as elaborate early warning systems, rapid response plans and mechanisms to control intentional introductions. The other axis of focus of the Action Plan relates to the impacts of NIS, where targeted impact studies for priority species are proposed in order to identify density-response relationships and acceptable abundance levels. The implementation of the NIS Action Plan will progress in parallel with the Ballast Water Management (BWM) Strategy for the Mediterranean (2022-2027) which focuses on the management of ship-mediated introductions from ballast water, by facilitating the implementation of the Ballast Water Management Convention, and biofouling, by developing national strategies and action plans to manage this vector.

Ecological Objective 3 (EO3, Populations of commercially exploited fish and shellfish are within biologically safe limits, exhibiting a population age and size distribution that is indicative of a healthy stock)
Common Indicator 7. Spawning stock Biomass
Common Indicator 8. Total landings
Common Indicator 9. Fishing Mortality

Common Indicators 7, 8 and 9

~~175.~~183. The assessment in relation to the EO3 **CI-7** (Spawning stock biomass) indicates that while the biomass of some species under management plans is already increasing as a result of decreased fishing pressure, others have yet to show any improvement. Across the region, 44 percent of the stocks were found to have low relative biomass levels, with 19 percent intermediate and 37 percent high. For Total landings (**CI8**), capture fisheries production in the region has been stalled since the mid-1990s, with a decrease in 2020 likely exacerbated by the COVID 19 pandemic. Landings for the Mediterranean and the Black Sea (2018–2020 average) amount to 1 189 200 tonnes (excluding tuna-like species), very similar to the landings reported in The State of Mediterranean and Black Sea Fisheries 2020 (2016–2018 average). However, landings in 2020 show a 16 percent decline in comparison with 2019, likely related to some extent to the impacts of the COVID-19 pandemic on fleet dynamics, demand and trade. The total production for the Mediterranean Sea alone was 743 100 tonnes (62 percent of the total capture fish production in the region).

~~176.~~184. For Fishing mortality (**CI9**), the overexploitation of stocks has decreased over the past decade, with an accelerated reduction of fishing pressure in the last two years, particularly for key species under management plans. However, most commercial species are still overexploited, and fishing pressure is still double what is considered sustainable. Most stocks for which validated assessments are available continue to be fished outside biologically sustainable limits, and average fishing pressure is still twice the level considered sustainable (average F/FMSY = 2.25). Nevertheless, there has been a 10 percent decrease in the percentage of stocks in overexploitation since 2012 and a continuous gradual decrease in fishing pressure since 2012 (a 21 percent decrease since 2012, double what was reported in 2020). Furthermore, for some priority species under management plans, fishing pressure has declined by considerably more over the past decade, including European hake (-39 percent) and common sole (-75 percent). However, fishing pressure continues to increase on certain

other stocks, notably commercially important blue and red shrimp in the central and eastern Mediterranean.

Measures and actions required to maintain/achieve GES for EO3 Common Indicators 7, 8 and 9

~~177.~~185. Although the percentage of stocks with validated assessments has continued to increase since the last edition of The State of Mediterranean and Black Sea Fisheries (FAO, 2020a), particularly in the western Mediterranean, as has the geographical coverage of assessments, efforts are still required to extend assessment coverage to all GSAs, while the decrease observed in the percentage of landings assessed highlights the need to ensure the regular assessment of key stocks with high landings.

~~178.~~186. The positive signs for fishing pressure provided by this overall analysis are most likely related to the adoption of a significant number of national and regional management measures in the recent past, underpinned by an increase in the quality and coverage of scientific advice, particularly on priority species and key fisheries. Measures consist of adopting multiannual management plans that include effort control measures and/or the introduction of quota-based management for some species, as well as the establishment of fisheries restricted areas (FRAs) and spatio-temporal limits to protect essential habitats and life stages. Nevertheless, the slow recovery in biomass of certain key stocks and the need to honour the objectives of the GFCM 2030 Strategy for sustainable fisheries and aquaculture in the Mediterranean and the Black Sea point to the importance of continuing to implement an effective and generalized management framework, including through strengthening existing management plans and defining new ones, as well as ensuring the effective implementation of those in place. Since 2018, research programmes have been incorporated, through specific recommendations, into the GFCM workplans for the Mediterranean. Research programmes share the common aim of improving the scientific basis for the provision of advice on existing and potential management measures through dedicated actions towards increasing the quality and quantity of information on resources and addressing previously identified knowledge gaps and shortcomings in relevant scientific or technical advice. More recently, research programmes have been complemented by pilot studies and projects. Pilot studies and projects rest on similar principles, i.e. conducting scientific data collection and analysis on specific themes, fisheries or species, but have a more limited geographical and temporal scope. In all cases, the core principle is to take full advantage of ongoing research at the country level by providing experts with a regional platform for coordination, knowledge exchange and capacity building enriched by new activities developed based on common methodologies. The data collected through these initiatives are generally aimed at providing the scientific basis for determining the most appropriate management measures for selected fisheries.

~~179.~~187. The correct estimation of fishing mortality requires a precise understanding of riparian states' fishing capacity. Due to the specificities of the Mediterranean fleet, composed of a large majority of small-scale polyvalent vessels, information on fishing capacity is sometimes incomplete or inaccurate. Furthermore, the estimation of robust reference points for fishing mortality requires the use of long time series and the incorporation of environmental and ecosystem variables, as well as the design of robust methods that can integrate information from different sources.

~~180.~~188. The update and adoption of new specific binding recommendations related to the mandatory requirements for data collection and submission, underpinned by the GFCM Data Collection Reference Framework (DCRF) has greatly improved the quality of the data in support of advice, in line with the need expressed by riparian states. The GFCM 2030 strategy for sustainable fisheries and aquaculture in the Mediterranean and the Black Sea is also contributing in this endeavour through specific actions such as, for example, the execution of harmonized scientific surveys-at-sea.

~~181.~~189. The correct estimation of total landings requires a precise knowledge of the fishing activities carried out by the active fishing fleet operating in the Mediterranean. The specificities of the Mediterranean fleet, composed by a large majority of small-scale polyvalent vessels, as well as the existing variety of landing sites, and the different capacity of Mediterranean riparian states to

accurately monitor the landings in such sites, make difficult an accurate estimation of landings in the region.

~~182.~~190. The GFCM has proposed a number of solutions to improve the quality of the estimation of total catch. On one hand, the GFCM DCRF provides the technical elements to improve and harmonize the collection of information on fisheries throughout the Mediterranean and on the other the GFCM 2030 strategy provides an effective instrument to guide an increase in the collection of sound information (e.g. bycatch monitoring programme and a survey of small-scale fisheries), as well as the implementation of dedicated actions to assess and curb IUU fishing, which are expected to largely improve the quality of the estimates for this indicator.

~~183.~~191. Care needs to be taken in interpreting trends in the indicator for total landings because variations in total catch/landing may be a result of various factors, including the state of the stock, changes over time in the selectivity of fishing gear, changes in the species targeted by fishing activities, as well as inconsistencies in the reporting.

Ecological Objective 7 (EO7): Alteration of hydrographical conditions
Common Indicator 15: Location and extent of the habitats impacted directly by hydrographic alterations

Common Indicator 15

~~184.~~192. All countries had difficulties with the monitoring of the CI15 (Location and extent of the habitats impacted directly by hydrographic alterations) of EO7 according to the Guidance factsheet and could not provide monitoring data therefore, the Good Environmental Status has not been assessed. Further simplification of the Guiding Factsheet is therefore needed so to allow countries to report on the physical loss of habitats, i.e., the structures' footprint. GES should be defined in close coordination with the EO1 and EO6.

~~185.~~193. A baseline assessment has been made using data from the national reports prepared in the frame of EcAp MED III and IMAP MPA projects, including some other countries that used the same report format, and from the data provided by scientific partners, Mercator Ocean in particular. Climate change seems to have far bigger impacts on the habitats and marine ecosystems in general than the impacts of hydrographic alterations caused by new structures.

Measures and actions required to maintain/achieve GES for Common Indicator 15

~~186.~~194. Establishment of the national IMAP, monitoring programme that will systematically collect statistically significant data of the hydrographic parameters is required – first, to allow modelling of hydrographic alterations of the planned structures at the very local scale in the EIA/SEA and second, to provide subsequent monitoring data once the structures have been built. A close cooperation has to be established with the authorities that are responsible for planning of such structures including those responsible for EIA. In parallel, mapping of habitats in a surrounding area that could possibly be impacted by such hydrographic alterations should be prepared (link to EO1 and EO6).

~~187.~~195. Creation of a digital spatial database of all data from EIA/SEA including spatial coverage and location of the intervention, existing and planned structures and marine habitats. The Copernicus Marine services, the EMODnet service and the spatial planning information system of individual countries (via WMS or WFS layers) should be used, thus providing necessary data for the CI 15 assessments and monitoring.

~~188.~~196. As the rational possibility, a revision of the existing indicator Factsheet should be considered that will simplify the method to allow countries to report on the physical loss of habitats, i.e., the structure's footprint only.

~~189.~~197. Considerations should also be given to the possibility of proposing a set of climate change related indicators in the frame of IMAP. This could include monitoring of hydrographic parameters (e.g., salinity, temperature, waves and currents) that are changing rapidly due to climate change. The use of hydrographic parameters reported within EO 5 on eutrophication should be taken into account with the use of remote sensing and other available sources for climate change in order to determine the hydrographic alterations in the Mediterranean region. In-situ data are equally important and should be used to monitor changes in variables due to climate effects that is required also by the EU Marine Strategy Framework Directive (MSFD). Such alterations may have much stronger impacts on marine habitats and ecosystems than those monitored by the CI 15 itself.

Ecological Objective 8 (EO8): Alteration of hydrographical conditions)
Common indicator 16 (CI 16): Length of coastline subject to physical disturbance due to the influence of human-made structures;
Candidate common indicator 25 (CCI 25): Land cover change.

Common Indicator 16 and Candidate Common Indicator 25

~~190.~~198. Monitoring data in relation to CI16 (Length of coastline subject to physical disturbance due to the influence of human-made structures) of EO8 was provided for 57% of the total Mediterranean coastline (31 283 km), out of which 26 658 km (85.2%) of coast is natural and 4 625 km (14.8%) is artificial. This provides a good overview of the baseline situation. However, changes in the percentage or total length of coastline subject to physical disturbance due to the influence of human-made structures could not be assessed because only the first set of monitoring data was provided, except three countries that provided two sets of data. The provided data indicate that the majority of human-made structures belong to ports and marinas.

~~191.~~199. Within the framework of this assessment a pilot study was conducted for the Candidate Common Indicator 25 (Land cover change) of EO8. It covered the Adriatic sub-region (coastal zone of 10 km width) and showed that in 2018 the built-up areas occupy 8.77% (2 500 km^2) of the Adriatic coastal zone. The largest land cover change from 2012 is the increase of the built-up area by 27 km^2 representing a land take trend of 1% in six years. In the 2012-2018 period the land cover changed from forest and semi-natural land (24 km^2), water bodies (3 km^2) and agricultural land (2 km^2) to built-up (27 km^2) and wetlands (2 km^2).

Measures and actions required to maintain/achieve GES for EO8 Common Indicator 16

~~192.~~200. First, technical issues that have to be considered in future monitoring and assessments of CI 16 are as follows:

a) Monitoring of the coastline (second and following assessments) should use the same level of details and spatial resolution as the initial assessment (baseline data). Otherwise, monitoring results could be compromised by the fact that coastline length increases by using larger scales, more so on more indented coasts.
b) The calculation of the length of the coastline varies also due to deformations caused by the choice of the cartographic projection (i.e., calculated in plane by using one of the cartographic projection or by using the ellipsoid). It is recommended to use the ellipsoid lengths calculated on WGS84 as required by the Guidance Factsheet and related Data Dictionaries and Data standards.
c) Methods of mapping coastline vary between the national reports which results in semantic differences of assessed CI 16, in particular with regard to mapping of the length of artificial structures. This should be taken into account while interpreting aggregate data for the Mediterranean. Classification of artificial structures should be unambiguous, regardless of the monitoring period, country or the method used (visual inspection of aerial images or field

survey). A manual that will elaborate on various situations should be prepared so that interpretation is unambiguous, i.e., harmonised.

~~193.~~201. Second, measures and actions to achieve GES include the following:

a) The country-specific GES should be defined based on the first set of monitoring data in order to allow assessment of changes for the next QSR. Country specificities could significantly affect the assessment, i.e., interpretation of calculated CI 16. Therefore, issues such as the following need to be taken into account. For example, a country with a significant length of coastline on uninhabited islands, islets and rocks and with a small proportion of artificial coast can be interpreted as a very good condition, while in fact there is a lot of construction on the mainland part of the coast. Another issue is the total length of the coastline per country. If a country has a short coastline than it is expected that the proportion of the artificial coastline will be larger to provide facilities for all human coastal and maritime activities. When defining GES thresholds, these should be considered; i.e., different thresholds could be defined for different parts of coastline. For the definition of country specific GES, the list of assessment criteria and the Guiding document prepared by PAP/RAC can be utilised (PAP/RAC, 2021), including the results of testing the Guiding document in Morocco (PAP/RAC, 2022).~~;~~

~~194.~~202. Also, measures and actions to achieve GES should be specified and may, in general, include the following three types:

a) Particular management actions needed in order to move towards GES.
b) Measures aimed at obtaining new knowledge for assessing and achieving GES (e.g., scientific research, application of innovative solutions at pilot locations).
c) Measures with the aim of disseminating knowledge to all stakeholders and involving them in defining measures and actions for achieving GES.

~~195.~~203. Particular management actions regarding coastline artificialisation could include:

a) Analysis of existing artificial coastlines and their categorization into those that are necessary, those that can be reduced and those that can be returned to nature (e.g., abandoned jetties, etc.).
b) When planning new artificial structures on the coastline, first analyse whether human needs can be achieved through better management of existing artificial structures and their functional transformations.
c) Along existing artificial coastlines: improve monitoring of environmental impacts and implement measures to reduce negative impacts (such as pollution, habitat fragmentation, noise, light pollution, water cycle).
d) For new artificial coastlines, examine the use of nature-based solutions and ensure financial or other benefits for their implementation.
e) Encouraging the use of coastline in a way that consumes spatial/natural resources as little as possible: e.g., restricting land-take for the second homes.
f) Protect, restore, conserve and enhance threatened and degraded coastal habitats.

~~196.~~204. Results of above measures and actions could be measured by km of reversed coastline (from artificial to natural), km of recovered coastal habitats, % of nature-based solutions used in e.g., coastal protection, number of innovative projects tested (e.g., beach nourishments without impacts on coastal habitats), number of people involved in GES awareness, number of people actively working on the measures, and alike.

Measures and actions required to maintain/achieve GES for EO8 Candidate Common Indicator 25

~~197.~~205. Varying geographic, socio-economic, cultural and environmental contexts of coastal zones require the application of specific measures and actions in order to achieve GES. First, in order to

define GES in a more objective way a technical manual should be prepared that will allow better understanding of concepts of integrity and diversity of coastal ecosystems and landscapes and their importance for ecosystem approach. This will also allow better assessment of land cover changes in the next QSR period, in particular for the areas with significant changes.

~~198.~~206. Second, more objective GES should be prepared either at the sub-regional level or at country level that will allow more objective assessments for the future QSR.

~~199.~~207. The main targets under EO8 could include the following:

a) Avoid further construction within the setback zone and the flooding prone low-lying coastal zone;
b) Give priority to low-lying coastal zone when preparing adaptation plans to climate change;
c) Maintain diverse and harmonised coastal land cover structure, and reverse dominance of urban land cover;
d) Keep and increase landscape diversity.
e) These general recommendations should be further elaborated and adapted to particular regions. In general, measures and action could be of the following types:
f) Particular management actions needed in order to move towards GES;
g) Measures aimed at obtaining new knowledge about assessing and achieving GES (e.g., scientific research, application of innovative solutions at pilot locations);
h) Measures with the aim of disseminating knowledge to all stakeholders and involving them in the actions for achieving GES.

~~200.~~208. Particular management actions regarding land cover change could include:

a) Analysis of existing built-up areas and their categorization into those that are necessary, those that can be reduced and those that can be returned to nature (e.g., abandoned industrial zones, etc.).
b) When planning new built-up areas, first analyse whether human needs can be achieved through better management of existing built-up areas and their functional transformations.
c) In existing built-up areas: improve monitoring of environmental impacts and implement measures to reduce negative impacts (such pollution, habitat fragmentation, noise, light pollution, water cycle).
d) For new construction areas, examine the use of nature-based solutions and ensure financial or other benefits for their implementation.
e) Encouraging the use of space in a way that consumes spatial/natural resources as little as possible: e.g., restricting land-take for second homes.
f) Protect, restore, conserve and enhance threatened coastal ecosystems and habitats (e.g., dunes, wetlands and coastal forests and woods, in particular).

Common measures to enhance knowledge gaps:

I. Strengthen the science-policy interface (SPI):

In order to improve the delivery of IMAP the following measures should guide addressing the gaps identified during the preparation of the 2023 MED QSR:

a) Strengthen the use of unprecedented achievements in science and technology in order to ensure that the growing development demands and a healthy ocean co-exist in harmony by identifying the most relevant innovative knowledge and technologies that are of utmost importance for reliable and cost-effective monitoring and assessment of the state of Mediterranean Sea with a focus on:

i. Promotion of inter-disciplinary research aimed at understanding and prediction in the Mediterranean Sea;
ii Mapping of all components of the Mediterranean marine environment, along with the anthropologic pressures across time scales;
iii. Application of observing and remote techniques to strengthen the IMAP-based monitoring practices and improve forecasts of the state of the marine environment;
iv. Application of holistic view within the "source-to-sea" framework to structure the assessment of the land-based pressures in conjunction with their impacts on the oceans.

b) Enhance partnerships and support the transfer of ocean knowledge for science-based management, with a focus on strengthening:

i. The national capacities related to monitoring and data analysis;
ii. The use of the scientific networks to support the objectives of partnerships for the science-policy interface (SPI);
iii. The synergies for marine science in the Mediterranean.

II. Improve IMAP InfoSystem database management:

IMAP-IS should be significantly improved. It should be restructured from the repository of data reported by the CPs into an advanced information system which supports integrated assessments and ensure the validation of uploaded data, first technically and then scientifically. It needs to provide a quarriable database, with export formats (vertical and horizontal) for scientific evaluation and presentation, therefore allowing IMAP users and data evaluators to sort, retrieve and export data based on any available parameter of the metadata and data. The formats of the extracted data should be compatible, to the extent possible with other standard analysis methodologies and presentation/mapping tools.

Most importantly, the QA/QC mechanism of the IMAP IS needs to be significantly strengthened including operational and scientific quality control of data. The implementation of QC/QA controls and data flagging is necessary. The online tools supporting assessments should also be integrated into IMAP IS.

DDs and DSs should be updated, as appropriate, further to the experince built during the present IMAP cycle of data reporting and the preparation of the 2023 MED QSR Pollution and Marine Litter assessments.

It is also necessary to invest significant resources to ensure IMAP IS interoperability with national databases This has to be followed by significant improvement of data quality control and quality assurance at the national level.

III. Improve the GES assessment:

For further improvement of the integrated GES assessment of IMAP Pollution and Marine Litter Cluster, it is necessary to continue streamlining the assessment methodologies applied for the environmental status assessment for the Pollution and Marine Litter Cluster within the 2023 MED QSR.

5. Main Actions and Measures Supported the work of UNEP/MAP for the Protection of the Mediterranean Sea and Coast since 2017 Med QSR

~~201.~~209. Since the adoption of MedQSR of 2017, a series of actions and measures were undertaken that supported the efforts made within the framework of UNEP/MAP-Barcelona Convention. The main measures adopted by the Contracting Parties to the Barcelona Convention since 2017 are:

- The **UNEP/MAP Medium-Term Strategy 2022-2027** (MTS) adopted in 2021 as a key strategic framework for the development and implementation of the Programmes of Work of UNEP/MAP. It aims at achieving transformational change and substantial progress in the implementation of the Barcelona Convention and its Protocols, also providing a regional contribution to relevant Global processes[15].
- **Designation of the Mediterranean Sea Emission Control Area for Sulphur Oxides and Particulate Matter**: The Contracting Parties to the Barcelona Convention successively adopted two consensual decisions at their 21st meeting (Naples, Italy, 2-5 December 2019) and 22nd meeting (Antalya, Türkiye, 7-10 December 2021) concerning the designation of the Mediterranean Sea Emission Control Area for Sulphur Oxides and Particulate Matter (Med SOX ECA), pursuant to Annex VI to the International Convention for the Prevention of Pollution from Ships (MARPOL).
- **The Regional Plan on Urban Wastewater Treatment.** It applies to the collection, treatment, reuse and discharge of urban wastewaters and the pre-treatment and discharge of industrial wastewater entering collecting systems from certain industrial sectors. Its objective is to protect the coastal and marine environment and human health from the adverse effects of the wastewater direct and or indirect discharges, in particular regarding adverse effects on the oxygen content of the coastal and marine environment and eutrophication phenomena as well as promote resource water and energy efficiency.
- **Regional Plan on Sewage Sludge Management**. It applies to the treatment, disposal and use of sewage sludge from Urban Wastewater Treatment Plants. Its objective is to ensure effective reuse of beneficial substances and exploitation of energy potential of sewage sludge, while preventing harmful effects on human health and the environment.
- **The Updated Regional Plan on Marine Litter Management in the Mediterranean.** The updated version of the Regional Plan further expands the provision of the version adopted in 2013, to include a number of additional elements, i.e., new definitions, expanded scope of measures in 4 principal areas (economic instruments, circular economy of plastics, land-based and sea-based sources of marine litter), and amendments targets for plastic waste and microplastics.
- The under development **Regional Plans on (a) Agriculture, (b) Aquaculture, and (c) Storm Water, Management in the Mediterranean,** which are expected to be approved by COP23 in December 2023.
- **The Common Regional Framework for Integrated Coastal Zone Management**. It provided the Methodological Guidance for Reaching Good Environmental Status (GES) through ICZM. Its objective is to support the implementation of the EcAp in a coordinated and integrated manner so to take all EOs and their GES into account through the implementation of the ICZM Protocol and other Protocols and related key documents.
- Following the emerging need to introduce MSP in the entire Mediterranean Region and to provide a planning tool to assist achieving GES of marine environment, the COP 20 (17-20 December 2017, Tirana, Albania) adopted the **Conceptual Framework for Marine Spatial Planning** as a guiding document to facilitate the introduction of this management tool into the Barcelona Convention framework, with the aim to further support achieving Good Environmental Status (GES) of the Mediterranean Sea and Coasts; investigate in more details connections between land and sea areas; and propose coherent and sustainable land and sea-

[15] In particular the 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs), the UN Decade on Ecosystem Restoration, the UN Decade of Ocean Science for Sustainable Development and the UNEP's Medium-Term Strategy 2022-2025, approved at UNEA-5 in February 2021.

use planning frameworks relating with key economic sectors and activities that may affect the coastal and marine resources.

- In order to provide best assistance to the CPs for the implementation of Marine Spatial Planning a **MSP Workspace** has been prepared and training provided for the region's planners and other MSP practitioners who can access information and tools, and share knowledge, news and insight on MSP. https://msp.iczmplatform.org/
- The **Post-2020 SAPBIO**16 and the **Post-2020 Regional MCPAs and EOCMs Strategy**17, both adopted in 2021 as action-oriented policies for the preservation of the marine and Coastal Biodiversity that contribute to achieve the respective targets of the Sustainable Development Goals and the CBD Post-2020 Global Biodiversity Framework, through the optic of the Mediterranean context.
- The **Mediterranean Strategy for the Prevention of, Preparedness, and Response to Marine Pollution from Ships** (2022-2031). Adopted in 2021 to enhance the implementation of the Protocol concerning Cooperation in Preventing Pollution from Ships and, in Cases of Emergency, Combating Pollution of the Mediterranean Sea. It sets seven Common Strategic Objectives addressing key ships related environmental issues (pollution, climate change, air emission, marine litter (plastic and), Nin-Indigenous Species, designation of special areas, emerging issues related to pollution from ships in the Mediterranean). Its implementation is supported by an Action Plan made of 190 specific actions expected to be implemented in the next ten years.
- The **Strategic Action Programme to address pollution from land-based activities** (SAP-MED) adopted in 1997 as a long-term policy (2000-2025) focused on combatting pollution from land-based sources and activities and their impact on marine and coastal environment. Its objective is to improve the quality of the marine environment of the Mediterranean through facilitating the implementation by the Contracting Parties of the LBS Protocol and promoting shared-management of the land-based pollution. The SAP-MED was designed to assist Parties in taking actions individually or jointly within their respective policies, priorities and resources, which will lead to the prevention, reduction, control and/or elimination of the degradation of the marine environment, as well as to its recovery from the impacts of land-based activities.
- The **Ballast Water Management Strategy for the Mediterranean Sea** (2022-2027) adopted in 2021 updates a first strategy in 2012. The overall objectives of this Strategy are to: (i) establish a framework for a regional harmonised approach in the Mediterranean on ships' ballast water control and management which is consistent with the requirements and standards of the Ballast Water Management Convention; (ii) initiate some preliminary activities related to the management of ships' biofouling in the Mediterranean region; and (iii) contribute to the achievement of GES with respect to NIS as defined in IMAP.
- The **Regional Action Plan on Sustainable Consumption and Production in the Mediterranean** adopted in 2016 as a substantive contribution by the Mediterranean Region to the implementation of the 2030 Agenda for Sustainable Development. It defines common objectives and identifies actions guiding the implementation of the sustainable consumption and production at the national level, addressing, as appropriate, key human activities which have a particular impact on the marine and coastal environment and related transversal and cross-cutting issues.

16 The Strategic Action Programme for the Conservation of Biodiversity and Sustainable Management of Natural Resources in the Mediterranean Region (Post-2020 SAPBIO). It was adopted in 2021

17 The Post-2020 Regional Strategy for marine and coastal protected areas and other effective area-based conservation measures in the Mediterranean

~~202.~~210. The UNEP/MAP efforts for the preservation of the Mediterranean Sea and Coast are a contribution from the region to achieve global objectives in relation to the marine environment. In addition to providing a regional contribution to achieve the relevant Sustainable Develop Goals, the action of UNEP/MAP is harmonised with the following global processes since 2017:

- UN Decade on Ecosystem restoration (2021-2030).
- UN Decade of Ocean Science for Sustainable Development (2021-2030).
- UNEP Regional Seas Strategic Directions 2022-2025.
- The Ecosystem Approach: Towards a practical application across Regional Seas Conventions and Action Plans.
- UNEP Marine and Coastal Strategy 2020-2030.
- Post-2020 global biodiversity framework (CBD).
- United Nations Environment Assembly: UNEA-3 (December 2017), UNEA-4 (March 2019), UNEA-5 (February 2021).
- The relevant Decisions of UNFCCC COP 27 (Sharm el-Sheikh from 6 to 20 November 2022).
- The Intergovernmental Negotiating Committee (INC) mandated to develop legally binding global treaty to control plastic pollution.

~~203.~~211. In addition to the measures undertaken within the framework of the UNEP/MAP, the conservation of the Mediterranean Sea and Coast benefited from measures adopted as part of European Union policies of relevance for the Mediterranean marine and coastal environment. These included in particular:

- The EU Sustainable blue economy, new approach.
- The EU Biodiversity strategy for 2030.
- The EU Nature restoration Law proposal.
- The EU Circular economy action plan.
- The EU MSP Directive and implementation.
- The EU Green Deal for the Climate neutrality.
- The EU Marine Strategy Framework Directive.
- The EU Plastics Strategy.
- The EU Single-use Plastic Directive.
- The EU Green Deal Policy Framework.
- The EU Waste Framework Directive.
- The EU Revised Port Reception Facilities Directive.

Annex II

New/Updated IMAP Assessment Criteria for Nutrients, Contaminants and Marine Litter within the framework of preparation of the 2023 MED QSR

PART I: Pollution

1. The assessment criteria for Common Indicators 13 and 14[18]

Table 1. Major coastal water types in the Mediterranean

	Type I	**Type II-A, II-A Adriatic**	**Type III-W**	**Type III-E**	**Type Island-W**
σt (density)	<25	25<d<27	>27	>27	All ranges
S (salinity)	<34.5	34.5<S<37.5	>37.5	>37.5	All ranges

Note: With the view to assess eutrophication, the classification scheme on Chl a concentration (in µg/l)is optimal in coastal waters as a parameter easily applicable by all Mediterranean countries based on the indicative thresholds and reference values presented in Table 3.
Noe: The major coastal water types are also indicative of the part of offshore waters next to coastal waters; however, it should be used with caution in the offshore (open) areas.

Table 2. Coastal water types reference conditions and boundary values in the Mediterranean, along with the new and updated values for coastal and open (offshore) waters in the Adriatic Sea Sub-region[19].
(Reference conditions and boundary (Good/Moderate status) values, expressed as G_mean annual values, are based on long time series (>5 years) of monthly sampling at least, which differ from type to type on the sub-regional scale, and therefore, were built with different strategies).

	Coastal waters					
	Reference conditions of *c*(Chl*a*) (µg/L)		**Boundaries of *c*(Chla) (µg/L) for G/M status**		**Reference conditions of *c*(TP) (µmol/L)**	**Boundaries of *c*(TP) (µmol/L) for G/M status**
Water Typology	*G_mean*	90% percentile	*G_mean*	90% percentile		
Type I	1,4	3,33[b]	6,3	10		
Type I Adriatic	1,4	3,94	5,0[a]	14,1	0,19 [a]	0,55 [a]
Type II-A-FR-SP[d]	-	1,9	-	3,58	-	-
Type II-A Adriatic	0,33	0,87	1,5	4,0	0,16 [a]	0,48 [a]
Type II-A[e] Tyrrhenian	0,32	0,77	1,2	2,9	-	-
Type III-W Adriatic[c]	-	-	0,64[f]	1,7[f]	-	0,26
Type III-W Tyrrhenian	-	-	0,48	1,17	-	-
Type III-W-FR-SP		0,9		1,80	-	-
Type III-E		0,1		0,4		
Type Island-W		0,6		1,2-1,22		

	Open (offshore) waters in the Adriatic Sea Sub-region					
	Reference conditions of *c*(Chl*a*) (µg/L)		**Boundaries of *c*(Chl*a*) (µg/L) for G/M status**		**Reference conditions of *c*(DIN) (µmol/L)**	**Boundaries of *c*(DIN) (µmol/L) for G/M status**
Water Typology	*G_mean*	90 % percentile	*G_mean*	90 % percentile		
Type I Adriatic	0,15[g]; 0,29[h]	0,42[f]; 0,81[g]	3,1	8,7	0,21[g]; 0,66[h]	22.3
Type II-A Adriatic	0.11	0.29	-	-	-	-
Type III-W Adriatic [c]	-	-	0.64	1.7	-	-

18 For ease of reference, the Secretariat included the values as approved by Decisions IG.22/7 (COP 19) and IG. 23/6 (COP 20) which are shown in shaded cells.
19 The new values are calculated based on data as available by December 2022.

[a] *From Giovanardi et al, 2018*
[b] *Applicable to Golf of Lion Type I coastal waters*
[c] *The ecological classification scheme would not be suitable for proper and safe classification, and therefore the boundary values for WT III-W Adriatic waters are based on the H/G values for WT II-A Adriatic in coastal waters i.e. 0.64 µg/L for Chla and 0,26 µmol/L for TP*
[d] *Correction of error included to ensure consistency with the classification as provided in Commission Decision 2013/480/EU i.e. Type II -FR-SP, as included in Decision IG.22/7, replaced with Type II -A-FR-SP*
[e] *Correction of error included to ensure consistency with the classification as provided in Commission Decision 2013/480/EU i.e., Type II-A Tyrrhenian replaced Type II-B Tyrrhenian, as included in Decision IG.22/7, since the latter does not exist in the Tyrrhenian Sea*
[f] *values based on the H/G values for WT II-A[c] The ecological classification scheme would not be suitable for proper and safe classification, and therefore the boundary values for WT III-W Adriatic waters are based on the H/G values for WT II-A Adriatic in coastal waters i.e. 0.64 µg/L for Chla and 0,26 µmol/L for TP*
[g] *for ME;* [h] *for HR, IT*
[h] *No pressure – effect relationship was found, and therefore RC for DIN and boundary G/M values for Chla and DIN could not be proposed.*

2. The assessment criteria for IMAP Common Indicator 17[20][21]

2.1 The BC and BAC values for IMAP Common Indicator 17

Table 3. The BC and BAC values for trace metals in sediments. .The units of concentration are given in µg/kg dry wt, as requested by IMAP.

The BC and BAC values for trace metals in sediments					
The BC values in sediments, µg/kg dry wt					
TM	MED	WMS	ADR	CEN	AEL
Cd	107	140	120	#	78.9
Hg	50.0	90.0	50.0	#	31.5
Pb	15000	16000	15700	1805	15674
The BAC values in sediments, (µg/kg dry wt)					
	Med	WMS	ADR	CEN	AEL
Cd	161	210	180	#	118
Hg	75.0	135	75.0	#	47.3
Pb	22500	24000	23550	2708	23511
*#All data points for Cd are **BDL** as well as 72% of the Hg data points.*					

Table 4. The BC and BAC values for Polycyclic Aromatic Hydrocarbons **(**PAHs) in sediments. The units of concentration are given in µg/kg dry wt, as requested by IMAP.

The BC and BAC values for Polycyclic Aromatic Hydrocarbons (PAHs) in sediments					
	The BC values in sediments, µg/kg dry wt				
PAH compounds	MED	WMS	ADR	CEN	AEL
Naphthalene	2.00	8.0	2.0	#	2.3
Acenaphthylene	(1.0)[#]	#	#	0.4	#
Acenaphthene	(2.0)[#]	#	#	*	#
Fluorene	(2.0)[#]	#	#	0.4	#
Phenanthrene	3.10	14.9	3.5	0.8	3.1
Anthracene	(2.2)[#]	#	#	#	#
Fluoranthene	5.00	#	7.0	0.1	2.7
Pyrene	6.20	24.8	8.0	0.4	3.0
Benzo[a]anthracene	3.38	19.7	4.1	*	1.8
Chrysene	2.70	35.9	4.6	1.6	1.6
Benzo(b)fluoranthene	5.00	8.7	15.0	*	2.6
Benzo(k)fluoranthene	4.00	#	3.0	*	#
Benzo[a]pyrene	(4.0)[#]	#	4.0	#	1.0

[20] For ease of reference, the Secretariat included the values as approved by Decisions IG.22/7 0F (COP 19) and IG. 23/6 (COP 20) which are shown in shaded cells.
[21] The new values are calculated based on data as available by December 2022

The BC and BAC values for Polycyclic Aromatic Hydrocarbons (PAHs) in sediments					
Benzo[g,h,i]perylene	(4.2)#	#	5.7	*	1.8
Dibenz[a,h]anthracene	(1.0)#	7.0	#	*	#
Indeno[1,2,3-c,d]pyrene	(4.0)#	#	4.4	*	2.1
Sum PAHs	27.4	160	41.0	6.3	21.4
	The BAC values in sediments, µg/kg dry wt				
PAH compounds	MED	WMS	ADR	CEN	AEL
Naphthalene	3.0	12.0	3.0	#	3.5
Acenaphthylene	(1.5)#	#	#	0.6	#
Acenaphthene	(3.0)#	#	#	*	#
Fluorene	(3.0)#	#	#	0.5	#
Phenanthrene	4.7	22.4	5.3	1.2	4.7
Anthracene	(3.3)#	#	#	#	#
Fluoranthene	7.5	#	10.5	0.2	4.1
Pyrene	9.3	37.1	12.0	0.6	4.5
Benzo[a]anthracene	5.1	29.6	6.2	*	2.7
Chrysene	4.0	53.9	6.9	2.4	2.4
Benzo(b)fluoranthene	7.5	13.0	22.5	*	3.8
Benzo(k)fluoranthene	6.0	#	4.5	*	#
Benzo[a]pyrene	(6.0)#	#	6.0	#	1.5
Benzo[g,h,i]perylene	(6.3)#	#	8.6	*	2.7
Dibenz [a,h]anthracene	(1.5)#	10.5	#	*	#
Indeno[1,2,3-c,d]pyrene	(6.0)#	15.0	6.5	*	3.2
Sum PAHs	41.0	240	61.5	9.5	32.0

*#most data (>50%) below detection limit, * no data reported*

Table 5. The BC and BAC values for trace metals in mussel (*M. galloprovincialis*) and fish (*M. barbatus*) . The units of concentration are given as requested by IMAP.

The BC and BAC values for trace metals in mussel soft tissue (*M. galloprovincialis*), µg /kg dry wt					
The BC values					
TM	**MED**	**WMS**	**ADR**	**CEN**	**AEL**
Cd	710	1030	629	*****	942>
Hg	77.9	85.0	75.4	*****	110>
Pb	1100	1260	1000	*****	2300>
The BAC values					
TM	**MED**	**WMS**	**ADR**	**CEN**	**AEL**
Cd	1065	1545	944	*****	1413>
Hg	117	128	113	*****	165>
Pb	1650	1890	1500	*****	3450>

** Only a few data points were available for the CEN. The calculated BCs were lower than in other sub-regions, however, the few data are not representative of the CEN.*

> Since new data were not available in the AEL to update BC/BAC values for M. galloprovincialis, it was approved to use the values calculated in 2019.

The BC and BAC values for trace metals in fish muscle *(Mullus barbatus*), µg/kg wet wt					
The BC values					
TM	**MED**	WMS	ADR	CEN	AEL
Cd	3.9	*	5.3	*	3.6
Hg	40.6	*	120	*	33.7
Pb	18.3	*	40.8	*	13.5
BAC values					
	MED	WMS	ADR	CEN	AEL
Cd	7.8	*	10.6	*	7.2
Hg	81.2	*	240	*	67.4
Pb	36.6	*	81.6	*	27.0

** Given the lack of data, it was not possible to propose values for BC in these sub-regions, therefore it was approved to use the regional MED BC values for the GES assessment*

Table 6. The BC and BAC values for Polycyclic Aromatic Hydrocarbons **(**PAHs) in mussel (*M. galloprovincialis)* . The unit of concentration is given in µg/kg dry wt, as requested by IMAP. No data were available for the CEN and the AEL Sub-regions.

The BC and BAC values for Polycyclic Aromatic Hydrocarbons (PAHs) in mussel (*M. galloprovincialis)*, µg/kg dry wt			
BC values			
	MED	WMS	ADR
Naphthalene	0.56	0.52	#
Acenaphthylene	(0.05)#	#	#
Acenaphthene	(0.50)#	#	#
Fluorene	2.50	7.87	#
Phenanthrene	5.35	19.9	2.25
Anthracene	1.12	0.94	#
Fluoranthene	4.83	10.0	#
Pyrene	2.50	5.54	#
Benzo[a]anthracene	0.60	0.69	#
Chrysene	2.54	2.98	#
Benzo(b)fluoranthene	1.00	1.36	#
Benzo(k)fluoranthene	1.00	0.73	#
Benzo[a]pyrene	(1.00)#	0.94	#
Benzo[g,h,i]perylene	1.00	0.67	#
Dibenz[a,h]anthracene	(0.10)#	#	#
Indeno[1,2,3-c,d]pyrene	(0.63)#	0.29	#
Sum 16 PAHs.[22]	5.80	5.60	6.60
The BAC values			
	MED	WMS	ADR
Naphthalene	0.84	0.79	#
Acenaphthylene	(0.08)#	#	#
Acenaphthene	(0.75)#	#	#
Fluorene	3.75	11.8	#
Phenanthrene	8.03	29.8	3.38
Anthracene	1.68	1.40	#
Fluoranthene	7.25	15.0	#
Pyrene	3.75	8.31	#
Benzo[a]anthracene	0.90	1.04	#
Chrysene	3.81	4.46	#
Benzo(b)fluoranthene	1.50	2.04	#
Benzo(k)fluoranthene	1.50	1.09	#
Benzo[a]pyrene	(1.50)#	1.42	#
Benzo[g,h,i]perylene	1.50	1.01	#
Dibenz[a,h]anthracene	(0.14)#	#	#
Indeno[1,2,3-c,d]pyrene	(0.94)#	0.43	#
Sum 16 PAHs	8.70	8.40	9.90

#most data (>50%) below detection limit;

Table 7. The BAC values for organochlorinated contaminants (PCBs and pesticides) in sediments and mussel (*M. galloprovincialis*). The unit of soncentrations is given in µg/kg dry wt, as requested by IMAP. For sediments, very limited data were available for the CEN sub-region, while for biota no data were available for

[22] Data dictionary gives 2 additional categories: Sum 4 PAHs Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Indeno(1,2,3-cd)pyrene) and Sum 5 PAHs (Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(ghi)perylene, Indeno(1,2,3-cd)pyrene). It is suggested that they be considered for use in the future data reporting.

the CEN and AEL sub-regions. When most (>50%) of the data points were below the detection limit for the sub-regions, BACs were not calculated.

The BAC values for organochlorinated contaminants (PCBs and pesticides) in sediments and mussel (*M. galloprovincialis*)					
SEDIMENTS, µg/kg dry wt	MED	WMS	ADR	CEN	AEL
PCBs					
PCB28	0.10	#	#	#	0.09
PCB52	0.07	0.10	0.09	#	0.04
PCB101	0.10	0.16	0.16	*	#
PCB118	0.10	0.46	0.18	#	0.01
PCB138	0.11	0.26	0.24	#	#
PCB153	0.14	0.40	0.28	#	0.02
PCB180	0.09	0.13	0.13	#	#
Sum 7 PCBs	0.40	1.60	0.21	#	0.19
Pesticides					
γ-HCH (Lindane)	(0.1)#	#	#	*	0.02
DDE(p,p')	(0.1)#	0.23	#	#	*
Hexachlorobenzene	(0.1)#	#	#	#	*
Dieldrin	(0)#		#	#	#
BIOTA – MG, µg/kg dry wt	MED	WMS	ADR	CEN	AEL
PCBs					
PCB28	0.20	0.07	1.38	*	*
PCB52	0.38	0.3	0.5	*	*
PCB101	1.20	1.1	1.4	*	*
PCB118	1.23	1.5	1.4	*	*
PCB138	2.31	2.4	3.3	*	*
PCB153	3.45	4.6	4.6	*	*
PCB180	0.50	0.3	0.5	*	*
Sum 7 PCBs	18.4	28.6	17.3	*	*
Pesticides					
γ-HCH (Lindane)	(1.0)#	#	#	*	*
DDE(p,p')	3.05	3.05	*	*	*
Hexachlorobenzene	(0.5)#	#	#	*	*
Dieldrin	(1.0)#	#	*	*	*

*# most data (>50%) below detection limit. * no data reported*

2.2 The Environmental Assessment Criteria (EAC) values for IMAP CI 17

Table 8. The Mediterranean EAC values for trace metals in sediments and biota, as endorsed by Decision IG.23/6

The Mediterranean EAC values for trace metals in sediments and biota			
TM	**MedEAC***	**#MedEAC**	**#MedEAC**
	Sediments, µg/kg dry wt	***M. galloprovincialis*, µg/kg dry wt**	***Mullus barbatus*, µg/kg wet wt**
	IG.23/6	IG.23/6	IG.23/6
Cd	1200	5000	50
Hg	150	2500&	1000
Pb	46700	7500	300

** Med EAC values equal to ERL (Effects Range Low, Long et al. 1995, idem OSPAR values). # Med EAC values equal to the maximum regulatory levels for contaminants in foodstuffs as provided in EC/EU 1881/2006 and 629/2008 Directives*
& Not included in EU directives, but adopted by OSPAR

Table 9. The Mediterranean EAC values for Polycyclic Aromatic Hydrocarbons **(**PAHs) in sediments and biota, as endorsed by Decisions IG.23/6 and IG.22/7, along with a few updated values to ensure consistency with ERL Long et al., and OSPAR EAC values

The Mediterranean EAC values for Polycyclic Aromatic Hydrocarbons (PAHs) in sediments and biota				
	Sediments, µg/kg dw		**Biota Mussels, µg/kg dw**	
PAH compounds	**EAC* IG.22/7 and IG.23/6 - OSPAR and ERLs**	**ERL Long et al, 1995[#]**	**EAC** IG.22/7 and IG.23/6 - OSPAR**	**OSPAR[#]**
Naphthalene		160		340
Acenaphthylene		44		
Acenaphthene		16		
Fluorene		19		
Phenanthrene	240		1700	
Anthracene	85		290	
Fluoranthene	600		110	
Pyrene	660		100	
Benzo[a]anthracene	261		80	
Chrysene	384			
Benzo(b)fluoranthene				
Benzo(k)fluoranthene			260	
Benzo[a]pyrene	430		600	
Benzo[g,h,i]perylene	85		110	
Dibenz [a,h]anthracene		63.4		
Indeno[1,2,3-c,d]pyrene	240			
Sum 16 PAHs		4022		

The Mediterranean EAC values for Polycyclic Aromatic Hydrocarbons (PAHs) in sediments and biota				
	Sediments, µg/kg dw		Biota Mussels, µg/kg dw	
PAH compounds	**EAC* IG.22/7 and IG.23/6 - OSPAR and ERLs**	**ERL Long et al, 1995#**	**EAC** IG.22/7 and IG.23/6 - OSPAR**	**OSPAR#**

** Med EAC values equal to ERL (Effects Range Low, Long et al. 1995, idem OSPAR values)*
*** Med EAC values equal to OSPAR values*
 # Med EAC values equal to ERL (Effects Range Low, Long et al., 1995) which were not included in Decisions IG.22/7 and IG.23/6.

Table 10. The Mediterranean EAC values for for organochlorinated contaminants (PCBs and pesticides) in sediments and biota, as endorsed by Decisions IG.23/6 and IG.22/7 along with the one updated value

The Mediterranean EAC values for for organochlorinated contaminants (PCBs and pesticides) in sediments and biota					
	Sediments			Mussel	Fish
PCBs	**EAC# IG.22/7 (µg/kg dry wt) – updated**	**EAC* IG.22/7 (µg/kg dry wt)**	**EAC** IG.23/6 (µg/kg dry wt)**	**EAC** IG.22/7 and IG.23/6 (µg/kg dry wt)**	**EAC** IG.22/7 and IG.23/6 (µg/kg lipid)**
CB28			1.7	3.2	64
CB52			2.7	5.4	108
CB101			3	6	120
CB118			0.6	1.2	24
CB138			7.9	15.8	316
CB153			40	80	1600
CB180			12	24	480
Sum 7 PCBs	67,9				
Pesticides					
γ-HCH (Lindane)		3		1.45	11 µg/kg ww
DDE(p,p')		2.2		5-50	
Hexachlorobenzene		20			
Dieldrin		2		5-50	

** ERL (Effects Range Low, (Long et al., 1995) or used by OSPAR (2009)*
*** From OSPAR (2009)*
#The EAC value of 11.5 µg/kg dry wt in Decision IG 22/7 originated probably from Long et al, 1995 as explained in document UNEP/MED 427/Inf.3. However, Long et al.,1995 present the ERL value of 22.7 µg/kg dry wt for Total PCBs in sediments but do not specify which congeners were considered. Moreover, OSPAR has not adopted an EAC value for the sum of 7 PCBs in sediments. Therefore, further to experience related to the preparation of the assessments within the 2023 MED QSR, the EAC value of 67,9 is included to present the sum of 7 individual IMAP PCB congeners.

3. The Environmental Assessment Criteria (EAC) related to IMAP Common Indicator 20

Table 11.The Mediterranean EACs values for CI 20 related to trace metals based on the maximum regulatory levels for trace metals in foodstuffs for the protection of human health, as provided in EC/EU Directives1881/2006 and its amendments 488/2014 and 1005/2015. The concentrations are presented in mg/kg wet wt.

The EAC CI 20 for trace metals- EU 1881/2006 directive and its amendments 488/2014 and 1005/2015			
	TM, mg/kg wet wt		
matrix	**Cd**	**Hg**	**Pb**
fish muscle	0.05-0.25	0.5-1	0.3
cephalopods	1		1
crustaceans	0.5	0.5	0.5
bivalve mollusc	1		1.5

Table 12. The Mediterranean EAC values for IMAP CI 20 related to Benzo(a)pyrene and sum of four PAHs based on the maximum regulatory levels for these contaminants in foodstuffs for the protection of human health, as provided in EC/EU EC Regulations 835/2011 and 1259/2011 amending Regulation (EC) 1881/200.6. The concentrations are presented in µg/kg wet wt.

The EACs values for CI 20 related to Benzo(a)pyrene and sum of four PAHs (benzo(a)pyrene, benz(a)anthracene, benzo(b)fluorantheneand chrysene) - EC Regulation (EC) 1881/2006 and amendments 835/2011 and 1259/2011		
Matrix	**Maximum levels (µg kg^{-1} wet wt)**	
	Benzo(a) pyrene	**Sum of Benzo(a) pyrene, Benzo(a) anthracene, Benzo(a) fluoranthene and chrysene**
Smoked fish muscle	2-5	12-30
Smoked bivalve mollusc	6	35
Bivalve mollusk (fresh, chilled or frozen)	5	30

Table 13. The Mediterranean EAC values for CI 20 related to Dioxins and PCBs based on the maximum regulatory levels for these contaminants in foodstuffs for the protection of human health, as provided in EC/EU EC Regulation 1259/2011 amending EC Regulation 1881/2006. The concentrations are presented in wet wt.

TheEACs values for CI 20 related to Dioxins and PCBs – EC Regulation 1259/2011 amending EC Regulation 1881/2006			
Foodstuffs	**Maximum levels**		
	Sum of dioxins (WHO-PCDD/F-TEQ) (1) pg g^{-1} ww	**Sum of dioxins and dioxin-like PCBS (WHO-PCDD/F-PCB-TEQ) (1) pg g^{-1} ww**	**Sum of PCB28, PCB52, PCB101, PCB138, PCB153 and PCB180 (ICES 6) ng g^{-1} ww**
Fish muscle	3.5	6.5	75
Fish liver	3.5	20	200
Eel muscle	3.5	10	300

(1) Dioxins (sum of polychlorinated dibenzo-para-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs), expressed as World Health Organisation (WHO) toxic equivalent using the WHO-toxic equivalency factors (WHO-TEFs)) and sum of dioxins and dioxin-like PCBs (sum of PCDDs, PCDFs and polychlorinated biphenyls (PCBs), expressed as WHO toxic equivalent using the WHO-TEFs). WHO-TEFs for human risk assessment based on the conclusions of the World Health Organization (WHO) (For TEF values see note 31, (EC) Regulation 1259/2011 – Annex 1.1.9.).
Where fish are intended to be eaten whole, the maximum level shall apply to the whole fish.

4. The Environmental Assessment Criteria (EAC) values for IMAP CI 18[23]

Table 14. The The Mediterranean BACs and EACs for biomarkers in mussel (*M. galloprovincialis*) as endorsed by Decisions IG.22/7 and IG.23/6.

The Mediterranean BACs and EACs for biomarkers in mussel (*M. galloprovincialis*)				
Biomarkers/Bioassays and units	BACs IG.23/6 in Mussels (*Mytilus galloprovincilais)*	EACs IG.23/6 in Mussels (*Mytilus galloprovincilais)*	BACs IG.22/7 in Mussels (*Mytilus galloprovincilais)*	EACs IG.22/7 in Mussels (*Mytilus galloprovincilais*)
Lysosomal membrane stability Neutral Red Retention Assay (minutes)			120[a*]	50 [a*]
Lysosomal membrane stability Cytochemical method (minutes)			20 [a*]	10 [a*]
AChE activity (nmol min-1 mg-1 protein) in gills (French Mediterranean waters)			29	20
AChE activity (nmol min^{-1} mg^{-1} protein) in gills (Spanish Mediterranean waters)			15	10
Stress on Stress (days)	11	5		
Metallothioneins (µg/g digestive gland)	247			

[23] For ease of reference, the Secretariat included the values as approved by Decisions IG.22/7 0F (COP 19) and IG. 23/6 (COP 20) which are shown in shaded cells.

Micronuclei frequency (number of cases /1000 cells) in haemocytes)	1			

[a]Technical annex: assessment criteria for biological effects measurements. Integrated monitoring of chemicals and their effects. ICES Cooperative Research Report No. 315. Davies, I.M. and Vethaak, A.D.Eds.
**Moore et al., 2006 (Standard values adopted by ICES)*

PART II: Marine Litter

5. Baseline Values (BV) and Threshold Values (TV) for IMAP Common Indicator 23

Table 15: Baseline Values and Threshold Values for IMAP Common Indicator 23 (i.e., seafloor macrolitter and floating microplastic).

IMAP Indicators	Categories of Marine Litter	Baseline Values 2023	Threshold Value TV-2023
Common Indicator 23	Seafloor Macro-litter	135 items/km^2	38 items/km^2
Common Indicator 23	Floating Microplastics	0.044338 items/m^2	0.000845 items/m^2

Annex III
Elements for a Renewed Ecosystem Approach Roadmap/ Policy

Elements for a Renewed Ecosystem Approach Roadmap/ Policy

Introduction

1. The UNEP/MAP EcAp Roadmap 2008-2021 is a holistic policy framework for implementing the ecosystem approach in the Mediterranean Sea and coast. It has been implemented at regional, sub-regional, and national levels, with the objective to achieve and maintain Good Environmental Status (GES). In this framework, the condition of different ecosystem components and the presence and effects of key pressures are monitored through the Integrated Monitoring and Assessment Programme (IMAP).

2. The *Independent evaluation of the implementation of the EcAp Roadmap* (see UNEP/MED WG.567/Inf.4) indicates that the seven steps defined in Decision IG.17/6 (COP 15, 2008) have been implemented by UNEP/MAP in the related Mediterranean Sea policies. Moreover, numerous sub-regional programmes and projects supported the integration of the ecosystem approach and the implementation of national Integrated Monitoring and Assessment Programmes (IMAP).

3. The evaluation of the EcAp Roadmap also reveals that implementation, in particular at national level, needs to be reinforced and that some elements can be suggested for consideration in a process for a renewed Mediterranean EcAp policy.

4. The Analysis of ongoing and recent developments at global and regional level relevant to the ecosystem approach and IMAP (see UNEP/MED WG.567/Inf.5), gives a larger perspective to the elements identified at the Mediterranean level and brings-in additional points to consider.

5. Taking account of the outcomes of the aforementioned studies, elements of interest for a potential future EcAp policy development have been identified and are presented in this document. These elements were prepared in consultation with the UNEP/MAP Executive Coordination Panel (ECP).

6. Based on the analyses indicated above, the following issues have been identified, to be considered in the framework of a potential renew of the EcAp Roadmap:

(a) Climate change and ocean acidification,
(b) Marine and coastal ecosystem protection and conservation, and sustainable management,
(c) Ecosystem restoration,
(d) Supporting nature-based solutions and sustainable consumption and production in national programmes of measures to attain GES,
(e) Data acquisition, management and accessibility,
(f) Science-Policy Interface (SPI) and communication,
(g) Policy coherence, cooperation and efficiency,
(h) Include assessment of coastal terrestrial ecosystems in EcAp policy and IMAP,
(i) Integrate assessment of human activities sustainability using socio-economic parameters.

7. Table 1 below presents the linkages between the identified elements and the seven steps of the EcAp Roadmap as shown below. Three elements are proposed as cross-cutting thematic issues.

8. EcAp Roadmap seven steps:

Step I. Ecological vision for the Mediterranean
Step II. Common Mediterranean strategic goals
Step III. Identification of important ecosystem properties and assessment of ecological status and pressures
Step IV. Development of a set of ecological objectives corresponding to the Vision and strategic goals
Step V. Derivation of operational objectives with indicators and target levels.

Step VI. Revision of existing monitoring programmes for ongoing assessment and regular updating of targets.
Step VII. Development and review of relevant action plans and programmes

Table 1. Links between the seven steps of EcAp Roadmap and the proposed elements to be incorporated or reinforced in a renewed EcAp policy

Proposed themes/ EcAp Steps	**Step I**	**Step II**	**Step II**	**Step IV**	**Step V**	**Step VI**	**Step VII**
Climate change and ocean acidification							
Marine and coastal ecosystem protection and conservation, and sustainable management							
Ecosystem restoration							
Coastal terrestrial ecosystems							
Human activities sustainability through socio-economic parameters							
Supporting nature-based solutions and sustainable consumption and production in national programmes of measures to attain GES							
Cross-cutting thematic issues			Data acquisition, management and accessibility				
			Science-Policy Interface (SPI) and communication				
			Policy coherence, cooperation and efficiency (national policies, EU policies, GFCM, MSP)				

1. Seven steps of the EcAp Roadmap 2008-2021

1.1. Step I. Definition of an ecological vision for the Mediterranean.

The EcAp Roadmap 2008-2021 ecological vision has been defined in Decision IG.17/6 (COP 15, 2008) as:
"A healthy Mediterranean with marine and coastal ecosystems that are productive and biologically diverse for the benefit of present and future generations".

1.1.1. Climate change and ocean acidification

9. This EcAp vision does not refer to climate change concerns. Yet, the Mediterranean Sea is particularly impacted by climate change with rapid changes occurring, threatening its ecosystems and coastal human populations. The Intergovernmental Panel on Climate Change (IPCC) indicates that risks associated with projected climate change are particularly high for people and ecosystems in the

Mediterranean Basin (see cross-chapter paper 4 Ali et al., in IPCC, 2022[24]). Climate change effects include sea warming, destructive marine heat waves, ocean acidification, sea level rise, changes in current circulation patterns, and increased number of extreme climatic events such as floods (MedECC, 2020)[25].

10. The Mediterranean Strategy for Sustainable Development (MSSD) 2016-2025, adopted by all Mediterranean countries (Decision IG.22/2), which translates 2030 Agenda for Sustainable Development and the Strategic Goals at the regional level, includes an objective relative to climate change: "*Addressing climate change as a priority issue for the Mediterranean*".

11. The overall objective of the Ecosystem Approach roadmap is to achieve and maintain Good Environmental Status (GES) of the Mediterranean Sea and coasts. The status is measured by indicators monitored through IMAP. These indicators should reflect the state of the environment and ecosystems as well as the changes induced by anthropogenic pressures. Climate change is a human induced phenomenon that impacts the physical and chemical nature of the sea which affects its ecosystems functioning and species distribution.

12. Taking these points in account, it is recommended to consider climate change concerns in a renewed EcAp policy and in consequence refer to it in the EcAp vision.

13. The UNEP/MAP Medium-Term strategy (MTS) 2022-2027 vision recognises climate change impacts in its vision: "*Progress towards a healthy, clean, sustainable and climate resilient Mediterranean Sea and Coast…*". Resilience to climate change could likewise be added in the EcAp vision e.g., "*A healthy Mediterranean with marine and coastal ecosystems that are climate resilient, productive and biologically diverse…*"

1.2. Step II. Setting of common Mediterranean strategic goals.

14. The EcAp Roadmap 2008-2021 strategic goals have been defined in Decision IG.17/6 (COP15, 2008). These are:

a. To protect, allow recovery and, where practicable, restore the structure and function of marine and coastal ecosystems thus also protecting biodiversity, in order to achieve and maintain good ecological status and allow for their sustainable use.
b. To reduce pollution in the marine and coastal environment so as to minimise impacts on and risks to human and/or ecosystem health and/or uses of the sea and the coasts.
c. To prevent, reduce and manage the vulnerability of the sea and the coasts to risks induced by human activities and natural events.

1.2.1. General points

15. The strategic goals could be expressed in a clearer and more direct way and the objective of attaining and maintaining GES could be more clearly formulated.

16. Also, for the Contracting Parties which are EU Member States, the term "ecological status" refers to the Water Framework Directive with a determined 5 category classification of water bodies

[24] IPCC. (2022). *Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]*. Cambridge, UK and New York, NY, USA: Cambridge University Press. Cambridge University Press. Retrieved from https://report.ipcc.ch/ar6/wg2/IPCC_AR6_WGII_FullReport.pdf

[25] MedECC (2020) Climate and Environmental Change in the Mediterranean Basin – Current Situation and Risks for the Future. First Mediterranean Assessment Report [Cramer W, Guiot J, Marini K (eds.)] Union for the Mediterranean, Plan Bleu, UNEP/ MAP, Marseille, France from https://www.medecc.org/medecc-reports/climate-and-environmental-change-in-the-mediterranean-basin-current-situation-and-risks-for-the-future-1st-mediterranean-assessment-report/

based on specific elements to be measured. It may therefore be of interest to replace "ecological status" by "good environmental status", in coherence with GES term used in the next steps of EcAp implementation.

1.2.2. Climate change and ocean acidification

17. As mentioned previously, climate change is a human induced phenomenon that modifies the physical and chemical nature of the sea and impacts its ecosystems. It is a global phenomenon but is particularly impacting the Mediterranean Sea. It seems therefore important that a renewed Mediterranean Ecosystem Approach roadmap/policy recognizes climate change impacts and refers to it in its vision and strategic goals. Moreover, it appears difficult to attain the EcAp strategic goal (a) without taking climate change impacts in consideration.

18. If it is decided that climate change resilience/vulnerability should be included in a renewed Mediterranean EcAp policy, this concern could be added in strategic goal (c): *To prevent, reduce and manage the vulnerability of the sea and the coasts to risks induced by human activities, including climate change and natural events*.

1.2.3. Ecosystem restoration

19. In Strategic Goal (a), the term "*allow recovery*" could be replaced by e.g., "*enhance environmental conditions allowing recovery*" to include passive or active ecosystem restoration actions. .

1.3. Step III. Identification of important ecosystem properties and assessment of ecological status and pressures.

1.3.1. General points

20. Past research has been spatially uneven e.g., less in deeper environments and habitats, uneven in species groups and rare in marine ecosystem functioning. In consequence knowledge on marine ecosystems is uneven.

21. The UNEP/MAP documents ***The Initial Integrated Assessment of the Mediterranean Sea and Coastal Areas*** (UNEP/MAP, 2011) and ***Economic and social analysis of the uses of coastal and marine waters in the Mediterranean (Plan Bleu, 2014)***[26] answer this step at regional and sub-regional level, but lack of precision at national level. Moreover, some ecosystems were not considered.

22. UNEP/MAP work on the implementation of the EcAp roadmap with substantive contribution also from relevant EU financed programmes/projects has contributed to reduce spatial disparity in marine coastal ecosystem knowledge. Many reports though, highlight, (i) the lack of scientific knowledge on species distribution, habitat distribution, ecosystem functioning; (ii) the lack of knowledge on cumulative effects of anthropogenic impacts and on climate change impacts; and (iii) the lack of availability and accessibility of scientific knowledge, including within the science-policy interface. Further, the lack of socio-economic information relevant for assessing human-caused pressures and their level of sustainability has also been reported.

23. This step is essential at national level, especially in view of EcAp implementation and of establishing well designed Marine Spatial Planning. Progress has been made recently in data acquisition in many CPs, but efforts are still needed to acquire, assemble and communicate a clearer

[26] Plan Bleu. (2014). *Economic and social analysis of the uses of coastal and marine waters in the Mediterranean, characterization and impacts of the Fisheries, Aquaculture, Tourism and recreational activities, Maritime transport and Offshore extraction of oil and gas sectors* [Technical Report]. Valbonne. Retrieved from https://planbleu.org/wp-content/uploads/2015/08/esa_ven_en.pdf

image of ecosystem properties and status. **Efforts need to be continued at national level to identify important ecosystem properties and assessment of ecological status and pressures.**

24. Moreover, establishing a mapping system at regional level with the capacity of overlaying ecosystem state, pressures and human activities, using perhaps also modelling methods, could be considered. Such an approach would give a holistic and analytic view at various scales. Some geospatial data, clearly georeferenced, relative to features, habitats, NIS and protected areas as well as outcomes from some projects are available in a cartographic viewer[27]. However, data is overall too fragmented in sublayers, lacks coherence (e.g., in the Mediterranean Biodiversity Platform *Posidonia* beds are represented by different colours depending on the project from which data stems) and often too localised to obtain a picture even at national level. Work of MAP Components on databases, observatories and knowledge management tools should continue in a coordinated manner, while collaborations with partners in data network could be further considered to minimize the investment in mapping technologies and resources while developing an efficient mapping system.

1.3.2. Coastal terrestrial ecosystems

25. Having in mind the geographical coverage of the Barcelona Convention and of the ICZM Protocol in particular, the coastal terrestrial (i.e., non-marine) ecosystems such as wetlands, estuaries, coastal forests and woods and dunes, as well as coastal landscapes, which are in connection with coastal marine ecosystems, should be taken in consideration in a holistic, ecosystem approach. Identification of such important ecosystems, of their ecological status and the pressures they undergo are probably, at least partially, covered by national policies. Such assessments of these coastal areas could be included in a renewed EcAp policy and increase the interconnections between terrestrial and marine ecosystems, in line with LSI in the framework of ICZM Protocol. Moreover, these ecosystems at the interface of land and sea in the Mediterranean are particularly under pressure of human activities and climate change impacts.

1.3.3. Climate change and ocean acidification

(i) Important ecosystem properties and assessment of ecological status regarding climate change concerns

26. Assessment should give the ability to identify vulnerable areas and ecosystems regarding climate change impacts and where resilience could be increased by addressing local impacts and implementing nature-based solutions. Also, some ecosystems have the faculty of mitigating climate change impacts.

27. For example, coastal wetlands, woods, forests and dunes that are at the interface of land and sea have an important nature-based solution role facing climate change impacts. These ecosystems will undergo climate change impacts from land and sea and therefor are also particularly vulnerable.

28. Another example of ecosystem that has a role in mitigating climate change impacts but that is also vulnerable is the *Posidonia oceanica* based ecosystem. These seagrass meadows trap CO_2 and stock large quantities of carbon in the sediments contributing to reduce acidification of the Mediterranean Sea. Seagrass meadows and in particular *Posidonia oceanica* meadows appear therefore as having an important role in climate change mitigation (Monnier et al., 2021[28]; Hendriks et

[27] The Mediterranean Biodiversity Platform developed by SPA/RAC
[28] Monnier, B., Pergent, G., Mateo, M. Á., Carbonell, R., Clabaut, P., & Pergent-Martini, C. (2021). Sizing the carbon sink associated with *Posidonia oceanica* seagrass meadows using very high-resolution seismic reflection imaging. *Marine Environmental Research*, *170*, 105415.

al., 2022[29]; Monnier et al., 2022[30]). In parallel, seagrass meadows act as barriers protecting the coasts from erosion and represent an essential habitat playing a functional role of nursery for many fish.

29. **Better integrating coastal terrestrial ecosystems and acquiring at national and sub-regional level further precise spatialized data on ecosystems that have the ability to mitigate climate change impacts are necessary to evaluate the ecosystems' resilience capacity, measure efficiency of protection measures, and eventually of restoration actions.**

(ii) Assessment of pressures regarding climate change concerns

30. Assessment of pressures have been conducted throughout the previously mentioned reports at Mediterranean level (UNEP/MAP, 2011 and Plan Bleu, 2014), and global assessment of climate changes risks has been published by IPCC (2022) . However, MedECC 2020 report indicates that "a more comprehensive, systemic and holistic approach to interrelated processes and components would likely make useful contributions to environmental decision-making in the Mediterranean Basin. So far, an adequate and comprehensive assessment of risks posed by climate and environmental changes in the Mediterranean Basin is lacking (Cramer et al. 2018)".

31. UNEP/MAP Plan Bleu/RAC initiated a meeting that took place in Marseille in October 2022 entitled "*Coastal risks related to climate change in the Mediterranean Sea*"[31]. The outcomes of this meeting, together with Cross-Chapter 4 Mediterranean Region in IPCC (2022)[32] relative to climate change risks under different climatic scenarios, could be a starting point for a detailed assessment of risks relative to climate change at regional, sub-regional and perhaps national level. A climate change risk assessment focused on Mediterranean marine and coastal ecosystems and coastal societies by sub-region would help anticipate climate change impacts. Nature-based solutions, by enhancing protection of key climate change mitigating ecosystems, could then be envisaged in a precautionary way.

1.3.4. Human activities sustainability through socio-economic parameters

32. The absence of a comprehensive monitoring system of socio-economic characteristics and the sustainability of economic activities makes it difficult to establish clear links between the quality status of the Mediterranean Sea and the social and economic pillars of sustainable development which are at the origin of pressures and therefore the degradation of the Mediterranean Sea. In particular, while a certain level of information on demographic, economic and employment has been collected as part of the implementation of the EcAp, the level of environmental and social sustainability of human activities that impact the coastal and marine environment has not been adequately informed. A knowledge gap remains in measuring to what extent human activities are compatible or in line with the objective of achieving GES and clear sustainability indicators of human activities are generally lacking. This is a major blind spot for decision makers when designing effective policies aiming at achieving GES.

1.3.5. Marine and coastal ecosystem protection, conservation and sustainable management

[29] Hendriks, I. E., Escolano-Moltó, A., Flecha, S., Vaquer-Sunyer, R., Wesselmann, M., & Marbà, N. (2022). Mediterranean seagrasses as carbon sinks: Methodological and regional differences. *Biogeosciences*, *19*(18), 4619–4637.
[30] Monnier, B., Pergent, G., Mateo, M. Á., Clabaut, P., & Pergent-Martini, C. (2022). Quantification of blue carbon stocks associated with Posidonia oceanica seagrass meadows in Corsica (NW Mediterranean). *Science of The Total Environment*, *838*, 155864.
[31] https://planbleu.org/en/event/les-rendez-vous-du-plan-bleu-3-coastal-risks-related-to-climate-change-in-the-mediterranean-sea/
[32] IPCC (2022). *Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]*. Cambridge, UK and New York, NY, USA: Cambridge University Press. Cambridge University Press. Retrieved from https://report.ipcc.ch/ar6/wg2/IPCC_AR6_WGII_FullReport.pdf

33. Recognising that marine and coastal ecosystem protection, conservation and sustainable management were important features in the EcAp Roadmap 2008-2021, additional proposals are made to be taken into consideration.

34. The assessments conducted for this step, concern in majority, marine coastal areas from 0 to 60-80 m depth. Very little is known about deep-sea habitats status and impacts of human pressure on these habitats. **To protect and conserve deep-sea habitats it is proposed that they be assessed and mapped also at sub-regional level, as appropriate. Available data start to be consequent in some sub-regions, but it remains dispersed, so strengthened efforts are required in this respect in coordination with relevant MAP Components.**

35. **Also, analysing the representativeness of benthic habitats across the Mediterranean MCPAs would allow to assess the accomplishment of benthic habitat protection at regional level with respect to international conservation goals as well as identify protection gaps either in habitats or biological zones** (see approached used for the Azores in Milla-Figueras et al., 2020[33]).

1.4. Step IV. Development of a set of ecological objectives corresponding to the Vision and strategic goals.

36. COP 17 adopted a set of 11 Ecological Objectives (EOs) based on Article 18 of the Barcelona Convention and in line with the agreed ecological vision and strategic goals for the Mediterranean under the ecosystem approach (Decision IG. 20/4). The development of these EOs are in line with the 11 Descriptors of EU Marine Strategy Framework Directive (MSFD).

1.4.1. Climate change and ocean acidification

37. The 11 EOs defined in the EcAp Roadmap 2008-2021 do not address climate change impacts/vulnerability.

38. Yet, the MedECC (2020) report highlights the need for monitoring programmes producing regular quality-assured data on climate-linked parameters even in northern countries of the Mediterranean Sea.

39. Therefore**, the development of an Ecological Objective on climate change/acidification vulnerability/resilience should be considered in a renewed EcAp policy.** The objective would be to maintain the resilience capacities of ecosystems at a level sufficient to cope with known climatic impacts (e.g., increase in water temperature, increased acidification, increasing number of underwater heatwaves and extreme events).

40. A cross-cutting integrated Ecological Objective on climate change/acidification vulnerability/resilience could perhaps be defined based on parameters already monitored in IMAP such as the parameter Low Elevation Coastal Zone within CCI 25, parameters followed under EO 5 and indicators followed in other monitoring programmes. Also, parameters usefully added within an EO already defined (e.g., adding plankton and pelagic habitats in CI1 and 2) could also contribute to define a cross-cutting EO on climate change. Further, indicators or parameters monitored in coastal terrestrial ecosystems, are of interest for a climate change EO. It is recommended to consider these possibilities also perhaps taking into account additional parameters such as hydrological regime, physical chemical parameters etc. Also, collaboration with other Regional Seas Conventions, with experience on climate change monitoring and assessment and ocean acidification, such as OSPAR could be fruitful.

[33] Milla-Figueras, D., Schmiing, M., Amorim, P., Horta e Costa, B., Afonso, P., & Tempera, F. (2020). Evaluating seabed habitat representativeness across a diverse set of marine protected areas on the Mid-Atlantic Ridge. *Biodiversity and Conservation, 29*(4), 1153–1175.

41. If an Ecological Objective on climate change resilience is developed within a renewed EcAp policy, climatic change concerns should be also clearly present in the vision and the strategic goals.

1.4.2. Coastal terrestrial ecosystems

42. The status of coastal terrestrial ecosystems affects the coastal marine ecosystems assessed through IMAP. In many CPs, indicators are already monitored in these ecosystems to assess their state of conservation and the pressures they undergo. If, as proposed, the coastal terrestrial ecosystems are to be taken in consideration in a renewed EcAp policy, it is perhaps not necessary to create a new Ecological Objective but rather to include new parameters/indicators within the existent EOs. Further, cooperation with existing national and regional policies is requested to identify already existing parameters and indicators that can be of interest for IMAP.

1.5. Step V. Derivation of operational objectives with indicators and target levels.

1.5.1. General points

43. Ecological and operational objectives and indicators have been defined for the great majority of EOs and factsheets and guidelines have also been created. But monitoring scales and threshold values (TV) or clear targets are still being outlined for many indicators making it difficult to determine at national and sub-regional level whether or not GES has been achieved.

44. Operational Objectives, GES definitions, Common Indicators and related targets still need to be defined for EO 4, EO 6 and for EO 8. EO 11, and its two candidate indicators, is still at an initial phase of development (countries invited to test the two CCIs by developing pilot monitoring of these CCIs). EO 4 on food webs is a complex subject, therefore, the development of operational objectives, indicators and targets for EO 4 may benefit of some extra time. **It is recommended to finalize as soon as possible the development of indicators, define GES for EO 8 which are country-specific, target levels and factsheets for EO 6 and target levels and factsheets for Candidate Common Indicators of EO 11.**

45. Operational Objectives, GES definitions, Common Indicators, Assessment Criteria and related targets for the IMAP Ecological Objectives are dispersed. No synthetic updated document regrouping these elements was found. **Creating a practical online centralised information platform integrated into the MAP InfoSystem that would regroup all the current operational objectives (OO), targets for EOs and also data dictionaries and data standards (DD/DS), threshold values (TV), assessment criteria (AC), guidance factsheets and guidelines and monitoring protocols for the indicators of all EOs (including EO 3) could be considered. This would help CPs to implement IMAP at national level but also enhance Science-Policy Interface.**

1.5.2. Climate change and ocean acidification

46. If it is decided to include climate change concerns within the renewed EcAp policy, derivation of operational objectives and indicators would need to be developed in collaboration with climate change specialists such as MedECC.

47. To better understand resilience/vulnerability of ecosystems to climate change, a first step could consist in collating existing specific assessment and monitoring data stemming from IMAP but also from other policies that require monitoring of relevant environmental parameters. In a second step, improvement in the “climate change” data collection could be defined and could consist of e.g., a few additional easy to measure parameters, specific spatial distribution of the monitoring points or adapt time lapse in monitoring. This would contribute in a cost-effective way to better understand how marine ecosystems’ resilience capacity to climate change can be assessed.

48. Several climate change vulnerability indexes have been developed that could be analysed to give food for thought for an eventual Mediterranean Sea ecosystem approach vulnerability Index. Developing a climate change spatialized vulnerability/resilience index would also contribute to better inform on marine ecosystems when building a Marine Spatial Planning (MSP).

1.5.3. Coastal terrestrial ecosystems

49. Including terrestrial coastal ecosystems in an ecosystem approach of the Mediterranean Sea appears as important considering the situation of this semi-enclosed sea. The ICZM Protocol and MSP cover this interface between sea and coast but do not specifically include monitoring of these coastal ecosystems. At national level, monitoring exists in many CPs through national or European policies. Based on a certain number of existent indicators of these ecosystems and integrating them into IMAP would allow for a holistic and ecosystem-based management to coastal and marine ecosystems, as a first step.

1.5.4. Human activities sustainability through socio-economic parameters

50. The question of the level of target setting within the DPSIR-sequence could be further investigated. It may be effective to set targets at the level of human activities that is to say on the Driver-Pressure side of the DSPIR sequence. As an example, some Mediterranean tourist destinations are setting targets in terms of number of tourists.

1.5.5. Marine and coastal ecosystem protection, conservation and sustainable management

51. The role of IMAP is to regularly assess the state of the environment and marine and coastal ecosystems through parameters and indicators at national level. Depending on the results, a CP should have the information to determine whether GES has been achieved or if measures and changes in management are required to achieve GES. **IMAP and GES can be considered as sensors of the state of the marine and coastal environment in the Mediterranean Sea and therefore as an essential tool to sustainably use and manage the Mediterranean Sea environment and ecosystems.** Technical aspects (monitoring scales, threshold values and measurable targets) of the current IMAP Common Indicators need to be finalised for CPs to be able to assess GES, and to contribute to protection, conservation and sustainable management of marine and coastal ecosystems.

52. For the moment, EO 1 Biodiversity, indicators CI 1 and CI 2 only concern benthic habitats receiving light and not exceeding 60-80 m depth (Coralligenous, maerl/rhodolith habitats and seagrass meadows). In the current IMAP there is a gap regarding the monitoring of deep-sea ecosystems (either pelagic or benthic). **No deep-sea pelagic or benthic habitats are for the moment assessed or monitored within the ecosystem approach.**

53. **Specific pelagic habitats (upwelling areas, fronts and gyres) and pelagic ecosystems (phyto and zooplankton) could be integrated in EO 1 indicators.** Work is ongoing to define parameters allowing the use of phyto and zooplankton for relevant IMAP biodiversity indicators and to define pelagic habitats. Indicators for pelagic habitats are not easy to develop and appear also to be a difficult task for the MSFD[34].

54. In collaboration with GFCM, **a limited number of fish and cephalopods species could be considered in CI 3 to CI.** These are important components of marine food webs. This could participate in the development of future EO 4 indicators and could also support the development of an eventual EO on climate change.

[34] Varkitzi, I., Francé, J., Basset, A., Cozzoli, F., Stanca, E., Zervoudaki, S., … Pagou, K. (2018). Pelagic habitats in the Mediterranean Sea: A review of Good Environmental Status (GES) determination for plankton components and identification of gaps and priority needs to improve coherence for the MSFD implementation. *Ecological Indicators*, *95*, 203–218.

55. **Mediterranean deep-sea benthic habitats** are diverse, can host high biodiversity and are jeopardised by multiple human threats (e.g., fisheries, pollution, litter, oil and gas exploration and production) (Fanelli et al., 2021 ; Katsanevakis et al., 2020 ; see various chapters in Orejas and Jiménez, 2019). Among these, Vulnerable Marine Ecosystems (VMEs) defined by Food and Agriculture Organisation of the United Nations (FAO) (see FAO, 2009) are particularly sensitive to anthropogenic pressures such as bottom trawling fisheries. Many Mediterranean deep-sea species including corals and sponges are considered as indicator species of VMEs (see document by WGVME Defining Mediterranean VMEs (II) , 2017). A GFCM Working Group on VMEs and essential fish habitats (WGVME-EFH) is dedicated to collect information and to advise on Fisheries Restricted Areas (FRAs).

56. In the Mediterranean Sea, deep-sea benthic habitats, benefit little from effective protection measures from bottom trawling fishing. These are limited to the GFCM trawling ban under 1000 m depth (Rec. GFCM/29/2005/1) and 4 FRAs for VMEs. Moreover, **deep-sea benthic habitats are also poorly represented in Mediterranean MPCAs.**

57. **Deep sea habitats and in particular VMEs could be further integrated within the EO 1 *Biodiversity*, Common Indicator 1 and 2. This would allow data collection at national and Mediterranean level and contribute to better mapping of these ecosystems and therefore their better consideration into MCPAs and marine spatial planning**. Currently, data exist for some Contracting Parties (e.g., Spain, France and Italy) and efforts are made to determine common parameters to assess the state of these habitats.

58. With regards to collateral destructive effects from benthic fishing gear on fragile ecosystems, including habitat forming species on soft bottoms, such as the bamboo coral *Isidella elongata* it is noted that abrasion pressure on benthic habitats by trawling gear is not assessed in the current state of IMAP. It should be included in the upcoming propositions of CIs for EO 6 *seafloor integrity* and would need to be rapidly effective.

59. **It is important to be able to identify abrasion pressure (through EO 6 indicators) on deep-sea habitats especially soft bottom ones, to sustainably manage deep-sea habitats but also fisheries and contribute efficiently to their protection and sustainability, in collaboration with GFCM.**

60. **Moreover, with regard to the development of *Blue Economy* and in particular offshore renewable energy in the Mediterranean Sea, indicators and threshold values for EO 6 "seafloor integrity" are needed.**

1.5.6. Supporting nature-based solutions and sustainable consumption and production in national programmes of measures to attain GES

61. At the Mediterranean level, several policies promote sustainable consumption and production and circular economy and two specifically focus on the subject: the Regional Action Plan on sustainable consumption and production in the Mediterranean (2016-2027) and the set of Regional Measures to Support the Development of Green and Circular Businesses and to strengthen the demand for more sustainable products.

62. **In the framework of a renewed EcAp roadmap,** nature-based solutions and **sustainable production concerns should be further integrated into the development/update and specification of IMAP indicators and targets, including on EO 3 Harvest of Commercially exploited fish and shellfish, as appropriate with the potential inclusion of a CI relative to discarded marine resources.**

1.6. Step VI. Revision of existing monitoring programmes for ongoing assessment and regular updating of targets.

1.6.1. General points

63. It is recommended to continue resource mobilization, capacity building and technical assistance at national level, as well as through regional and sub-regional collaboration, to implement IMAP at national level and enhance IMAP data acquisition and submissions by the CPs. Efforts are still needed to revise or implement monitoring programmes at national level in accordance with IMAP indicators.

64. National monitoring protocols and assessment elements and methods still need to be harmonised and standardized throughout the Mediterranean although much work has been done.

1.6.2. Climate change and ocean acidification

65. Within IMAP, EO 1 CI 1 and 2, *Posidonia oceanica* meadows are monitored following specific parameters. Considering the importance and vulnerability of this ecosystem in the climate change context, the parameters followed could be reviewed to ensure better protection of this essential habitat which have a functional role for many species, limit coastal erosion and contributing to climate change mitigation. Parameters that could inform on their resilience capacity to climate change impacts could perhaps also be studied.

1.6.3. Marine and coastal ecosystem protection, conservation and sustainable management

66. In 2021 a maximum of half the CPs had declared an implemented operational IMAP[35]. Some progress has been made since then also with support from MAP-implemented programmes and EU-funded projects supporting national IMAP implementation, but work is still to be done. **IMAP implementation at national level needs to be more effective so that GES assessment can be an efficient conservation and management tool for marine and coastal ecosystems.** Identifying more precisely the difficulties encountered by the CPs in implementing IMAP, in consultation with them, would allow to more effectively address these difficulties individually or more efficiently.

1.6.4. Human activities causing pressure on the marine and coastal environment

67. Current monitoring under IMAP focuses on ecological parameters and provides information to decision makers that attempts to answer the question “How good/bad is the state of the environment?”. It does not include a specific monitoring programme for human activities but relies on literature review to describe the “socioeconomic characteristics of the Mediterranean Sea”. Achieving a monitoring that is more balanced between the different components of the Drivers-Pressures-State-Impacts-Response (DPSIR) framework, and giving more attention to the human activities that cause the degraded state and the pressures, can be an opportunity for action plans and programmes of measures that would act on the causes of environmental degradation. This can potentially yield better preventive measures, known to be generally more cost-effective than curative measures (Plan Bleu, 2005[36]). It would also switch the attention of decision makers to the question “Which are the sources of what kind of environmental degradation and what can we do to close the tap?”, rather than focusing mainly on trying to increase knowledge about how adverse these impacts are.

[35] See 2021 survey presented in document UNEP/MED WG.514/Inf.8 (8th Meeting of the Ecosystem Approach Coordination Group, (Videoconference), 9 September 2021)
[36] Plan Bleu (2005). A Sustainable Future for the Mediterranean: The Blue Plan’s Environment and Development Outlook.

1.7. Step VII. Development and review of relevant action plans and programmes

1.7.1. General points

68. Implementation of National Action Plans still needs to be supported especially concerning Biodiversity cluster.

69. Several Regional Action Plans have been updated taking EcAp and IMAP in consideration. Nevertheless, interrelations could be reinforced between relevant Regional Action Plans to increase an ecosystem and integrated approach.

1.7.2. Climate change and ocean acidification

70. In 2016, the Regional Climate Change Adaptation Framework for the Mediterranean Marine and Coastal Areas was adopted through Decision IG.22/6. It defines a regional strategic approach to increase the resilience of the Mediterranean marine and coastal natural and socioeconomic systems to the impacts of climate change.

71. Climate change national action plans mainly concern actions for limiting greenhouse gases emissions responsible for climate change from terrestrial activities. At the Mediterranean Sea level ships emissions contribute to these gas emissions. At the regional level, an agreement was adopted in December 2022 concerning Mediterranean Sea Emission Control Area for Sulphur Oxides and Particulate Matter (Med SOx ECA) that will enter in force in 2025 and will limit ship emissions.

72. MedECC (2020) states that "4.1.3.2 *All measures that improve marine ecosystem health, resilience or biodiversity have the potential to delay and reduce the adverse effects of climate drivers. These include more sustainable fishing practices, reducing pollution from agricultural activity, sustainable tourism and more effective waste management".* Further "4.1.3.4 *Developing practical management actions that take into consideration the uniqueness of each species and their responses towards different drivers is crucial to increasing their resilience and plasticity in the context of climate change*."

73. Under 4.1.3.4 on adaptation strategies for ocean warming and ocean acidification in the Mediterranean Sea, MedECC indicates: *"In conclusion, any kind of action that improves marine ecosystem health, resilience or biodiversity could delay and reduce the adverse effects of climate drivers. This includes the implementation of more sustainable fishing practices as well as reducing pollution from agricultural activity, sustainable tourism and developing more effective waste management. Marine protected areas can potentially have an insurance role if they are placed in locations not particularly vulnerable to ocean acidification and climate change. […]Adaptation strategies must have medium- to long-term effectiveness. They thus require careful and anticipatory planning to enjoy their benefits reasonably soon, and especially to enable them to tackle problems while they are still manageable. Overall, adaptation strategies are a necessary to response to ongoing and expected Mediterranean environmental changes. However, the necessary strategy for reducing climate change impacts needs effective mitigation policies and actions to be implemented."*

74. Referring to coastal terrestrial ecosystem the MedECC under Chapters 4.2. (4.2.1.1., 4.2.2.1, 4.2.2.2, 4.2.3) and in particular Ch.4.3. provides justification for the integrated approach to all Mediterranean ecosystems, including terrestrial. *"Mediterranean coasts are expected to suffer further severe disturbance due to intensive urbanization and other land uses, which could worsen as land availability decreases and population growth continues. In the future, coastal storms and floods, probably more frequent and intense, will have adverse impacts on ecological balances, as well as human health and well-being, particularly in Mediterranean coastal cities".* {4.2.2.3}. *"Developing more integrated approaches would support adaptation policies for the entire Mediterranean, involving ecosystem-based management of coastal areas, identifying synergies and conflicts, as well as*

integrating local knowledge and institutions." {4.2.3.6}. *"Drier climate and increased human pressure are expected to cause significant impacts on terrestrial biodiversity, forest productivity, burnt area, freshwater ecosystems and agro-systems during the 21st century".*{4.3.2} *„The management of spatial heterogeneity in landscapes can help reduce fire extent under climate warming."* {4.3.3.1}

75. It appears that systematically integrating climate change adaptation strategies in action plans and programmes that improve marine and coastal ecosystems' health (protection, restoration, ecosystem management), is an effective pathway to increase marine and coastal ecosystems' resilience to climate change. The timescale of the Regional Climate Change Adaptation Framework for the Mediterranean Marine and Coastal Areas is 2016-2025, therefore the framework should be soon reconsidered and probably revised in the next biennium, in parallel with the renewal of the EcAp/IMAP.

76. **It is recommended to consider the preparation of the eventual future Regional Climate Change Adaptation Framework for the Mediterranean Marine and Coastal Areas in synergy with relevant developments at regional and global levels, i.e. Paris Agreement, EU Strategy on Adaptation to Climate change (2021), UfM relevant activities, etc. and taking into consideration MedECC findings, focusing on protection, conservation and sustainable management actions/programmes to specifically enhance resilience capacities of marine and coastal ecosystems and coastal societies facing climate change impacts.**

1.7.3. Marine and coastal ecosystem protection, conservation and sustainable management

77. Many UNEP/MAP conservation policies have been adopted and have increased the level of protection, conservation and management in the Mediterranean Sea. Still some less known ecosystems need further conservation actions.

78. Increased cooperation between UNEP/MAP and GFCM could result in an action plan focusing on VME conservation that have a very low growth rate and little restoration capacity.

79. Mediterranean VME distribution in space and depth is needed. Modelling VME distribution is also possible but needs initial observation data to be reliable. In the framework of a renewed EcAp policy, **developing a common action plan between GFCM and UNEP/MAP on VME conservation would contribute to acquire information on spatial distribution and a more efficient protection of these deep-sea habitats.**

80. Recent developments and provisions under the new Treaty for the conservation and sustainable use of marine biodiversity beyond national jurisdiction (hereinafter referred to as the BBNJ Treaty) should be also taken into consideration for the development and implementation of new/updated action plans and programmes at regional and national level, especially in relation to biodiversity-related Ecological Objective.

1.7.4. Ecosystem restoration

81. When protection and conservation are mainly proactive actions by preventing ecosystem degradation by human impacts, restoration consist of repairing disturbed ecosystems to bring them towards to a state in which they were before human impacts.

82. 2021-2030 has been declared the decade of ecosystem restoration by the UN which has an overarching objective to restore 20% of degraded priority ecosystems by 2030. In parallel, EU Nature restoration Law should be adopted shortly. Both call for action in restoring marine ecosystems.

83. **No specific Regional Plan on restoration in the Mediterranean Sea exists to date. An action plan at Mediterranean Sea level on marine and coastal ecosystem restoration could provide a common framework for coordinated restoration actions.**

84. The following elements could contribute to design a Mediterranean Action Plan on marine and coastal ecosystem restoration.

- ✓ Restoration objectives should be defined before any action, therefore a minimum of knowledge on the ecosystem/area state before it was disturbed by human activity is necessary.
- ✓ Most appropriate marine and coastal ecosystems and habitats, *priority ecosystems*, for restoration in terms of vulnerability, representativeness and success, need to be defined on selected criteria Such criteria could include ecosystem services, vulnerability, minimal spatial extent, existence of historical data before degradation etc.
- ✓ The question of whether restoration should be (i) spatially based (that is reducing significantly anthropogenic impacts of an impacted area to restore multiple ecosystems of the area), or (ii) ecosystem/habitat based (e.g., decreasing impacts on a specific habitat sufficiently for the habitat to restore itself) is an important point that will also have consequences on the parameters to monitor to measure restoration.
- ✓ Restoration can be "passive" by giving the opportunity to nature to restore its ecosystems after stopping anthropogenic disturbances. Restoration can be "active" be replanting sessile species or bringing back species that have disappeared. The results of past active restoration projects in the Mediterranean (e.g., for *Posidonia oceanica* or *Pinna nobilis*) are not very encouraging and concern localised, limited surfaces.
- ✓ Restoration is a measure that can be put in place to achieve GES. However, it takes time and needs to be measurable, therefore, long-term monitoring must be set. In consequence, it is essential that all areas where restoration actions are led, be an IMAP monitoring point so that progress towards GES be effectively assessed.

1.7.5. Supporting nature-based solutions and sustainable consumption and production in national programmes of measures to attain GES

85. **Nature-based solutions** benefit both ecosystems and human societies and increase their resilience to climate change impacts, disaster risks and biodiversity loss. Nature-based solutions should be favoured since they are cost-effective and are an integral part of an ecosystem approach.

86. IMAP network, through an ecosystem approach, allows assessment of the state of the marine and coastal environment and ecosystems. UNEP/MAP could further support CPs to develop national Action Plans/ Programmes of Measures (PoMs) based on nature-based solutions in conservation measures, restoration actions and consequently to achieve and maintain GES.

87. **Developing sustainable consumption and production** and favouring circular economy can enhance green economy development. Within the national programmes of measures to achieve GES, measures leading to sustainable consumption (e.g., increasing educational programmes, prohibiting use of plastic bags in commerce) and production and developing the reuse of wastes, should be amongst the preferred leverage policies to implement.

88. **Assembling and disseminating best practices in nature-based solutions and sustainable consumption and production would be useful for the CPs in addition of developing localised and specific programmes based on these approaches.**

1.7.6. Human activities sustainability through socio-economic parameters

89. The uses of the Sea, or more largely human activities, are the main drivers of change of the marine environment. Action plans and programmes address these drivers of change and by doing so, bring change to the uses of the marine and coastal waters, which in turn impact the state of the environment. Socio-economic analysis of action plans and programmes allows to evaluate the changes brought to the uses of the marine and coastal waters, and ultimately human welfare, linked to the

transition towards GES. As human wellbeing is explicitly integrated in the EcAp's vision and strategic goals, socio-economic parameters need to be measured in order to make statements about the achievement of the strategic goals and vision.

90. Furthermore, socio-economic analysis can be a way of communicating about GES and can potentially facilitate integration of GES into other policies and initiatives, highlighting better where trade-offs need to be arbitrated. Especially sectoral policies (energy, mobility, tourism, etc.) are likely to use language and metrics that are closer to those used to describe the uses of the Sea than the ecological parameters. Socioeconomic analysis of action plans and programmes can therefore help foster policy coherence.

2. Cross-cutting thematic issues

2.1. Data acquisition, management and accessibility

91. IMAP and EcAp programmes produce spatial and temporal data with many indicators from 21 CPs and from numerous monitoring sites. Acquiring homogeneous and intercalibrated data is a real challenge especially from 21 different CPs.

92. A considerable effort was made for MED QSR 2017 to collate available data on IMAP EOs as data submissions from IMAP were not yet available in the great majority. A comparable and even reinforced effort is currently made for MED QSR 2023 to complete the latest data submissions by the CPs.

93. Acquiring quality data through monitoring programmes represents an important effort at many levels for CPs. These efforts need to be maximized avoiding duplication and using innovative technologies that are cost and effort efficient. Technology development and innovative solutions need to be frequently searched to decrease costs and efforts in monitoring.

94. Data **submission by CPs needs to be improved.** Various impediments to reporting seem to exist including a lack of effective monitoring and data, difficulties of interoperability with other monitoring programmes, inadequacy of the reporting system etc.

95. IMAP InfoSystem being the main platform for the collection, uploading, management, and accessibility of IMAP data should continue being managed and upgraded with a view to providing to the Partiesa sustainable, effective and efficient platform. In a monitoring programme such as IMAP, funds and means have to be assured on the long term for such a task. Searching for possibilities of cooperation with already existing long-living platforms dedicated to data management can be an option that should perhaps be studied.

96. The difficulties identified in some CPs in reporting adequate IMAP data reflects that progress can still be done on the subject. Potential next steps to improve the Info System, in agreement with thematic MAP Components and CPs that ultimately process and prepare assessments on the basis of the acquired data, could be to improve (i) facilitate data submission; (ii) increase interoperability with data stemming from other policies; and perhaps (iii) to develop and integrated into the Info System adequate tools for assessment, analysis, and well as to map and disseminate part of the data or metadata. Defining specifically what is needed in terms of data management and process by the CPs and UNEP/MAP, would help identifying what can be expected and feasible by IMAP Info System.

97. **Data acquisition and management in the framework of IMAP is seen as a priority step in the renewed EcAp policy, to ensure a successful development of ecosystem approach and an IMAP able to assess GES.**

98. IMAP generates information, documents, products and data provided by the CPs monitoring programmes that need to be compliant with defined standards (DSs and DDs) to ensure interoperability and to be stored and consistently managed. End users should easily have access to

sortable data with the possibility to visualise a spatial distribution; and a development to enable geographical visualization of the data is in process. Info web systems and GIS applications enable the storage, access and reporting of data collections and are appropriate for displaying geographical distribution of data. Therefore, the online IMAP Info System is an essential tool that should allow CPs to upload monitoring and assessment data relative to IMAP CIs easily, and facilitate spatial visualization at least of some metadata, which is currently not the case. IMAP Info System is in the actual configuration a repository of national data files. **INFO/RAC is actually working on ways to improve IMAP Info System. Development of this essential tool needs to be urgently boosted in terms of efficiency and accessibility.** This would also probably encourage contracting parties to upload data more regularly.

99. Information on fisheries assessment findings was provided from GFCM to UNEP/MAP for MED QSR 2017 and MED QSR 2023 purposes, but a possible integration of relevant data in the IMAP Info System in the future, in cooperation with GFCM, would allow to cross it with other data sets which could bring important elements into the holistic Mediterranean ecosystem approach.

2.2. Science-Policy Interface (SPI) and communication

100. Within UNEP/MAP framework, much effort has been made to transfer scientific knowledge and enhance exchanges. As an example, the Symposia on marine habitats (seagrass meadows, coralligenous habitats, dark habitats and NIS) regularly organised by SPA/RAC develop an exchange of knowledge and experiences throughout the Mediterranean on these habitats.

101. Science-Policy Interface has been developed within UNEP/MAP with the objective of improving dialogue between scientists and policy makers and contribute to better implement EcAp/IMAP.

102. A prerequisite for the successful implementation of IMAP and the design of national monitoring programmes following the ecosystem approach is bridging the existing gaps between the scientific and policy-making spheres (Plan Bleu, 2019)[37].

103. Science-Policy Interface could be strengthened, structured and sustained, by being integrated into e.g., the national monitoring programmes, to ensure that ongoing scientific projects can interact and address IMAP national implementation needs. Cooperation should be strengthened at sub-regional level for Common Indicators, as appropriate, to share best practices and to address specific gaps within national monitoring programmes.

104. National administrations can contribute by communicating on the objectives, organization etc. of the Barcelona Convention, UNEP/MAP and the EcAp policy and IMAP. Publication of documents such as the French UMS PatriNat 2021 document38 should be encouraged but are not sufficient.

105. An inception workshop on the Implementation of the Ecosystem Approach in the Mediterranean: strengthening the SPI was held in December 2015 in Sophia Antipolis France39 and a

[37] Plan Bleu. (2019). *Science-Policy Interface (SPI) to support monitoring implementation plans as well as sub-regional and regional policy developments regarding EcAp clusters on pollution, contaminants and eutrophication, marine biodiversity and fisheries, coast and hydrography* (No. 18).

[38] Lizińska, A., & Guérin, L. (2021). *Synthesis and analysis on the current structure and functional organisation of the Barcelona Convention (UNEP/MAP)—Recommendations for biodiversity works and French issues.* (p. 37). UMS PatriNat (OFB, MNHN, CNRS), station marine de Dinard.

[39] It is astonishing to see that for this workshop on Implementation of the Ecosystem Approach in the Mediterranean, no expert from the French Mediterranean marine stations were present (e.g., Observatoire Océanologique de Villefranche sur mer, IMBE/Station Marine d' Endoume, Marseille; Mediterranean Institute of Oceanography (MIO), Observatoire Océanographique de Banyuls/Mer). This means that progress can be done in SPI for EcAp/IMAP. Perhaps workshops on more specific subjects and at sub-regional level could be more adapted to researchers and IMAP needs.

report was published (Plan Bleu, 2016)40. Several workshops followed to strengthen the implementation of IMAP in 2016 and 2017 in the framework of the EU funded EcAp MED II programme. The technical report elaborated by UNEP/MAP-Plan Bleu, Strengthen, structure and sustain a Science Policy Interface (SPI) for IMAP implementation in the Mediterranean published in 201941, brings together and outlines the main points and underlines needs of SPI for IMAP. The mutual benefits of an increased collaboration of marine researchers and EcAp/IMAP policy were underlined and constructive. The importance of Science-Policy Interface (SPI) and communication within an ecosystem approach has been underlined by documents such as UNEP/MAP/Plan Bleu publication on Science-Policy Interface (Plan Bleu, 2019).

106. SPI could probably benefit of focusing on specific problematics at sub-regional level to increase complementarity and interaction between EcAp/IMAP and scientific research objectives and improve understanding of the needs and possibilities of each.

107. Integrating SPI in a transversal way within a renewed EcAp policy, would contribute to sustain SPI and would benefit to IMAP implementation especially at national level.

2.3. Policy coherence, cooperation and efficiency

(i) Increase coordination with other policies

108. Much work has been done by UNEP/MAP, its components and the Ecosystem Approach Correspondence Groups on Monitoring (CORMONs) to build IMAP Ecological Objectives and Common Indicators in coherence with other policies, especially EU MSFD.

109. **There is room for strengthened synergies and increased interoperability with relevant regional and global instruments and processes, including for the CPs that are EU Member States the relevant EU Directives especially MSFD, WFD and the Habitat Directive, but also national policies to streamline reporting, harmonise the data produced by monitoring programmes and minimise reporting effort and avoid duplications.**

(ii) IMAP in MSP and offshore development

110. At the Mediterranean level, the Conceptual framework for the MSP defines common principals with a step-by-step methodology to implement MSP and the ecosystem approach for a sustainable development. Several conferences and courses organised by UNEP/MAP-PAP/RAC support the implementation of MSP in Mediterranean countries.

111. The articulation of EcAp/IMAP with spatial planning policies and in particular MSP is essential.

112. The GEF Adriatic project is a model that promotes Marine Spatial Planning processes based on the Ecosystem Approach, and it demonstrates the use of IMAP indicators for MSP in particular. Experience from the demonstration projects on how to use IMAP indicators in an integrated way for the preparation of the MSP should be promoted and used for other countries.

113. Promoting, facilitating and enhancing the integration and interoperability of IMAP in MSP and Integrated Coastal Zone Management (ICZM) as early as possible, is strongly recommended within a renewed EcAp policy. This will increase sustainable development, improve ecosystem management in coastal areas and climate resilience of marine and coastal ecosystems and societies. MSP, but also Strategic Environmental Assessments (SEA) and Environmental Impact Assessments (EIA) at

[40] Plan Bleu. (2016). *Report of the Inception workshop: Implementation of the Ecosystem approach in the Mediterranean: Strengthening Science-Policy interface*. Sophia Antipolis. Retrieved from https://planbleu.org/wp-content/uploads/2017/01/rapport_atelier_ecap-spi_en.pdf

[41] Plan Bleu. (2019). *Science-Policy Interface (SPI) to support monitoring implementation plans as well as sub-regional and regional policy developments regarding EcAp clusters on pollution, contaminants and eutrophication, marine biodiversity and fisheries, coast and hydrography* (No. 18).

operational level, ICZM and Land Sea Interactions (LSI), as well as the assessment of the sustainability of human activities that impact the Sea and coast and their compatibility with GES, should be key tools within a renewed EcAp policy and in view of effectively implementing IMAP to achieve GES at national level.

114. Several reports can be useful to identify further efficient ways to integrate IMAP in spatial planning programmes. The Pan Adriatic Scope Report on Adriatic-Ionian cooperation towards MSP gives indicative information on the needs and opportunities for the harmonized implementation of MSP at sub-regional level. Other existing guidelines and studies should also be considered to better integrate EcAp and IMAP in spatial planning policies.

115. Moreover different tools on spatial planning are now easily accessible such as the Mediterranean MSP Workspace and AdriAdapt for the Adriatic region and climate change impacts.

116. **IMAP and the 2023 MED QSR will bring useful and needed marine environmental and ecosystem data and information to take into consideration by spatial planning policies such as MSP.** This implies that IMAP data and MED QSR be extractable spatially (at CP and sub-regional level) and by subject, which underlines the importance and the need for allowing the means and funds for IMAP data management and analysis (as already mentioned).

117. **The renewed EcAp and IMAP need to anticipate sustainable *Blue Economy* development in the Mediterranean by integrating MSP in an efficient and effective way.** A few suggested elements for thought that could be considered at national and Mediterranean level to increase integration of EcAp/IMAP in MSP are the following:

- Make use of ecosystem and environmental data needed for spatial planning to fill in EcAp knowledge gaps;
- Make available and easily accessible to stakeholders, pertinent IMAP data through GIS to assess areas with cumulative human impacts and vulnerable ecosystems;
- Facilitate the integration of IMAP indicators/parameters and interoperability in monitoring programmes nationally requested for EIA or SEA (or other) as much as possible;
- Identifying parameters and indicators monitored for various policies that concern the coastal zone either marine (coastal waters) or terrestrial (in wetlands, estuaries, coastal forests and woods and dunes as well as coastal landscapes) and consider integrating them in IMAP to have a comprehensive approach for the ecosystem-based management, in particular for the Land Sea Interface.
- Developing a new set of indicators to monitor the sustainability of human activities and their compatibility with GES
- Make use of new installations and their regular survey by installing physico-chemical (or other) sensors if pertinent or/and cooperate to associate ecosystem surveys to technical surveys (e.g., ROV).

118. Integrating IMAP in spatial planning could be one of the most important elements to work on for a future EcAp policy to ensure IMAP national implementation and achieve GES.

119. Comprehensive MSP can efficiently mitigate the human impacts on marine ecosystems and the environment, and in consequence, support the achievement of GES. It is necessary to identify areas or ecosystems that are particularly important for the functioning of the Mediterranean Sea, to identify the human threats integrate the information in the MSP.

120. The implementation of EO 6 “seafloor” indicators, threshold values, guidelines etc. is urgent in the context of growing *Blue Economy* and the development of offshore installations. Indicators on seafloor integrity are needed to be taken in account in the Mediterranean developing spatial planning but also to protect deep-sea ecosystems (mentioned before in step 5).

121. Indeed, the acceleration of development of offshore units is confirmed by Abanades (2019)[42] that indicates that exploitation of subsoil but also marine Renewable Energy (especially offshore wind) in the Mediterranean is bound to develop in the near future. Manea et al. (2020)[43] approach the subject of ecosystem-based MSP in the deep Mediterranean Sea and the ways to incorporate deep Mediterranean conservation objectives in ecosystem-based MSP.

122. Installation of such units will contribute to reduce greenhouse gases but the impacts on marine ecosystems should be assessed and monitored. Impacts may occur during the drilling activities and installation of the wind turbine in deep-sea, cable installations, and its maintenance and others to be assessed. Moreover, the port receiving the offshore wind farm elements will need to undergo important changes in infrastructure. **The impact of such offshore developments should be monitored, using the appropriate legal basis within the MAP Barcelona Convention framework, while it can also be seen as an opportunity of acquiring additional monitoring data from areas, such as offshore and deep-sea, where monitoring is non-existent or limited because of the difficult access (see Bescond et al., 2022[44]). Here collaborations between environmental/ecosystem monitoring needs and industries may be encouraged at national level but also at regional, Mediterranean level.**

[42] Abanades, J. (2019). Wind Energy in the Mediterranean Spanish ARC: The Application of Gravity Based Solutions. *Frontiers in Energy Research*, *7*.
[43] Manea, E., Bianchelli, S., Fanelli, E., Danovaro, R., & Gissi, E. (2020). Towards an Ecosystem-Based Marine Spatial Planning in the deep Mediterranean Sea. *Science of The Total Environment*, *715*, 136884.
[44] Bescond, T., Blandin, J., & Repecaud, M. (2022). *ECOSYSM-EOF. Projet d'observatoire des écosystèmes marins du golfe du Lion en interaction avec les parcs Eoliens Offshore Flottants.- L4.3—Propositions d'architectures potentielles de réseaux d'observation.*

Annex IV

Terms of Reference for the CORMONs, CORESA and Online Working Groups and Flow of Interaction between Ecosystem Approach and MAP Governing Bodies

Terms of reference (TORs) for Ecosystem Approach Correspondence Groups on Monitoring (CORMONs), Economic and social analysis (COR ESA) and Online Working Groups (OWGs)

1. Background and rationale

1. Since COP15 (Almeria, Spain, 15-18 January 2008, Decision IG.17/6), Contracting Parties decided to progressively apply the Ecosystem Approach to the management of human activities that may affect the Mediterranean marine and coastal environment for the promotion of sustainable development, with the overall objective of achieving the Good Environmental Status (GES) of the Mediterranean Sea and Coasts. COP15 also set out the governance of the Mediterranean Action Plan Barcelona Convention system, its goals and principles, and the mandates for the CU and the MAP Components (Decision IG.17/5).

2. COP17 (Paris, France, 8-10 February 2012) established the EcAp Coordination Group and adopted 11 Ecological Objectives (EOs) with a suite of associated Operational Objectives and indicators (Decision IG.20/4). The EcAp Coordination Group consists of MAP Focal Points, as per Decision IG.21/3, and its Terms of Reference were agreed by the Bureau (BUR/75/5, July 2012).

3. At their COP19 (Athens, Greece, 9-12 February 2016), the Contracting Parties to the Barcelona Convention adopted the Integrated Monitoring and Assessment Programme and related Assessment Criteria (IMAP), (Decision IG.22/7).

4. COP22 Antalya, Turkey, December 2021 endorsed an updated governance mechanism for the implementation of the ecosystem approach in the Mediterranean in the framework of UNEP/MAP Barcelona Convention (Decision IG.25/03). Contracting Parties agreed to "Renew their commitment to the implementation of the Ecosystem Approach and endorse the Governance Mechanism for the Implementation of the Ecosystem Approach policy in the Mediterranean, set out in Annex I to this Decision". The Decision, in its Annex I, states, "every effort to be made by the Secretariat to streamline and ensure the technical documents are cleared by the respective CORMON and MAP Component/Thematic Focal Points in line with their mandates, as appropriate, before they are submitted to the decision-making bodies".

2. Ecosystem Approach Correspondence Groups on Monitoring (CORMONs)

2.1 Composition

5. The Correspondence Groups on monitoring (CORMONs) are established for each thematic cluster – Biodiversity and Fisheries; Pollution and Marine Litter; and Coast and Hydrography.

6. CORMONs are composed of national experts designated by the Contracting Parties possessing the necessary expertise and experience in line with the mandates of respective CORMON for IMAP implementation. They can be designated by the MAP Focal Points/EcAp CG members or by the thematic/MAP Components' Focal Points, preferably in consultation with each other.

2.2 Operation

7. The CORMONs' work is supported by the respective MAP Component: MED POL for Pollution and Marine Litter; PAP/RAC for Coast and Hydrography; and SPA/RAC for Biodiversity and Fisheries. Technical and scientifically related tasks may be supported by external experts, during preparation of the documents for consideration of respective CORMONs. The overall coordination of the work of CORMONs remains with the Coordinating Unit and is carried out in accordance with MAP Programme of Work (POW) priorities and implementation of the EcAp Roadmap and Policy.

8. CORMONs may meet physically or by teleconference, depending on the agenda, the volume of work and documents to be considered. Provisions for CORMON meetings numbers, main deliverables and modality are made in the MAP POW.

2.3 CORMON Mandates

9. CORMONs have the primary role to guide and deliver the implementation of technical and scientific aspects of IMAP and delivery of QSR with support from the Secretariat and MAP Components and foster regional and sub-regional collaboration and exchange of best practices and know-how with regards to monitoring and assessment of marine and coastal environment.

10. The operation of the CORMONs should recognise that the implementation of the ecosystem approach is comprehensive in terms of the multidisciplinary and scientific context of the documents that need to be discussed, and therefore iterative in terms of coordination of the results of work within the UNEP/MAP-Barcelona Convention system and at Contracting Party level.

11. Generally, CORMONs are assigned with the preparation and negotiation of the following main types of IMAP products:

- Monitoring guidelines and protocols on, sampling; sample processing analysis/determination; quality assurance (QA); and reporting
- IMAP indicator guidance factsheets
- Areas/scales of assessment, assessment criteria, and guidance for their application
- Assessment methodologies, assessment products and QSR (structure/contents, conclusions)
- Data standards (DS) and data dictionaries (DD)
- Data management QA and QC
- Updates of IMAP & progress reporting on IMAP implementation
- Implementation of national IMAPs
- Proficiency testing
- Capacity building activities
- IMAP related Project outcomes

12. CORMON IMAP products are of a technical and scientific nature, they may impose policy and financial impacts on IMAP implementation. A detailed elaboration of the different levels of responsibilities for consideration and approval of different types of IMAP products is provided in Annex 1.

13. Informal Online Working Groups (OWG) may be established by CORMONs in order to provide specific scientific inputs: OWGs are composed of a restricted number of experts and scientists nominated by the Contracting Parties. In their delivery OWGs may be supported by experts mobilised by the Secretariat and MAP Components in accordance with provisions of the approved MAP POW and budget or related projects as appropriate. The tasks and outcome of the work of OWG are defined by the CORMONs. OWGs report to CORMONs. To this aim the chair of the OWG in consultation with the Secretariat/MAP Components presents the outcome of the OWG to CORMON.

14. The informal OWG do not replace the formal Correspondence Groups.

15. Every effort should be made to maintain geographical balance in the composition of the OWG and mobilise high level expertise.

16. No language interpretation is provided by the Secretariat at the OWG, nor are official meeting documents formally disseminated. Members of the OWG are strongly encouraged to provide scientific and technical inputs and support to the Secretariat/MAP Component work with regards to IMAP implementation and delivery of its products.

3. Correspondence Group on Economic and Social Analysis (COR ESA)

3.1 Composition

17. The Correspondence Group on Economic and Social Analysis (COR ESA) is composed of national experts designated by the Contracting Parties and invited experts and coordinated by Barcelona Convention/UNEP-MAP Coordinating Unit and Plan Bleu/RAC. The Group also includes representatives of the other UNEP/MAP Components as well as international experts selected by the Contracting Parties through Plan Bleu/RAC Focal Points and/or by the Secretariat for their experience in similar initiatives or for their scientific expertise.

3.2 Operation

18. The work of COR ESA is supported by Plan Bleu RAC under the overall coordination of the Coordinating Unit.

3.3 Mandate

19. The COR ESA is responsible for the following:

- Preparing and guiding the socio-economic assessments
- Preparing the socio-economic chapter of the Mediterranean Quality Status Report (QSR)
- Undertaking analyses of the socio-economic aspects of national programmes of measures
- Supporting Contracting Parties to undertake socio-economic analyses at the national level
- Developing methodological tools with regard to socio-economic assessments

4. Effective interaction among different MAP bodies

20. The level of interaction between the bodies of the EcAp governance structure and MAP decision making bodies i.e., MAP Components/Thematic Focal Points, MAP Focal Points and COP depends on the nature of the products as detailed in Annex 1, in line with their respective mandates. Annex also provides information on the type of documents to be reviewed by each body.

Annex 1 Possible products and interaction between EcAp governance bodies.

CORMONs	**Component/ Thematic Focal Points (FP)**	**EcAp Coordination Group (CG)**	**MAP Focal Points (FP) / COP**
1.Monitoring guidelines/ protocols			
Products of a complex scientific and technical nature that may have financial implications for implementation of IMAP	MAP Components report on progress to their Focal Points Focal Points review proposed activities for their inclusion in the programme of Work (POW)	Coordinating Unit (CU) reports to EcAp CG on progress based on reports of MAP Components	CU reports on progress and related activities of POW and Budget
2. IMAP indicator guidance factsheets			
Products of a complex scientific and technical nature that may have policy and financial implications	MAP Components report on progress to their Focal Points Focal Points review proposed activities for their inclusion in POW Recommended by CORMONs for no objection procedure	CU reports to EcAp CG on progress based on reports of MAP Components Based on current practice, endorsement by EcAp CG	Approval of the respective provisions in the POW & budget, as appropriate
3. Data dictionaries and data standards (DDs and DSs)			
Products of a technical nature	MAP Components report on progress to their Focal Points Focal Points review proposed activities for their inclusion in POW Recommended by CORMONs for no objection for their submission to EcAp CG meeting and approval of the related provisions in the POW	CU reports to EcAp CG on progress based on reports of MAP Components Based on current practice, endorsement by EcAp CG, for MAP FP	Approval of the respective provisions in the POW & budget, as appropriate
4. Assessment criteria			
Products of a complex scientific and technical nature that may have policy implications, including allocation of financial resources for implementation of IMAP	MAP Components report on progress to their Focal Points Focal Points review proposed activities for their inclusion in POW Review and endorsement for submission to EcAp CG meeting	CU reports to EcAp CG on progress based on reports of MAP Components Review and endorsement for submission to MAP FP	Review and approval for submission to COP COP Decision

5. Assessment methods & products, QSR structure, contents & conclusions			
Scientific products with recommendations for COP consideration	MAP Components report on progress to their Focal Points Focal Points review proposed activities for their inclusion in POW No objection from the scientific point of view; endorsement of recommendations. Recommendation for transmission to EcAp CG meeting.	CU reports to EcAp CG on progress based on reports of Map Components Endorsement of key findings and recommendations for submission to MAP Focal Points.	General review of main findings and recommendations and approval for submission to COP. In depth review of the related draft Decision body for submission to the COP. COP Decision
6. Thematic assessments			
Thematic assessments prepared and approved.	MAP Components report on progress to their Focal Points Focal Points review proposed activities for their inclusion in POW Overall discussion and feedback on assessment recommendations. Endorsement for publication	CU report on the progress; review of recommendations as appropriate. Endorsement of key findings and recommendations for submission to MAP Focal Points as appropriate.	Review of potential activities included in the POW. Review and endorse as appropriate of the key findings and recommendations.
7. IMAP development and update			
Scientific and policy products	MAP Components report on progress to their Focal Points Focal Points review proposed activities for their inclusion in POW Review and approval for transmission to EcAp CG meeting	CU reports to EcAp CG on progress based on reports of MAP Components Review and endorsement for submission to MAP FP	Responsible for approving all updates of IMAP implementation and approving the financial resources to address the needs as proposed by the respective CORMON and Component FPs. Review and approval for submission to COP, COP Decision
8. Implementation of National IMAPs			
National IMAPs are of a technical nature with the implications for financial and policy aspects. The respective CORMON should be responsible for providing the recommendations in relation to (i) the effectiveness of implementation of the National IMAPs related to the relevant IMAP Cluster; (ii) the gaps identified in the process of the National IMAPs implementation; (iii) the needs to be addressed, including technical, human resources, governance and financial aspects; (iv) harmonisation of National IMAPs implementation; and (v) mechanisms/sources/means that could provide solutions and be used to improve implementation of National IMAPs	MAP Components report on progress to their Focal Points Focal Points review proposed activities for their inclusion in POW Report on the progress, POW provisions as appropriate	CU reports to EcAp CG on progress based on reports of MAP Components	CU reports on progress and related activities of POW and Budget as appropriate

9. Proficiency Testing			
Proficiency Testing (PT) is of a technical nature, based on the complex scientifically related procedures; however, with certain implications for policy decision-makers.	MAP Components report on progress to their Focal Points Focal Points review proposed activities for their inclusion in POW Review of the outcome of Proficiency testing and delivery of recommendations to Focal Points; consideration of their outcome in the design of the POW as appropriate	CU reports to EcAp CG on progress based on reports of MAP Components	CU reports on progress and related activities of POW and Budget as appropriate
10. Capacity Building Activities			
Products of a technical character.	MAP Components report on progress to their Focal Points Focal Points review proposed activities by CORMONs for their inclusion in POW	CU Report on the progress	CU reports on progress and related activities of POW and Budget
11. Data management/QA/QC			
Products of a technical nature.	MAP Components report on progress to their Focal Points Focal Points review proposed activities for their inclusion in POW as appropriate	CU reports to EcAp CG on progress based on reports of MAP Components	CU reports on progress and related activities of POW and Budget as appropriate

COR ESA	Component/ Thematic Focal Points	EcAp Coordination Group	MAP Focal Points / COP
Review of relevant assessments/studies			
COR ESA is responsible for reviewing analyses and assessments carried out for EcAp that are of relevance for social and economic considerations. In particular:	Report on the progress	Report on the progress	Report on the progress
Socio-economic assessments	MAP Components report on progress to their Focal Points Focal Points review proposed activities for their inclusion in POW	CU reports to EcAp CG on progress based on reports of MAP Components Endorsement of assessment by the EcAp CG Possible recommendations to MAP FP meeting	CU reports on progress and related activities of POW and Budget Approval of assessment
Socio-economic chapter of the Mediterranean Quality Status Report (QSR)	MAP Components report on progress to their Focal Points Focal Points review proposed activities for their inclusion in POW No objection from the scientific point of view	CU reports to EcAp CG on progress based on reports of MAP Components Review and Endorsement of the chapter	Overall endorsement of the chapter as part of the relevant 2023 MED QSR endorsement COP Decision
Analyses of the socio-economic aspects of national programmes of measures	MAP Components report on progress to their Focal Points Focal Points review proposed activities for their inclusion in POW	CU reports to EcAp CG on progress based on reports of MAP Components Endorsement of analyses, Possible recommendations to MAP FP	Report on the progress. Submission of COR ESA recommendations by the EcAp CG to MAP Focal Points/COP as relevant
Provide guidelines to support Contracting Parties to undertake socio-economic analyses at the national level	MAP Components report on progress to their Focal Points Focal Points review proposed activities for their inclusion in POW Review and Endorsement and recommend submission to EcAp CG	CU reports to EcAp CG on progress based on reports of MAP Components Review and endorsement	Report on the progress
Methodological tools with regard to socio-economic assessments	MAP Components report on progress to their Focal Points Focal Points review proposed activities for their inclusion in POW	CU reports to EcAp CG on progress based on reports of MAP Components Review and endorsement	Report on the progress

COR ESA	Component/ Thematic Focal Points	EcAp Coordination Group	MAP Focal Points / COP
	Review and Endorsement and recommend submission to EcAp CG		