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Agenda Item 3: Ecosystem Approach Roadmap Evaluation of Implementation and Renewal

Elements for a Renewed Ecosystem Approach Roadmap/Policy

UNEP/MAP
Athens, 2023

Note by the Secretariat

The Contracting Parties, with their Decision IG. 25/19 on the Programme of Work and Budget for 2022-2023 (Antalya, Türkiye, 7-10 December 2021), requested the Secretariat to progress on the preparation of a new/updated Roadmap for the implementation of the ecosystem approach and the achievement of GES beyond 2023 prepared for review of EcAp/IMAP Governance bodies (PoW 2022-2023 Activity 5.1.2 deliverable (b)).

The Secretariat engaged an independent regional expert to prepare an analysis of elements for a renewed EcAp Roadmap/Policy and IMAP for the achievement of GES beyond 2023 until 2030, building on the key findings and outcomes of mainly two desk studies, i.e. an independent evaluation of the Ecosystem Approach Roadmap and an analysis of recent developments at global and regional level relevant to EcAp and IMAP, which are presented to the present Meeting as Information Documents (UNEP/MED WG.567/Inf.4 and UNEP/MED WG.567/Inf.5 respectively). All these documents have been also presented as Information Documents to the Integrated CORMON Meeting held in Athens, Greece, on 27-28 June 2023.

The present document provides information on the identified key elements to be considered for a renewed Ecosystem Approach Roadmap/Policy linked with each of the seven steps of the current Roadmap, in terms of relevant to them.

The present document aims at serving as a source of information for discussions of the Ecosystem Approach Coordination Group Meeting on key issues that may be considered in a potential renewal of the Ecosystem Approach Roadmap in the next biennium, together with other elements as appropriate, including the outcomes of the 2023 Mediterranean Quality Status Report, key regional and global developments etc.

List of abbreviations and acronyms

ABNJ	Areas Beyond National Jurisdiction
CCI	Candidate Common Indicators (relatively to IMAP)
CI	Common Indicator (relatively to IMAP)
COP	Conference of the Parties
CORMON	Correspondence Group on Monitoring
CP	Contracting Party
DPSIR	Drivers-Pressures-State-Impacts-Responses
EcAp	Ecosystem Approach
EC	European Commission
ECP	Executive Coordination Panel
EIA	Environmental Impact Assessment
EO	Ecological Objective (used for IMAP)
EU	European Union
FRA	Fisheries Restricted Area
GES	Good Environmental Status
GFCM	General Fisheries Commission for the Mediterranean
ICZM	Integrated Coastal Zone Management (EU or UNEPMAP Protocol)
IMAP	Integrated Monitoring and Assessment Programme
INFO/RAC	Information and Communication Regional Activity Centre
IPCC	Intergovernmental Panel on Climate Change
LSI	Land Sea Interactions
MAP	Mediterranean Action Plan
MED QSR	Mediterranean Quality Status Report
MedECC	Mediterranean Experts on Climate and environmental Change
MCPAs	Marine and Coastal Protected Areas
MS	Member State
MSFD	Marine Strategy Framework Directive
MSP	Marine/Maritime Spatial Planning
MSSD	Mediterranean Strategy for Sustainable Development
MTS	Mid-Term Strategy
NIS	Non-indigenous species
OO	Operational Objectives (Relative to IMAP)
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
PAP/RAC	Priority Actions Programme Regional Activity Centre
REMPEC	Regional Marine Pollution Emergency Response Centre
PoM	Programmes of Measures
RSC	Regional Sea Conventions
SAPBIO	Strategic Action Programme for the Conservation of Biological Diversity in the Mediterranean Region (2003)
SEA	Strategic Environmental Assessments
SPA/RAC	Specially Protected Areas Regional Activity Centre also RAC/SPA
SPI	Science-Policy Interface
TV	Threshold values
UN	United Nations
UNEP/MAP	United Nations Environment Programme/Mediterranean Action Plan
VME	Vulnerable Marine Ecosystems
WFD	Water Framework Directive (EU)

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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[1]). 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)[2].

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] 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

[2] 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/

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 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)***[3] 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 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[4]. 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

[3] 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

[4] The Mediterranean Biodiversity Platform developed by SPA/RAC

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[5]; Hendriks et al., 2022[6]; Monnier et al., 2022[7]). 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)".

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[5] 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.

[6] 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.

[7] 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. 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*"[8]. The outcomes of this meeting, together with Cross-Chapter 4 Mediterranean Region in IPCC (2022)[9] 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

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[10]).

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[8] https://planbleu.org/en/event/les-rendez-vous-du-plan-bleu-3-coastal-risks-related-to-climate-change-in-the-mediterranean-sea/

[9] 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

[10] 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.

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.

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[11].

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.

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

[11] 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.

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[12]. 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[13]). 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.

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.

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[12] See 2021 survey presented in document UNEP/MED WG.514/Inf.8 (8th Meeting of the Ecosystem Approach Coordination Group, (Videoconference), 9 September 2021)

[13] Plan Bleu (2005). A Sustainable Future for the Mediterranean: The Blue Plan's Environment and Development Outlook.

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)[14].

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 document15 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 France16 and a

[14] 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).
[15] 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.
[16] 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

report was published (Plan Bleu, 2016)17. 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 201918, 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.

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.

[17] 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

[18] 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).

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 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)[19] 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)[20] 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[21]). Here collaborations between environmental/ecosystem monitoring needs and industries may be encouraged at national level but also at regional, Mediterranean level.**

[19] Abanades, J. (2019). Wind Energy in the Mediterranean Spanish ARC: The Application of Gravity Based Solutions. *Frontiers in Energy Research*, *7*.
[20] 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.
[21] 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*.