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Agenda item 3: State of Play of IMAP Implementation and Way Forward

Progress Report on the implementation of Decision IG.22/7 on the Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast and Related Assessment Criteria (IMAP)

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Note by the Secretariat

At their 19th Ordinary Meeting (COP 19, Athens, Greece, 9-12 February 2016), the Contracting Parties to the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention) adopted a novel and ambitious Integrated Monitoring and Assessment Programme and related Assessment Criteria (IMAP).

IMAP foresees in its initial phase (2016-2019) of implementation, the following:

- existing national monitoring and assessment programmes of Contracting Parties to be updated and integrated, in line with the IMAP structure, principles and common indicators;
- Good environmental status (GES) definitions to be updated and the assessment criteria to be further refined;
- scale of reporting units to be defined, taking into account both ecological considerations and management purposes, following a nested approach;
- an updated and integrated data and information system for UN Environment/Mediterranean Action Plan (MAP)-Barcelona Convention with clearly set roles for data handling and assessment for the various components and with a user-friendly reporting platform for Contracting Parties to be developed.

In line with their commitment and UN Environment/MAP Programme of Work 2018-2019, Contracting Parties with the support of various projects, have progressed on national implementation of IMAP. Draft national monitoring programmes based on IMAP are close to be finalized or in preparation all over the Mediterranean.

In line with the timeline of IMAP, the Secretariat and respective MAP Components have organized between 2016-2018 four Meetings of the Correspondence Groups on Monitoring (CORMON) to discuss specific GES and assessment outstanding issues, as well as four Science-Policy Interface (SPI) Workshops, out of which two were dedicated to the risk-based approach and to scales of monitoring and assessment.

An important achievement of IMAP implementation is the preparation, in close consultation with and with inputs from the Contracting Parties, of the 2017 Mediterranean Quality Status Report¹ (2017 MED QSR). Following the Initial Integrated Assessment undertaken in 2011, the 2017 MED QSR is the first report assessing the status of the marine and coastal environment of the Mediterranean Sea in an integrated manner using the IMAP Common Indicators and data reported from the Contracting Parties and other reliable sources.

Decision IG. 23/6 on the 2017 MED QSR (COP 20, Tirana, Albania, 17-20 December 2017) has also underlined the gaps of the 2017 MED QSR and requested the Secretariat to make all possible efforts to overcome them and recommended as general directions towards a successful 2023 Mediterranean Quality Status Report (2023 MED QSR) the: (i) harmonization and standardization of monitoring and assessment methods; (ii) the improvement of availability and ensuring of long time series of quality assured data to monitor the trends in the status of the marine environment; (iii) the improvement of availability of the synchronized datasets for marine environment state assessment, including use of data stored in other databases where some of the Mediterranean countries regularly contribute; (iv) the improvement of data accessibility with the view to improving knowledge on the Mediterranean marine environment and ensuring that Info-MAP System is operational and continuously upgraded, to accommodate data submissions for all the IMAP Common Indicators.

¹ At their 20th Ordinary Meeting (COP20, Tirana, Albania, 17-20 December 2017), the Contracting Parties to the Barcelona Convention, in Decision IG.23/6 endorsed the Key findings of the 2017 MED QSR (the QSR Decision).

With the view to implementing this Decision and specifically addressing the above-mentioned issues as well as to further fostering regional cooperation on IMAP implementation, the Secretariat and MAP Components have planned in line with UN Environment/MAP Programme of Work 2018-2019, the organization of 4 CORMON meetings in spring 2019.

The current meeting, with its discussion and recommendations, is expected to contribute to the preparation of working documents and proposals for in-depth discussions and review by the respective CORMON meetings.

The present Progress Report aims at:

- a) reviewing the state of play of national implementation of IMAP, focusing on best practices and challenges faced with regards to different aspects of its implementation at national level;
- b) bringing to the attention of the Contracting Parties and initiating a discussion on a number of cross-cutting issues and region-wide challenges, that are crucial for ensuring effective implementation of IMAP in particular related to integrated GES assessment and related scales as well as assessment criteria based on the current achievements of IMAP implementation by the Contracting Parties as well as other regionally- and/or globally-relevant best practices.

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List of Abbreviations / Acronyms

BACs	Background Assessment Criteria
CI	Common Indicator
COP	Conference of the Parties
CORMON	Correspondence Group on Monitoring
EACs	Environmental Assessment Criteria
EcAp	Ecosystem Approach
EO	Ecological Objective
ERL	Effects Range Low
EU	European Union
GEF	Global Environment Facility
GES	Good Environmental Status
GIS	Geographic Information System
ICZM	Integrated Coastal Zone Management
IMAP	Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast and Related Assessment Criteria
INFO/RAC	Regional Activity Centre for Information and Communication
MAP	Mediterranean Action Plan
MED POL	Programme for the Assessment and Control of Marine Pollution in the Mediterranean Sea
MoU	Memorandum of Understanding
MPA	Marine Protected Area
MSFD	Marine Strategy Framework Directive
MSP	Marine Spatial Planning
MTF	Mediterranean Trust Fund
NIS	Non-Indigenous Species
OCs	Organochlorine Pesticides
PAP/RAC	Priority Actions Programme/Regional Activity Centre
MED QSR	Mediterranean Quality Status Report
SPA	Specially Protected Areas
SPI	Science-Policy Interface
SPA/RAC	Regional Activity Centre for Specially Protected Areas
SSFA	Small-Scale Funding Agreement
TTC	Thresholds of Toxicological Concern
UN	United Nations
WFD	Water Framework Directive

1. INTRODUCTION

1. The present Progress Report on the implementation of Decision IG.22/7 on the Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast and Related Assessment Criteria (IMAP) provides information on IMAP national implementation and highlights the progress, challenges faced and possible future steps to overcome these challenges.

2. It also provides an analysis on options and methodologies for several horizontal and cross-cutting issues which still need to be addressed in the initial phase of IMAP (2016-2019) related to the integrated GES assessment and approaches on scale of assessment, assessment criteria and thresholds.

3. The present Progress Report is divided into two parts:

- a) Overview of national implementation of IMAP;
- b) Cross-cutting issues, common challenges.

2. OVERVIEW OF NATIONAL IMPLEMENTATION OF IMAP

4. With support from the Secretariat and MAP Components namely MED POL, SPA/RAC and PAP/RAC, work is ongoing by all Contracting Parties to the Barcelona Convention to progress on national implementation of IMAP, building on the existing relevant monitoring programmes previously established under MAP Barcelona Convention system and on lessons learnt from other regional and/ or global processes.

5. In this respect, the instrumental role of the EU Marine Strategy Framework Directive (MSFD²) can be noted regarding the national monitoring programmes established by the Contracting Parties, which are also EU Member States. The country monitoring programmes established in line with the MSFD provide a solid basis for implementation of IMAP requirements considering national specificities.

6. As indicated in the UN Environment/MAP Programme of Work 2016-2017 providing dedicated funding, as well as with the support of the EcAp-MEDII and Marine Litter-MED EU-funded Projects and recently with the support of the GEF Adriatic Project, work has progressed in almost all other Contracting Parties too (namely in Albania, Algeria, Bosnia and Herzegovina, Egypt, Israel, Montenegro, Lebanon, Libya, Morocco, Tunisia and Turkey) on the update of the national monitoring programmes.

7. Country-specific and sub-regional trainings were organized on all three clusters of monitoring (i.e. biodiversity and non-indigenous species (NIS), pollution and litter, and coast and hydrography), to ensure that specific capacity needs are addressed and followed up, in line with the needs of the Contracting Parties, with a focus on the Southern Mediterranean.

8. While the GEF Adriatic Project will implement ecosystem-based management activities, including Marine Spatial Planning (MSP), the project activities will also provide a follow-up of the UN Environment/MAP IMAP-related activities including those developed within the EcAp-MED II Project, where detailed guidelines for monitoring of each individual indicator were already developed (i.e. indicator guidance fact sheets), and will result in two national monitoring programmes aligned with the requirements of IMAP that could be, in view of the joint methodological approach used, considered as sub-regional/harmonized monitoring programmes (for Albania and Montenegro). While Bosnia and Herzegovina is not a beneficiary country under the GEF Adriatic Project, exchange of experience with Albania and Montenegro is planned and further assistance from UN Environment/MAP will be generated to support alignment of the national monitoring programme with the requirements of IMAP.

² <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32008L0056>

9. Turkey has been also progressing on IMAP implementation, with most recent efforts to strengthen the integration of IMAP provisions into the national monitoring programmes through the implementation of the EU-funded Project entitled “Technical Assistance for capacity building on Marine Strategy Framework Directive in Turkey (2015-2017)”.

10. In conclusion, as indicated above, the initial phase of IMAP implementation up to date (2016-2018) showcases a high level of progress by all Contracting Parties.

2.1 Biodiversity and NIS cluster

11. The biodiversity and NIS parts of national IMAP-based monitoring and assessment programmes were developed for all Southern Mediterranean countries with the technical support of SPA/RAC under ECAP MED II Project. Drafts were extensively discussed and validated by dedicated national workshops for the following Contracting Parties: Libya (Tunis, 18-19 April 2017), Tunisia (Tunis, 20 April 2017), Morocco (Rabat, 4 July 2017), Egypt (Cairo, 10 October 2017), Lebanon (Beirut, 17 January 2018) and Algeria (Algiers, 13 May 2018). During these workshops, national experts and stakeholders selected the potential sites for the implementation of IMAP, including Marine Protected Areas (MPAs), and the list of species and habitats to be monitored during the second phase of IMAP implementation. The adopted national IMAP-based monitoring and assessment programmes are accessible (http://www.rac-spa.org/fr/ecapmed_ii) and are currently being harmonized and edited³.

12. In accordance with the UN Environment/MAP Programme of Work 2016-2017, SPA/RAC supported the Contracting Parties towards successful implementation of their national monitoring programmes on biodiversity through pilot projects. The ongoing activities include implementation of specific Memoranda of Understanding with relevant national authorities, with the aim to develop monitoring programmes on biodiversity and NIS-related IMAP Common Indicators.

13. Sub-regional capacity-building events and exchange of best practices to support national implementation of IMAP on specific monitoring techniques were held in Tunisia (Kuriat island, 17-23 July 2017) and in Greece (Samos island, 22-28 September 2017). Trainings were held, focused on strengthening the capacities of the countries on specific areas, such as the use of monitoring protocols on biodiversity and NIS-related IMAP Common Indicators such as the marine habitats, marine mammals, sea birds, marine turtles and non-indigenous species. This was followed by specific sessions on reporting obligations about the quality assured data including mapping/cartography using the Geographic Information System (GIS). A reporting template was deeply discussed to provide a standard for submission and assessment of data related to biodiversity component, generated from the pilot monitoring projects.

14. Upon country request, additional trainings to reinforce national capacities concerning the implementation of Biodiversity/NIS monitoring protocols are planned to be held during the summer season of 2018 in Tunisia (10-13 May 2018), Morocco (26-29 June 2018), Lebanon (2-6 July 2018), Egypt (13-16 July 2018) and Algeria (16-19 July 2018) respectively.

2.2 Pollution and litter cluster

15. The alignment of the assessment component of MED POL Programme (Phase IV), adopted since 2006, with the requirements of the IMAP brought a new perspective and challenges to the Contracting Parties, including more demanding requests for regular reporting of quality-assured and comparable data deriving from the implementation of the updated integrated national monitoring and assessment programmes to a fully-fledged and operational Info-MAP System: (i) improved availability of long time series of quality-assured data to monitor the trends of the status of the marine

³ Regarding the national IMAP-based monitoring and assessment programme of Israel, draft chapters have been already discussed between SPA/RAC and Israel and finalization of the draft national IMAP-based monitoring and assessment programme for Biodiversity and NIS is also close to end.

environment; (ii) revised temporal and spatial scale of monitoring programmes (e.g. eutrophication becomes integral part of monitoring programme, whereas it was previously implemented through pilot approaches; temporal trends of selected contaminants at the designated hot spot sites in the coastal marine environment and coastal reference stations to be extended as appropriate to the offshore area, etc.), (iii) enhanced data quality assurance and control.

16. In accordance with Article 12 of the Barcelona Convention which stipulates that all Contracting Parties shall establish pollution monitoring programmes and designate the competent authorities responsible for pollution monitoring, and Article 8 of the Land-Based Sources Protocol, the Secretariat/ MED POL continues to support the Contracting Parties to the Barcelona Convention in implementing the National Marine Pollution Monitoring Programmes. Small-Scale Funding Agreements (SSFAs) were concluded with Egypt, Israel, Lebanon, Libya and Morocco, and financed through the Mediterranean Trust Fund (MTF) and EcAp MED II and Marine Litter MED Projects, with the aim to: i) support ongoing implementation of the MED POL IV Monitoring Programme, avoiding any discontinuity in submitting and assessing data related to marine pollution; ii) ensure gradual transition to new IMAP-based monitoring programmes of marine environment, as well as to iii) support implementation of some pilot projects which include marine litter monitoring.

17. Capacity building workshops to support national implementation of IMAP and related criteria for eutrophication and marine litter were organized in Egypt (Alexandria, 26 – 28 February 2018), Morocco (Rabat, 19-20 February 2018) and Libya (Tunis, Tunisia, 12-15 March 2018). The workshops addressed the methodological and practical aspects related to monitoring and assessment of marine environment with regards to pollution and marine litter clusters of IMAP Common Indicators: 13, 14, 22 and 23. The IMAP monitoring protocols and assessment methods, sample processing, metadata, reporting templates, as well as the examples of existing national monitoring schemes and capacities compared to IMAP requirements and the guidance factsheets have been presented and extensively discussed.

18. Progress is noted with regards to the update of the pollution assessment criteria and thresholds. 24 new/updated pollution assessment criteria were approved by the COP 20 with the aim to encourage the Contracting Parties and the Secretariat to test them for indicative purposes in the different contexts that exist in the Mediterranean.

19. Up to now, data submissions have been received by Croatia (2011-2014), Cyprus (2013, 2014, 2015 and 2016), Egypt (2012, 2013 and 2015), France (2010, 2011, 2012, 2013, 2014, 2015 and 2016), Israel (2012, 2013 and 2015), Montenegro (2014, 2015, 2016), Morocco (2013, 2014 and 2015), Slovenia (2014, 2015 and 2016), Tunisia (2014) and Turkey (2014 and 2015). The preparation of the 2017 MED QSR was instrumental in promoting the reporting of new data series related to marine pollution by many Contracting Parties.

20. The Secretariat/MED POL is in close dialogue with INFO-RAC to ensure that the MED POL online database, which was developed in 2012, is made available to all Contracting Parties to report their monitoring data and view their past reports. The online database has required some revision from the “testing phase” to ensure clear and easy accessibility and uploading of existing and new data that are expected to be reported by the Contracting Parties in the near future before the IMAP-compatible Info-system is completed. Also, MED POL data since 2000 are in the process of being re-uploaded by INFO-RAC into the system with the aim of ensuring MED POL online database availability for inclusion into IMAP compatible Info-system.

21. Work has been undertaken to provide training to appointed MED POL designated national laboratories and experts included in the implementation of the data Quality Assurance Programme, by organizing two Proficiency Tests (inorganic and organic contaminants in marine sample), and two Training Courses on the Analysis of Organochlorine Pesticides (OCs) and on the Analytical Techniques for the Determination of Trace Elements in Environmental Samples. This contributes to the improvement of the national capacities to meet the IMAP requirements. Final reports of the 2017

proficiency tests on trace metals and organics in sediments will be shared with MED POL Focal Points and their main findings and recommendations at the forthcoming CORMON meetings next year.

2.3 Coast and hydrography cluster

22. All countries are currently verifying the final draft of the coast and hydrography monitoring programmes or finalizing their drafts, with some exceptions. In addition, based on the country capacity analyses, specific trainings were held, both on country and sub-regional level. A training⁴ workshop on coast and hydrography IMAP Common Indicators was held on 26-27 October 2016, in Rabat, Morocco, dedicated to the precise definition of monitoring requirements. A second training workshop on coast and hydrography IMAP Common Indicators was held in 24-25 April 2017, in Rome, Italy, which allowed experts to exchange state-of-the-art information regarding the development of national IMAP-based monitoring and assessment programmes. These workshops were followed up by a sub-regional expert group meeting on coast and hydrography, held on 6-7 December 2017, in Zagreb, Croatia, where representatives from the countries, national experts, discussed the presentations of the final draft IMAP parts on coast and hydrography, as well as collaboration and experience-exchange on monitoring between different sub-regional groups of countries.

23. Main recommendations and requests formulated by national experts in the above workshops are as follows:

- The constitution of sub-regional expert groups for better coordination of monitoring;
- Work on strengthening interconnections between EO1 Biodiversity (i.e. marine habitats) and EO7 Hydrography (i.e. estimation of hydrographic alterations);
- Further need for capacity building, especially in terms of technical support regarding the implementation of the indicators (e.g. modelling, GIS application, etc.).

24. The discussions helped pave the way towards the future implementation of the national monitoring programmes and to build synergies with other relevant programmes and projects, which may support the implementation of the coast and hydrography indicators, such as the upcoming MedProgramme or ongoing projects such as Portodimare (EU Interreg ADRION) in the Adriatic and Ionian region that will establish a Geoportal for ICZM/MSP including IMAP Indicators.

2.4 Resource mobilization for IMAP implementation

25. Building on the key findings of the Ecosystem Approach Funding Strategy (UNEP/MED WG.450/Inf.3), as well as on Contracting Parties' views expressed during recent CORMON and the Ecosystem Approach Coordination Group Meetings, the Secretariat has prepared two initial draft Concept Notes to address both short-term (2019-2021) and long-term (2020-2024) IMAP and Ecosystem Approach Roadmap implementation needs. Both concept notes are presented to the present Meeting (UNEP/MED WG.450/7) for feedback and inputs.

26. The aim of the first short-term proposal is to support IMAP by implementing pilots of Common Indicators with the view to addressing the following specific needs towards the 2023 MED QSR development: (i) provision of quality assured data; (ii) definition of assessment criteria to assess GES on sub-regional level in support of the 2023 MED QSR; (iii) strengthening of synergies with Agenda 2030 implementation; (iv) strengthening of Science-Policy Interface (SPI) in priority areas for cooperation; (v) further actions for resource mobilization starting from 2020; (vi) strengthening of IMAP Info-System and its use by the Contracting Parties.

27. The aim of the second long-term proposal is to support the implementation of different steps of the Ecosystem Approach Roadmap through strengthened sustainable marine resource management,

⁴ Further progress towards focal point appointment and development of the coast and hydrography part of the national IMAP will be necessary still in Egypt for full IMAP implementation.

mainstreaming the protection of biodiversity in key sectors and addressing specific drivers including an IMAP implementation component. Focus is placed on the following issues: (i) marine biodiversity and living resources conservation; (ii) contribution to the Blue Economy, by the implementation of the ecosystem-based MSP and (iii) reduction of marine litter impacts on marine and coastal environment with a particular focus on the biodiversity.

2.5 IMAP-compatible data information system

28. INFO-RAC is developing a fully operative Info-MAP platform and platform for the implementation of IMAP, connected to MAP Components' information systems and other relevant regional knowledge platforms.

29. In consultations with the Secretariat and relevant Components, namely MED POL, SPA/RAC and PAP/RAC, and based on the initial Contracting Parties feedback, INFO-RAC developed with the support of the EcAp-MEDII project the draft of the IMAP compatible pilot Info-system. The IMAP Info System is expected to enable IMAP-related reporting as of May 2019 for 10 IMAP Common Indicators.

30. INFO-RAC, with the support of the EcAp MED II Project, has developed drafts of the data standards and data dictionaries for each of the 10 selected IMAP Common Indicators, covering all three clusters of IMAP, as submitted for a preliminary discussion to the current meeting (pollution and litter (UNEP/MED WG.450/4), biodiversity and NIS (UNEP/MED WG.450/5), coast and hydrography (UNEP/MED WG.450/6)).

2.6 Next steps to support effective IMAP national implementation

31. Acknowledging achievements, lessons learned and challenges faced during the current initial phase of IMAP implementation at national level, the following directions have been identified and highlighted for further work:

- 1) Efforts for coordinated national IMAP implementation should be enhanced;
- 2) Enhanced integration between the three clusters of IMAP is a key challenge and needs further action;
- 3) Tailored capacity-building activities should be established to fill the gaps clearly identified during IMAP national trainings, including on technical capacities, software, monitoring protocols, human resources needed etc.;
- 4) Further efforts are necessary by the Contracting Parties to generate more synchronized datasets for assessments (collection of quality assured data in a coherent manner and format and availability of long-time data series to monitor trends);
- 5) Specific support should be provided to Contracting Parties on new areas of monitoring (i.e. biodiversity, NIS, coast and hydrography, marine litter) as from 2019;
- 6) IMAP-compatible Info-System needs to be finalized to accommodate reporting of IMAP compatible data by the Contracting Parties;
- 7) Monitoring protocols and assessment methods have to be harmonized and standardized, including region-wide harmonized criteria for reference conditions and threshold/boundary values per assessment area, as appropriate;
- 8) Further development of the risk-based approaches, analytical testing and assessment methodologies, assessment criteria for integrated chemical and biological assessment methods and testing of new research-proved tools for monitoring the toxic effects, as well as improvement of knowledge on emerging chemicals, are needed;
- 9) Testing of the Background Assessment Criteria (BACs) and Environmental Assessment Criteria (EACs) and thresholds application should be undertaken on a trial basis and at regional and sub-regional levels.
- 10) Identification and evaluation of marine litter accumulation (stranding fluxes, loads and linkage with specific sources) and hotspots using GIS and mapping systems and

modelling tools should be enhanced, including better understanding of transport dynamics and accumulation zones;

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

3. CROSS-CUTTING ISSUES AND COMMON CHALLENGES

3.1 Overview of cross-cutting issues and common challenges of IMAP implementation

32. IMAP describes the strategy, themes, and products that the Contracting Parties are aiming to deliver, through collaborative efforts in the framework of the UN Environment/ MAP - Barcelona Convention, during the second cycle of the implementation of the Ecosystem Approach Process in 2016-2021. IMAP Decision IG.22/7 provides, during the initial phase of IMAP implementation (2016-2019), for the review and revision, as appropriate, of the national monitoring and assessment programmes in order to integrate IMAP provisions, the update of GES definitions, as well as the further refinement of assessment criteria.

33. Based on common region-wide agreed indicators per Ecological Objective (EO), the underlying aim of IMAP is to monitor and assess the status of the marine and coastal environment towards the achievement of Good Environmental Status (GES) of the Mediterranean Sea and Coast. The determination and assessment of GES follows the main elements of the ecosystem and is closely linked to the effects of pressures from human activities (pressure-based ecological objectives).

34. The IMAP assessment component shall consider the characteristics, pressures and impacts on the marine and coastal environment and evaluate the current environmental state in relation to GES; thereby assessing the distance between the current state and GES. Discussions on GES assessments and related methodologies were initiated during the preparation of IMAP and its main Guidance document (UNEP(DEPI)/MED IG.22/Inf.7). Two Science-Policy Interface (SPI) Workshops, held in 2016-2017 by Plan Bleu, in collaboration with the respective UN Environment/MAP Components, were specifically dedicated to risk-based approach and to appropriate monitoring and assessment scales.

35. Decision IG.23/6 (COP 20, Tirana, Albania, 17-20 December 2017) endorsing the key findings of the 2017 MED QSR, provides clear guidance on the way forward to improve data delivery and ensure a fully data-based integrated assessment in 2023.

36. In line with the recommendations of the 2017 MED QSR, for an ecosystem-based integrated approach to determine and assess GES, the main elements of the ecosystem should be assessed in an integrated manner and closely linked to the effects of pressures from human activities.

37. In order to achieve the above, further work is required on a number of issues including (i) the harmonization of monitoring and assessment methods; (ii) the definition of links between assessment scales, pressures and cumulative impacts on ecosystem components; (iii) the improvement of long time series of quality assured data to monitor the trends; and (iv) the improvement of data management and data accessibility through the MAP Info-System for all the IMAP Common Indicators (CI). The CORMON groups started to address the above issues since the beginning of their establishment. The outcome of this work is reflected in the IMAP Guidance document (UN Environment, 2017). However, there is a need to address these issues in depth. In this respect, criteria for assessments, reference levels (baselines, thresholds etc.), aggregation rules, assessment scales (spatial/temporal), and review/ expert judgment are considered critical to ensure an effective implementation of IMAP.

38. The purpose of Part II of the current Progress Report is to provide a number of considerations addressing the above issues related to several aspects of GES assessment as a basis for further discussions in the upcoming CORMON meetings, with a particular focus on:

- a. Integrated GES assessment;
- b. Approaches to define assessment scales and areas: regions, sub-regions, subdivisions and finer scales, if needed;
- c. Review of suitable tools to show the environmental status of the different Ecological

- Objectives across the Mediterranean Sea and coasts, and pressures/impacts/state interactions;
- d. Linkages between different assessment scales, and in particular between ecologically-relevant scales for the various ecosystem elements and relevant scales for assessing pressure elements.

3.2 From 2017 Mediterranean QSR towards 2023 Mediterranean QSR: A more integrated approach for GES assessment

39. As indicated above, based on the 2017 MED QSR, the IMAP Guidance (UNEP(DEPI)/MED IG.22/Inf.7) and other UN Environment/MAP documents, as well as findings from ongoing projects and other relevant work, the following issues should be considered as priority to improve GES assessment:

- assessment of pressures/impacts/state interactions;
- definition of clear and common aggregation and integration, including in time and space;
- definition of adequate assessment scales using a nested approach;
- gradual move from trends to thresholds in defining assessment criteria and GES.

Interaction of pressures, impacts and state of the marine and coastal environment in the Mediterranean

40. There is a need to ensure better integration and interaction of pressures, impacts and state elements in assessing GES and interrelation to the extent possible among different relevant Ecological Objectives.

41. Transboundary issues should be also considered, since GES achievement in one Contracting Party may be dependent on actions taken by other Contracting Parties within the region or sub-region, due to different interactions, especially regarding anthropogenic pressures that may have transboundary effects. In this respect, based on existing assessment best practices, a two-step process for assessments may be recommended:

- First, an assessment of the predominant pressures and their impacts on the marine environment, including a mapping of the uses and activities in the marine environment, when appropriate, is necessary.
- Secondly, the assessment will concern the environmental status of marine ecosystems (including species and habitats), informed by the pressure and impact assessments under the first step.

42. There are different possible approaches to support the integrated assessment of predominant pressures and their impacts on the marine and coastal environment.

a) *GRID/Table approach*

43. Pressures can be considered in the two following ways: (i) at source, i.e. the activity generating the pressure; this aspect is relevant for setting environmental targets and defining measures aiming at reducing the pressures in order to achieve or maintain GES; and (ii) at sea, i.e. the level of pressure in the marine environment to which the different elements of the ecosystem are subjected; this aspect is particularly relevant for determining GES for both IMAP pressure-based and status-based Common Indicators.

44. Table 1 provides a tabular representation of interactions between pressures and impacts, as measured by IMAP Common Indicators grouped per related Ecological Objectives. This table is filled partially and is expected to be reviewed and fully completed during the present meeting and future CORMON meetings.

EO	Common Indicator	Non construction zone	Natural hazards	Natural disasters	Climate change	Agriculture & forestry run offs	coastal urbanization	Damming (demand on water)	Waste water discharges	Industry	tourism frequentation	Yachting	Marine mining	Dredging	Desalination	coastal artificialisation	Port operations	Offshore structures	cables and pipelines	Shipping	oil and gaz extraction	renewable energy	Fishing (incl. Recreational)	Sea-based food harvesting	Extraction of genetic resources	Aquaculture	Solid waste disposal	Storage of gases	Research and education	defence operations	Dumping of munitions	
		1	CI1 Distributional range																													*
CI2: Condition species																															*	
CI3 Species distribution																														*		
CI4 Population abundance																														*		
CI5 Population demography																													*			
2	CI6 Trends in NIS																															
3	CI7 Spawning stock Biomass																															
	CI8 Total landings																															
	CI9 Fishing Mortality																															
	CI10 Fishing effort																															
	CI11 CPUE/LPUE																															
	CI12 Bycatch																															
4	CI13 Nutrients																															
	CI 14 Chlorophyll-a																															
7	CI 15 Habitats impacted																															
8	CI16 Erosion																															
9	CI17: Key harmful contaminants																															
	CI 18: Pollution effects																															
	CI 19 Acute pollution events																															
	CI20: Seafood Contaminants																															
	CI21 Intestinal enterococci																															
10	CI22 Beached litter																															
	CI 23 Litter at sea																															

	Significant contribution of the activity to pressure
	Minor contribution of the activity to pressure
	No activity but possible development of the activity
	No contribution to pressure

Table 1. Overall interrelationships between the IMAP Common Indicators grouped per related Ecological Objectives (EO) and the main activities in terms of pressures in the Mediterranean Sea (based on ICZM Protocol and other Barcelona Convention's Protocols) The selected examples are given on indicative basis for Common Indicators related to EO 1 (Biodiversity) and 10 (Marine litter). EOs without Common Indicators or candidate indicators are not included in the analysis. (*) mammals

45. Following the first step, experts can/may better define/refine specific interactions, for activities contributing to pressures at Common Indicator level. The proposed approach is to cross-map appropriate activities (with minor and significant contribution to pressures) with the Common

Indicators, considering sub-regions, or, if relevant and appropriate, subdivisions (using as appropriate the nested approach). Table 2 is an example of pressure/impacts interactions at sub-regional level for key pressures, also considering subdivisions, which may be subject to a possible further analysis, as appropriate.

EO	SUB REGION	SUBDIVISION	Natural hazards	Natural disasters	Climate change	Coastal urbanization	Waste water discharges	Industry	Tourism	Shipping	Fishing (incl. Recreational)	Solid waste disposal								
EO 10, Common Indicator 23	Sub Region I	Subdivision a	Green	Red	Green	Red	Yellow	Red	Yellow	Yellow	Yellow	Yellow								
		Subdivision b	Green	Red	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow							
		Subdivision c	Green	Red	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Yellow	Yellow							
		Subdivision d	Green	Yellow	Green	Green	Green	Green	Green	Green	Green	Yellow	Yellow							
		Subdivision e	Green	Green	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Yellow	Yellow							
		Subdivision f	Green	Red	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Green	Yellow	Yellow							
	Sub Region II	Subdivision a																		
		Subdivision b																		
		Subdivision c																		
		Subdivision d																		
	Sub region III																			
	Sub Region IV																			

Table 2. Interrelationships between the IMAP Common Indicators and activities contributing to pressures with consideration of scale of assessment (nested approach). An example is given for EO 10 (marine litter). EO without Common Indicators or candidate indicators are not to be included in the analysis. Four sub-regions have been defined for practical reasons and for the purpose of the UN Environment/MAP 2011 Initial Integrated Assessment (UNEP(DEPI)/MED WG.363/Inf.21), namely the Western Mediterranean, Ionian and Central Mediterranean, Adriatic Sea and Aegean-Levantine.

46. This table is filled partially and is expected to be reviewed by the present meeting and fully completed by future CORMON meetings at least for the four sub regions established in the Mediterranean for assessment purposes in the framework of Ecosystem Approach Roadmap.

47. Some metrics and subdivisions are still to be refined to improve the analysis, prior to setting up any management strategy. This approach can support the definition of areas/sectors where appropriate reduction and management measures will be needed. It can also provide priorities in terms of specific baselines, thresholds, and finally targets, and support the monitoring of associated measures' efficiency.

b) Mapping of pressures/impacts relationships; risk-based approach

48. Mapping of pressures/impacts relationships can be done using the risk-based approach. Risk-based approach is particularly effective for Ecological Objectives that are spatially patchy and where pressures are applied at specific locations. It is recommended to map the pressures that are most likely to have significant impacts, considering the vulnerability of various properties of the ecosystem.

49. Variation in the scale of both environmental conditions and impacts of pressures means that assessments of GES could begin with sub-areas of both greatest sensitivity and highest level of

pressures. If the environmental status in these areas is “good”, then it can be assumed that the status over the larger area is good. In contrast, if the environmental status in the sub-areas is not “good”, then monitoring and assessments should be conducted stepwise at additional sites along the gradients of pressure or sensitivity. The size of the appropriate steps along the gradient will depend on the nature of the gradient and the way the environmental conditions are degraded. It may vary significantly between different cases (Cardoso *et al.*, 2010).

50. There are several methodological approaches that may be used for the mapping of distribution of pressures and assessment of their impacts over different ecosystem components (species groups, pelagic or benthic habitats), including defined quality threshold values. The one recently tested in Boka Kotorska Bay, Montenegro, under a guidance of PAP/RAC-UN Environment/MAP includes interrelation between IMAP Common Indicators, vulnerability assessment and management approach and MSP. This methodological approach may also guide next steps to develop the matrixes for mapping spatial distribution of pressures and their impacts over different ecosystem components. Developing such a methodology will be the subject to further work and review by the future CORMON meetings in 2019.

51. The pressure-impact assessments, combined with the pressure-based Common Indicators, should provide outcomes on impacts, which are directly relevant to the state-based assessment of the ecosystem elements being assessed (for example, for the assessment of impact on non-commercial species, incidental by-catch needs to be separated into at least the specified species groups of birds, mammals, reptiles and fish and preferably at species level, to feed into species-level assessments). The state-based assessment, combined with the state-based Common Indicators to assess a set of ecosystem elements in a more integrated manner, needs to reflect the impacts upon each state element from all the predominant pressures to which each is subject (for example, assessment of a benthic habitat should encompass, where appropriate, the impact assessments from the pressures: physical loss, physical disturbance, non-indigenous species, nutrient enrichment, removal of species and, if appropriate, other pressures).

52. A variety of assessment scales are therefore necessary to reflect state-based assessments (ecologically-relevant scales for the various ecosystem elements: species, habitats, ecosystems), and pressure-based assessments aimed to guide management of human activities to reduce their impacts.

c) The NEAT Approach

53. The Nested Environmental Status Assessment Tool (NEAT, Borja *et al.*, 2016) uses a combination of high-level integration of habitats and spatial units, and averaging approach, allowing for specification on structural and spatial levels, applicable to any geographical scale. NEAT is a structured, hierarchical tool for making marine status assessments and is freely available at www.devotes-project.eu/neat. Based on a nested assessment approach, the NEAT has been discussed and applied at various scales in the framework of different projects (ActionMed, PERSEUS, DEVOTES).

54. The results were evaluated in relation to the anthropogenic pressures affecting the study area, as well as the management measures taken and compared to the results from previous studies. The NEAT was able to show clear spatial gradients differentiating the impacted and slightly impacted areas and the response of the ecosystem towards some management measures. The application of NEAT tool classified the whole tested area with the pelagic habitat components (fish, water column and phytoplankton ecosystem components), contributing strongly to the global environmental status. Sediment, benthic fauna and vegetation, mammals and aliens NIS were the most impacted ecological components.

55. This approach is now being further considered at the Mediterranean scale, within the project MEDCIS, and could be considered as a best practice in the context of the second phase of IMAP implementation.

d) Promoting integrated assessment of GES

56. Interrelationships between the UN Environment/MAP Ecological Objectives, the status of the ecosystem elements and pressures, and the IMA Common Indicators are important to ensure the integrated assessment of GES.

57. Building on the relevant best practices coming from the EU MSFD implementation (European Commission, 2017), Table 3 presents an approach enabling the integrated assessment of GES taking into account the relationship among different Ecological Objectives.

58. This is based on the assessment of impacts, which relates directly to the ecosystem elements to provide outcomes on their status, which are directly useful for the state-based assessments. For example, for the assessment of impact on non-commercial species, incidental by-catch (Common Indicator 12) needs to be separated into at least the specified species groups of birds, mammals, reptiles and fish and preferably at species level, in order to feed into species-level assessments. Each state element is assessed to reflect each of the pressure-related impacts, ensuring that the state-based and pressure-based assessments are compatible, in terms of scales of assessment and resolution of the ecosystem elements.

59. In order to make best use of this integrated framework, the following logical sequence of assessments is recommended:

- Map the distribution and intensity of human uses and activities and identify the main areas of activity; this can be used as proxy pressure assessment to support later identification of measures;
- Assess the pressures in terms of spatial distribution and intensity (including temporal aspects, where necessary); this may be less relevant for the assessment of mobile species (e.g. birds and cetaceans), for which it is more difficult to know the place and time of exposure to particular pressures;
- Assess the environmental impacts/ extent of impacts in relation to the elements to be used for the state-based and the pressure-based assessments;
- Assess the state, as derived from the assessments of impacts in previous step, to lead to an overall assessment of status.

GES				Pressures				
				EO 2	EO 3	EO5	EO9	EO10
				NIS	Extraction of Wild species	Eutrophication	Contamination	Marine litter
State				Pressure				
State	EO1, EO3	Species (birds, turtles, fish etc.)	CI 1 to 5, CI17, CI9	?	CI8 to CI12	?	CI17 to CI21	CI24
	EO1, EO3	Pelagic habitats		CI6	CI8 to CI12	C13, C14	CI17 to CI20	CI24
	EO1, 3,	Benthic habitats		CI6	CI8 to CI12	C13, C14	CI17 to CI20	CI24
	EO 1, 2, 3, 4	ecosystems		CI6	CI8 to CI12	C14	CI18, CI19	?

Table 3. A possible framework for integrated GES assessment, showing IMAP Common Indicators in relation to the predominant pressures. EOs/Cells in Orange concern pressures (P); IMAP Common Indicators in yellow concern impacts (I) and ecosystem elements in grey cells concern state. Some EOs are repeated, as they are applicable to several ecosystem elements (species groups, pelagic and benthic habitats). EOs for which Common Indicators are not defined (EO 6, 7 and 11) are not considered in the table. Cells marked with ‘?’ indicate situations where an impact from the pressure is possible without any possible assessment.

60. This table is built on best practices from the EU countries on MSFD implementation, taking also into account IMAP and Mediterranean region specifics.

61. In order to reach a clear conclusion on whether GES is achieved or not for a specific area, there is need for aggregation and integration across the individual assessments and data sets relating to the eleven Ecological Objectives. Aggregation and integration need to take into consideration and be balanced with appropriate details and scales for identifying and implementing any necessary management actions.

62. The integration of individual assessments at Common Indicator and Ecological Objectives’ level into a unique status assessment entails a number of challenges, including the following:

- i) Some Ecological Objectives may act as pressure for other Ecological Objectives (for example, NIS can be a threat to biodiversity and food web);
- ii) Not all the Ecological Objectives have an equal weighting when assessing the overall GES;
- iii) Some pressure-related Ecological Objectives may affect other Ecological Objectives (see table 4 below);
- iv) Integration at the Ecological Objectives’ level may be based on partly redundant information given by Common Indicators (for example, under EO 10 on marine litter, CI 22 is partly related to CI 23);
- v) Assessment integration and scaling up requires Contracting Parties’ assessments to be comparable.

	EO1	EO2	EO3	EO4	EO5	EO6	EO7	EO8	EO9	EO10	EO11
EO1		Extended relations	Extended relations	Extended relations	Extended relations	Extended relations	Extended relations	Signifiant relations	Signifiant relations	Limited relations	Signifiant relations
EO2			Limited relations	Extended relations	Limited relations	Limited relations	Signifiant relations	Signifiant relations	Signifiant relations	Signifiant relations	Signifiant relations
EO3				Extended relations	Signifiant relations	Signifiant relations	Signifiant relations	Signifiant relations	Signifiant relations	Limited relations	Signifiant relations
EO4					Extended relations	Limited relations	Signifiant relations	Signifiant relations	Signifiant relations	Limited relations	Limited relations
EO5						Limited relations	Signifiant relations	Signifiant relations	Limited relations	Signifiant relations	Signifiant relations
EO6							Signifiant relations	Signifiant relations	Signifiant relations	Limited relations	Signifiant relations
EO7								Signifiant relations	Signifiant relations	Signifiant relations	Signifiant relations
EO8									Limited relations	Signifiant relations	Signifiant relations
EO9										Limited relations	Signifiant relations
EO10											Signifiant relations
EO11											

	No relation
	Limited relations
	Signifiant relations
	Extended relations

Table 4. Indicative interrelations between Ecological Objectives (EOs)

63. In line with the above, the following recommendations may be considered:

- The integration across levels of different complexity should accommodate different alternatives, i.e. integration at indicator level (across indicators within EOs) could certainly differ from integration at Ecological Objectives' level;
- Integration across state-based Ecological Objectives (EO1 to 3, EO6) is different than across pressure-based Ecological Objectives (EO 2, 5, 8 to 11);
- There is a different contribution of the two main types of Ecological Objectives to the overall GES evaluation, as GES for pressure-based Ecological Objectives should also be met when GES for state-based Ecological Objectives (EO1, 3, 4, 6) is achieved.

64. The process of processing/analyzing data from monitoring programmes in an assessment and concluding on the current environmental status involves a number of assessment steps. It is necessary to define the way in which the data are processed (spatial and temporal aggregation) and how they are interpreted for an indicator and operational objective; there may be multiple elements to be aggregated to give a broader perspective and multiple assessment areas.

65. Decisions on a 'boundary' between 'in GES' and 'not in GES' are needed at various steps (levels) in this process:

- a. There is need to determine appropriate threshold values for each Common Indicator used to assess the elements, enabling a clear distinction on whether GES for an Ecological Objective has been achieved or not. For each of these there can be a margin of variance. These threshold boundaries should, wherever possible, be set in relation to a baseline, which represents a 'reference condition', sometimes termed a 'background level';
- b. Where several Ecological Objectives are used per ecosystem element, a specified method of aggregation across the Ecological Objectives is needed in order to assess whether the element has achieved GES or not. These rules could include the one-out-all-out principle or other specified approaches. In this sense GES can be defined as having been achieved for specified elements of the marine environment (e.g. related to specific EOs or biodiversity elements) rather than as a whole; this allows for a more step-wise approach to assessments and for a means to communicate that GES has been achieved for certain elements but not yet for others;
- c. For multiple elements (e.g. multiple species or contaminants) in a broader functional group (e.g. demersal fish, heavy metals etc.), a way to express overall status of the broader group is

needed. In this situation, a minimum list of elements, which ‘represent’ the broader group, should be specified and then used for assessment of that group. In these cases, all the listed elements within the group should achieve the specified quality levels in order to say that the broader group has achieved GES. Progress towards GES for the group could be expressed as the proportion (percentage) of the minimum list of elements, which have achieved GES. It has to be noted that the respective specific features of IMAP Common Indicators will be addressed by the upcoming CORMON meetings for more concrete guidance in that respect.

e) Geographical aggregation and integration

66. Integration at a higher geographical scale to achieve consistent conclusions on the extent to which GES is achieved for each of the different topics remains a key step to support assessments.

67. The 2011 Initial Integrated Assessment of the Mediterranean Sea and Coastal Areas undertaken by the UN Environment/MAP Barcelona Convention Secretariat and its Contracting Parties delivered a region-wide assessment report complemented by four sub-regional assessment reports. The 2017 MED QSR followed the regional approach only. Further discussion is needed and should start well in advance to define the level of aggregation of assessments for the 2023 MED QSR.

68. This raises the question of how the assessment of complementary elements is taken into account when presenting the overall extent to which GES is being achieved.

69. A proposed scheme is to base the regional assessment on the integration of IMAP-based national indicators and their incorporation into the assessment for each sub-regional/ regional assessment unit. The assessment outputs for presenting the extent to which GES is achieved can take different forms depending on the purpose of the presentation and communication.

These options include:

- To combine all assessment results in an integrated scheme for presenting assessment results which provides a concise presentation of GES status in relation to all IMAP Common Indicators at the relevant geographic scales.
- To provide details on the assessment results which are relevant for management. Needs and options are specific for the Ecological Objectives and Common Indicators. In general, possible approaches include:
 - number or percentage of assessed elements failing/meeting threshold values/good status;
 - distinction between elements accessible to management and those that are not (e.g. banned legacy contaminants vs contaminants in use);
 - distinction between matrices where this helps addressing management;
 - expression of distance to the threshold value/good status in order to provide an insight into the magnitude of the problem and an indication of progress between IMAP cycles. Options depend on the indicators and may include bar chart presentations of the assessment values against threshold, possibly normalised on a scale 0–1 or differentiated classification on both sides of the good/not good boundary.

70. Consideration will be then given to the envisaged level of integration of Common Indicators and Ecological Objectives, the flow/sequence of assessment and integration steps, the possible nodes of integration and the associated integration rules. Comparable outputs should be agreed to be delivered as part of the assessment process within the UN Environment/MAP - Barcelona Convention, understanding some differences for purposes of the management of pressures in national waters. Contracting Parties are then expected to deliver the assessment of the environmental status at sub-regional level through regional cooperation and common regional assessment frameworks,

understanding that some regional indicators may not be ready, or be only of national relevance (See annex for examples).

f) Assessment scale

71. IMAP Decision recognized that further work is necessary during the initial phase of its implementation on assessment scales. A nested system provides a flexible approach to defining the scales for assessment (for the different EOs) in a way that also provides consistency and clarity on the scales/areas to be used for assessment. It enables a linkage between state-based and pressure-based assessments, which facilitates linkages to measures. Whilst an outline approach to defining and using such a nested system is presented here, it would be necessary for Contracting Parties, working together on regional level, to develop this into an operational mechanism, by:

- a. Assigning the elements to be assessed to the most appropriate scale, taking account of the most appropriate ecological scales for state-based elements and relating these to appropriate scales for pressure-based assessments; an initial generic proposal for this is given in Table 5 below, noting that this needs further discussion and adaptation;
- b. Defining suitable boundaries for the areas to be used for each scale within the region;
- c. Adjusting the proposal to accommodate practical implementation issues, e.g. the occurrence of national boundaries, the foreseen assessment process, balancing the number of areas for assessment with implementation needs, such as links to measures and management etc.

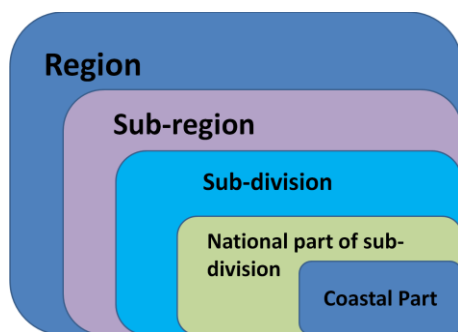


Figure 1. Schematic representation of a nested set of assessment scales to be used to cover all assessment needs for IMAP.

72. In the Mediterranean the sub-regions (as defined in the 2011 Initial Integrated Assessment) may provide the basis for defining scales and areas for assessment and reporting and the Contracting Parties are required to cooperate within each of them to ensure a common and coordinated approach in their monitoring and reduction measures. However, assessments of whether GES has been achieved can be at a finer scale, as deemed appropriate.

73. The broad range of topics to be assessed across the eleven Ecological Objectives and related Common Indicators calls for a variety of scales to be used. For example, wide-ranging species such as sea turtles are more appropriately assessed at the regional scale, whilst nutrient enrichment and marine litter may be more appropriately assessed at finer scales linked to their land-based sources and management needs. In addition, there may be several populations of particular species (e.g. commercial fish) in the region and in sub-regions, which should be assessed separately.

74. A variety of assessment scales are therefore necessary to reflect ecologically-relevant scales for the various ecosystem elements (species, habitats, ecosystems) and management and administratively-relevant scales for pressure elements. Additionally, the outcome of the assessment is intrinsically linked to the scale of assessment. Assessing pressures and their impacts at too broad a scale can hide significant areas of impact in certain parts of a sub-region. On the other hand, it should

be also borne in mind that IMAP must be applied across the entire region waters and adoption of too fine a scale could lead to burdensome assessment processes.

75. Developing suitable mapping/dissemination tools to show the environmental status of the different Ecological Objectives across the whole region should use a nested scale system, accommodating state and pressure aspects to provide a reference layer for information management at regional level. An initial proposal for assignment to appropriate scales for elements' assessment is provided below (Table 5) building on best practices from MSFD implementation for further development in the framework of IMAP implementation and possible adaptation to sub-regional needs.

Elements for assessment	Region	Sub-region	Subdivision	National part of subdivision	Coastal waters
State elements					
Species groups (EO1)	Large cetaceans, deep-sea fish	Offshore birds, small cetaceans, turtles, pelagic & demersal fish	Coastal birds, seals, coastal fish		
Water column and seabed habitats (EO1)			Water column habitats, seabed habitats beyond 1nm		Seabed habitats
Ecosystems (EO1 and 7)		Ecosystems			
Pressure elements					
Physical loss and damage, hydrographical changes (EO6, 7)			Linked to seabed habitats		EO7
UW noise (EO11)	Linked to large cetaceans	Linked to small cetaceans			
Nutrients (EO5)				X	MED POL practice
Contaminants (EO 9)				X	MED POL practice
Litter (EO10)				X	
Removal of species (EO3)	As fish groups/GFCM practice	As fish groups/GFCM practice	As fish groups/GFCM practice		
Non-indigenous species (EO2)				NIS	

Table 5. Initial proposal for assignment to appropriate scales of elements to be assessed (as a basis for discussion and further development during the initial phase of IMAP).

76. A key benefit of such an agreed approach is that it enables visualization of the outcomes of assessments in a map form at different scales. In addition, it would still need an agreement among the Contracting Parties on the smallest entity for each assessment. This may well vary between and within Ecological Objectives but pragmatic approaches are needed which allow assessment and management at all relevant levels.

77. Regarding existing challenges, data may be of limited availability and implementation is still at an early phase, as a number of countries are in the process of revising their national monitoring programs to align them with IMAP. However, previous projects have produced results, outcomes and recommendations for a nested system (Actioned, PERSEUS, DEVOTES, etc.) that can be considered

by the Contracting Parties in an easy-to-use format (see indicative proposed scales for IMAP Common Indicators in table 6 below).

78. As stated previously, the nested approach is considered as one of the best-fitted approaches in the view of GES assessment. As a prerequisite, harmonized approaches must be highlighted and the best approaches should be further identified for monitoring and assessment scales for some of the Ecological Objectives and/ or Common Indicators. Considering the practical steps for its implementation, and given the number of different assessments to be undertaken, it is recommended to first minimise the number of areas defined, using the same areas for several species and habitats, pelagic or benthic, keeping in mind the need for ecologically-relevant scales. Secondly, the areas used for pressure-based and ecosystem-based assessments must be associated with each other (e.g. areas for assessment of physical disturbance are the same as used for the assessment of seabed habitats or nested within the area).

79. The outcomes from the EU-funded project MEDCIS can be also considered. The Project agreed on the same nested principle, proposing Mediterranean Regional Units (MRU), including the Mediterranean basin as region, the marine sub-regions as defined by the UN Environment/MAP 2011 Initial Integrated Assessment, subdivisions to be further discussed, national parts of subdivision and territorial waters (possibly the WFD zones for the Contracting Parties, which are EU Member States). It also identified issues requiring further consideration, distinguishing what could be used for the present cycle and what is for the next.

80. All initiatives also recognised that (i) the subdivisions are still uncertain (nationally and internationally) although information is shared, (ii) the scale of reporting for each Ecological Objective and Common Indicator is not always defined, and (iii) more coordination is foreseen.

81. An indicative set of proposed assessment scales is provided in Table 6 below, building on the initial proposal for assignment to appropriate scales of elements (see Table 5) and considering the key findings of the 2017 MED QSR and work in progress within MEDCIS Project, for further discussion and development by the present meeting and future CORMON meetings.

Eos	Common Indicators	Region	Sub-region	Sub division	National part of subdivision	Coastal waters
EO1	CI 1 Distributional range	diving whales deep sea fish	birds, small cetaceans, turtles, demersal and pelagic fish	Coastal fish and benthic species		
	CI 2 Condition species	Biogeographically-relevant scales				
	CI 3 Species distribution	Biogeographically-relevant scales				
	CI 4 Population abundance	diving whales	small cetaceans, turtles, demersal & pelagic fish	Coastal fish and benthic species		
	CI 5 Population demography	diving whales	small cetaceans, turtles, demersal & pelagic fish	Coastal fish and benthic species		
EO2	CI 6 Trends in NIS	XX	XX	XX		
EO3	CI 7 Spawning stock Biomass	ecologically-relevant scales, based on GFCM areas				
	CI 8 Total landings					
	CI 9 Fishing Mortality	ecologically-relevant scales, based on GFCM areas				
	CI 10 Fishing effort	ecologically-relevant scales, based on GFCM areas				
	CI 11 CPUE/LPUE					
	CI 12 By-catch	ecologically-relevant scales, based on GFCM areas				
EO5	CI 13 Nutrients			X	XX	XXX
	CI 14 Chlorophyll-a					

EO7	CI 15 Habitats impacted			X	XX	XXX
EO8	CI 16 Erosion	X	X	XX	XXX	XXX
EO9	CI 17 Key harmful contaminants	X	X	XX	XXX	XXX
	CI 18 Pollution effects	X	X	XX	XXX	XXX
	CI 19 Acute pollution events	X	X	XX	XXX	XXX
	CI 20 Contaminants in seafood			Catch or Production Area		
	CI 21 Intestinal enterococci				X	XXX
EO10	CI 22 Beached litter	Harmonized protocol				
	CI 23 Litter at sea	Surface litter and microplastics			Sea floor litter	

Table 6. Proposed Assessment scales for IMAP Common Indicators (after 2017 MED QSR and 2017 MEDCIS workshop) to be further reviewed and developed by future CORMON meetings. The assessment scales will be further developed taking into account specific elements (e.g. species of bird, mammal, certain habitat type).

3.3 Moving from trends to threshold values: further implementation of IMAP

82. In the Mediterranean, most of the reduction targets are trends, expressed as reduction in percentage over time, in a reasonable and achievable period. The setting of threshold values overcomes this problem by committing to lower pressure or impacts to an agreed and 'acceptable' level in relation to GES. The threshold values should ensure protection of the environment and human health by indicating concentration levels or impact-indicator levels that should not be exceeded. The Contracting Parties have approved the most recent update of the pollution assessment criteria and thresholds as presented in Annex II of Decision IG 23/6 and encouraged themselves and the Secretariat to test them for indicative purposes in the different contexts that exist in the Mediterranean. This progress is a continuation of many years of MED POL's work on continual introduction and implementation of the assessment criteria and thresholds. The updated criteria have been tested during the preparation of the 2017 MED QSR contaminant factsheets. Because of their satisfactory testing at this initial stage, their future application is recommended for indicative purposes.

83. Further work on assessment criteria refinement and establishment of new quantitative thresholds need to be set at appropriate geographical scales, thereby taking into account the different biotic and abiotic characteristics of regions, sub-regions and subdivisions (see chapter 2 above). Defining threshold values will require involvement of relevant UN Environment/MAP Components' Focal Points as well as experts from related areas of expertise.

84. Threshold value means a value or range of values that allows for an assessment of the quality level achieved for a particular Common Indicator or Ecological Objective, thereby contributing to the assessment of the extent to which GES is being achieved. While they are expressed as numerical values, it should be kept in mind that they have been derived from underlying data, which often entails uncertainties. Applying ample safety factors to the threshold values in order to take knowledge gaps and uncertainty effect into account is a necessary process.

85. Thresholds should ideally meet the following requirements: be based on scientific knowledge; consider different harm end points; be expressed in numerical values; be based on comparable reporting units; be set at appropriate geographic scales (see chapter 2 above); be set on the basis of the precautionary principle; be consistent across different Common Indicators and Ecological Objectives and consider pressures/impacts interactions; reflect natural ecosystem dynamics and fit with defined assessment scales.

86. Depending on the Common Indicators and Ecological Objectives, the definition of thresholds can be based on various approaches, such as thresholds of no concern, thresholds of toxicological concern (TTC), end points of effects, or the precautionary principle. Translating this concept into IMAP Common Indicators, it could be summarized as irreversible changes in populations communities, assemblages and ecosystems (EOs 1 & 2); toxicological action mode (EOs 5, 9 & 10), physical damage (OE 6, 10 & 11), disruption of human activities (EO 9/ CIs 20 & 22) and irreversible changes in habitats, or components of the environment (EOs 1, 5, 6 & 7). This approach may be however complicated by various types of harm for a specific pressure with different end points that must be considered for threshold setting. The *Risk* approach, based on cross-mapping data on pressures and impacts, enable a better definition of areas where interactions occur. It could be used for many indicators through a quantitative risk assessment framework, supporting the prioritization of efforts against specific pressures.

Options for the definition of thresholds

87. Table 7 below presents different options and concepts for the definition of thresholds within IMAP.

Threshold	Concept	IMAP Common Indicators	Comments
Zero option	Possible option when the pressure does not exist in nature, by definition (contaminant, litter, man-made noise)	CI 12, CI 21	<i>“zero pressure” appears unreasonable, since impossible to reach when the pressure is a common situation</i>
Value-of-no-return	Values that alter irreversibly (or through significant effects) the indicator when exceeded/going below	CI 1-5, CI 6, CI 7, CI 14, CI 9, CI 18	<i>This approach is well adapted to population, communities, assemblages that may be altered beyond recovery.</i>
Cut-off values	Agreement that the reduction of a pressure can be defined on a concentration/ significant value when scientific evidence of impact is still investigated	CI 1-5, CI 6, CI 7, CI 9, CI 13, CI 18, CI 21	<i>Thresholds based on the mapping of areas where concentration/abundance of a particular high impact may support this approach</i>
Expert judgement	Approach based on the expertise of a wide range of contributors, a subjective opinion based on scientific evidence.	CI 8, CI 15-16	<i>The setting of low provisional threshold values is a way to initiate provisional thresholds. This could be an Expert Judgment</i>
Public acceptance	Societal agreement to reduce a pressure in the marine ecosystem while research is investigating the impacts. Human well-being disturbance is a component of socioeconomic considerations	CI 8, CI 16, CI 22	<i>Based on concentration/abundance mapping, areas of particular high impact can be determined and tackled.</i>
Lowest end point	Lowest concentration causing an adverse effect on one of the specific endpoints (Non-effect Concentration)	CI22, CI23, C13-14, C17-21, CI23	<i>The lowest concentration approach is relevant when it is impossible to balance different adverse effects of a single pressure (toxicological, physiological effect, socioeconomic impact)</i>
Hot spot areas	Possible definitions of areas or situations, which are clearly unacceptable from a societal point of view.	CI 1-7, CI 23	
Precautionary principle	No conclusive scientific knowledge but evidence of harm, thresholds may be defined to provide maximum protection against adverse effects	Pressure indicators	
Significant decrease	Relevant when no metric is available to measure the impact	Pressure indicators	
Calculation of reduction	Based on defined target. The threshold is defined as the baseline minus a desired percentage of reduction until deadline.	Pressure indicators	<i>Thresholds defined through predefined targets, possibly by policy makers</i>

Table 7. Options and concepts for the setting of thresholds within IMAP with possible associated Common Indicators

88. There are few existing baseline values and targets defined for the IMAP Common Indicators (CIs 13- 14, 17-18, 20-24; see UN Environment, 2017a) with some of them, as defined by experts, based on percentage reduction over time in the pressure or impact level (CIs 22-24). Some will have to be refined, considering sub-regional constraints, when appropriate. Thresholds are still to be defined and/or updated by CORMON meetings including the definition of proportion/percentage to meet GES. While thresholds for some Ecological Objectives in the different compartments of the marine environment (beach/surface/seabed or Pelagic/benthic) may follow the same basic concepts, they may each require specific approaches and the different marine compartments need to be discussed. For sure, the setting of quantitative thresholds requires the possibility for a quantification of the pressure and an appropriate formulation of the threshold unit. Finally, as measures aimed to reduce impacts over marine environment from pressures might be targeted for specific species, contaminants, items (litter) classes, groups, etc. thresholds should be set for single items, types, groups, classes, accordingly. As an example, measures to reduce impacts related to a specific contaminant (e.g. cadmium), or a type of litter (e.g. plastic bags) will need the definition of specific baselines and thresholds to support both monitoring and the evaluation of measures efficiency.

89. Finally, it might be advisable to derive “provisional thresholds” rather than moving towards a situation with many different approaches across regions, sub-regions or Contacting Parties. The contribution by stakeholders with different backgrounds will be then beneficial. Setting priorities, depending on the availability of data, the relevance of metrics, and the most impacted Common Indicators is the proposed scheme prior to the second phase of IMAP implementation (2019-2023).

Annex I

Examples of geographical integration of data collected at local scale to support an assessment at the Mediterranean scale and possible associated measures

Example 1: Ecological Objective 1 (EO1): 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 4: Population abundance of selected species (related to seabirds)

1. The Mediterranean Sea is considered an important habitat for seabirds, some of them being endangered or listed in the Annexes of the Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean of the Barcelona Convention (SPA-BD Protocol).
2. Many of the seabird species face threats on land and at sea. On land, this includes high pressure from coastal developments affecting availability of breeding and wintering habitats, and predation at colonies from native and invasive species. At sea, the main threats include interaction with fisheries (bycatch), the lack of prey caused by depletion of fish stocks and from acute and chronic pollution (oil spills, chemical discharges, etc.) and disturbance from maritime traffic (UN Environment/MAP 2017 MED QSR).
3. Population size is the most straightforward indicator to assess the status and trends of seabirds. However, this information is subject to strong biases, depending on the importance of colonies and breeding mode. The population size is defined as the number of individuals present in an animal aggregation in a subjectively designated geographical range, and expressed as the number of individuals per unit area. The index of population abundance is a single species indicator that reflects the temporal variation in the breeding or the non-breeding (wintering) population of selected species compared to a base year (or reference level). This assessment in the framework of the IMAP tends to determine the population status of selected species by medium/long term monitoring to obtain population trends for these species.

Methods

4. The present example is related to the Mediterranean shag (*Phalacrocorax aristotelis*) and the little tern (*Sternula albifrons*). For shags, the direct count of nests often requires boat-based counts following the rocky and cliff areas where the birds breed. For terns, they tend to breed in aggregated colonies and their direct count may be relatively easy through nest counts. Transects are the most used approach, dividing the colony in bands of a given width (which may depend on the visibility of the nests and the difficulty of the terrain) and counting every nest within each band.

Mediterranean shag

5. This species is a diurnal species and it is easier to detect the nests that may be however inaccessible or spread across long stretches of coastline. According to the available information, the breeding population of this shag is spread across the Mediterranean basin, occupying the four sub-regions considered here, with the bulk of it in the north (Figure 2-A). The largest populations occur in the Balearic Islands and Corsica- Sardinia, Croatia and the Aegean (both Greece and Turkey), with only a few small colonies in the north African coast, usually lacking reliable numerical data (Algeria, Tunisia, Lybia and Egypt). The global population of this subspecies, endemic to the Mediterranean, is estimated at below 10,000 breeding pairs, although proper prospection is lacking for some areas. Available data for Turkey and Cyprus is particularly old. Trends are unclear, with differences between countries, but either slight declines or stability seems the norm for those countries with most reliable data.

Little tern

6. This is a widespread species across the region, breeding in wetlands and beaches in the four sub-regions considered (Figure 2-B). Numbers are lacking for Morocco, Libya and the easternmost countries. Turkey populations appear to be the largest ones, but the available information is poor, with 5,000-8,000 breeding pairs estimated (UN Environment/MAP 2017 MED QSR). Population trends vary between countries, with no clear trend at regional level.

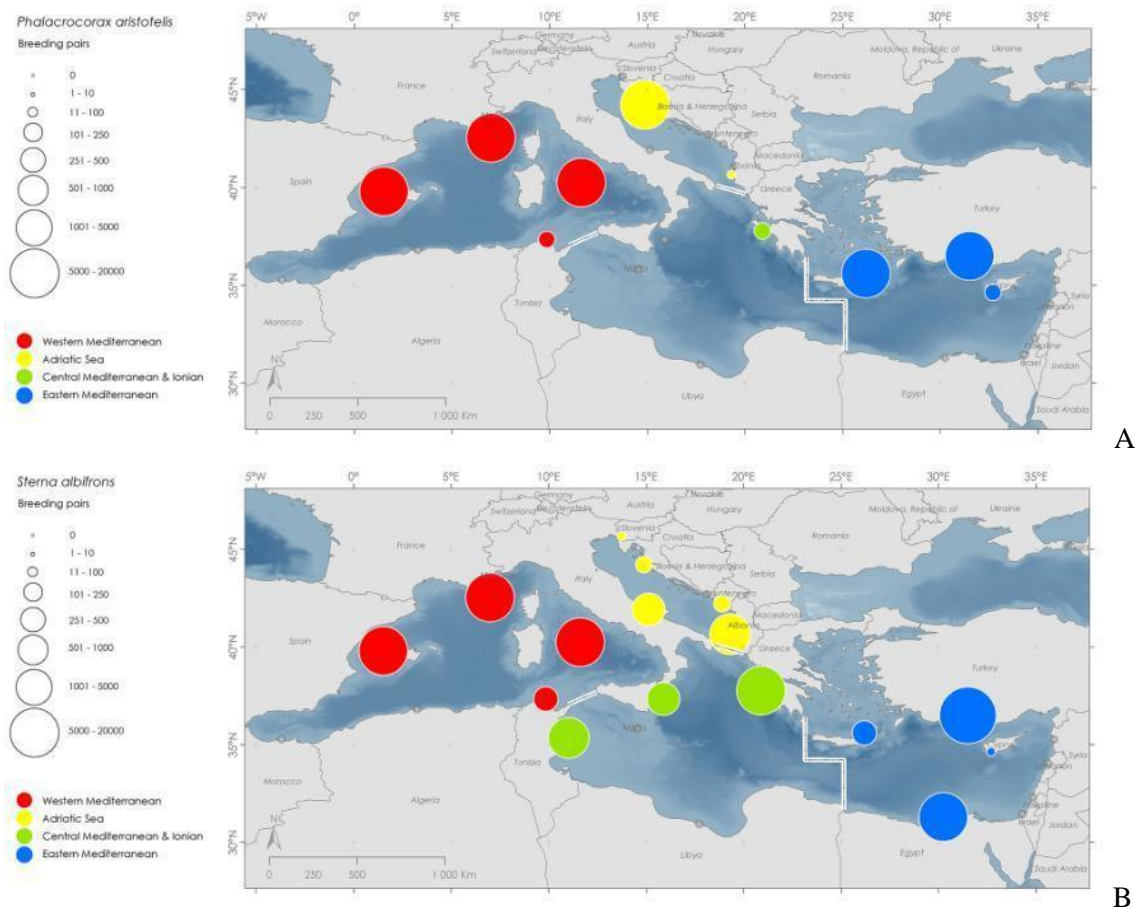


Figure 2. Distribution and relative size of (A) the Mediterranean shag (*Phalacrocorax aristotelis*) breeding population, sorted by sub-region, and (B) the little tern (*Sternula albifrons*) breeding population, sorted by sub-region; each colour corresponds to a given sub-region, (see map legend) and country.

Results and Status

7. The overall pattern of seabird abundance in the Mediterranean region is consistent with the results of Common Indicator 3 (species distributional range): seabirds tend to be more abundant in the north and west of the Mediterranean basin (shag). As in the case of the distribution patterns, it remains to elucidate to which extent this pattern, that makes sense in terms of productivity and maybe of suitable breeding habitat availability, is not confounded by prospection effort/data quality.

8. Obtaining reliable estimates of population size is harder than just confirming presence/absence, so there are more gaps regarding this Common Indicator. Information for some countries and species is old and it is important to ensure that the different countries start implementing proper monitoring programmes. Information will be easier to collect and more reliable for the diurnal species breeding in open habitats (terns). Information remains patchy, often old and subject to potentially high biases. For many countries, the information on seabird breeding populations is patchy or completely lacking.

Related reduction measures

9. Reduction measures will typically focus on the prevention of pressures from coastal developments affecting availability of breeding and wintering habitats, and predation at colonies from native and invasive species. At sea, limiting (i) bycatches from fisheries, (ii) both acute and chronic pollution, especially from oil pollution or discharges, and (iii) disturbance from maritime traffic, including pleasure boats, are the most critical measures. (UN Environment/MAP 2017 MED QSR).

Example 2: Ecological Objective (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 (related to biota, sediment, seawater)

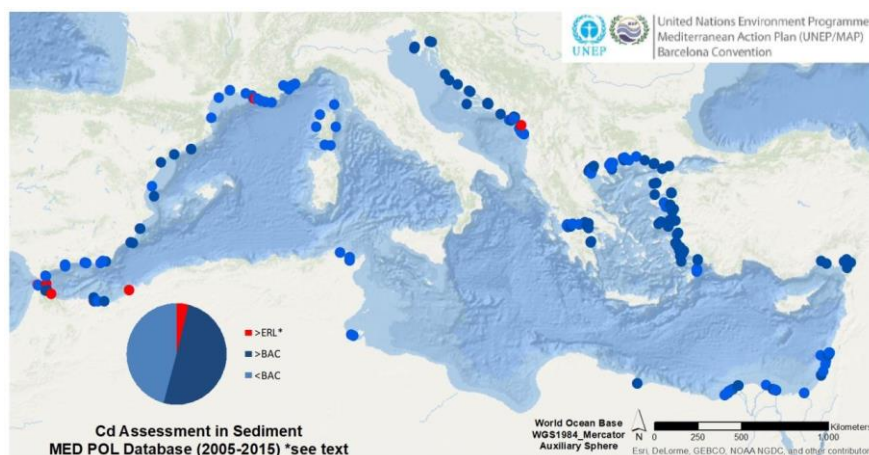
10. The following example describes the process for the assessment of two contaminants on the status of the chemical contamination as the result of the human activities that take place all around the coastal and marine areas of the Mediterranean Sea. Cadmium (Cd) and mercury (Hg) were considered for this example, with a significant number of quality-assured datasets available from Mediterranean countries.

Method

11. Good Environmental Status (GES) for Common Indicator 17 (CI 17) can be accomplished when levels of pollution would be below a determined threshold (e.g. Environmental Assessment Criteria (EACs); ERLs). In our example, the method for the assessment has been undertaken by evaluating the latest and available MED POL datasets of levels of the two metals against background thresholds (BACs) and US Effects Range Low sediment toxicological criteria. For Cadmium, BAC and ERL are at 150 and 1200 µg/kg dry weight respectively when the BAC and ERL values are at 45 and 150 µg/kg dry weight (UN Environment/MAP 2016a and UN Environment/MAP, 2017b)

12. Figure 3 shows the assessment for cadmium in coastal sediments against BACs and ERLs for the latest information available in the Mediterranean Sea. Cd shows only 6% and 49% of the evaluated stations above the ERL and BAC, respectively, therefore a 94% of sediment stations with acceptable environmental levels of cadmium below the Cd ERL. However, a few of these 6% of stations are known to be impacted by anthropogenic sources, whilst others respond to different natural input processes, such as the input of Cd from the Atlantic waters through the Gibraltar Strait, which can be observed close to this area (Figure 3).

13. On the contrary, HgT (total) concentrations in the coastal sediments reflect a situation far from a GES, according to the current regional assessment criteria, particularly in the North-Western Mediterranean, the Adriatic Sea, the Aegean Sea and the Levantine Sea. All the data assessed in the different sub-regions show a 53% of the stations above the ERL. Thus, a 30% above the BAC and 17% below BAC in the coastal sediment sums a limited 47% of the monitored stations with acceptable environmental conditions. The main sources of this mercury in the marine environment are due to the industrial exploitation of mines of the Hg-rich natural land resources in these areas. It should be pointed out that the reference values agreed are based on information from core sediments collected in the Mediterranean Sea and the revision of these values has been proposed (UN Environment/MAP MED POL, 2016a) to include sub-regional criteria to balance the potential geological background differences across the Mediterranean basin in future assessments.



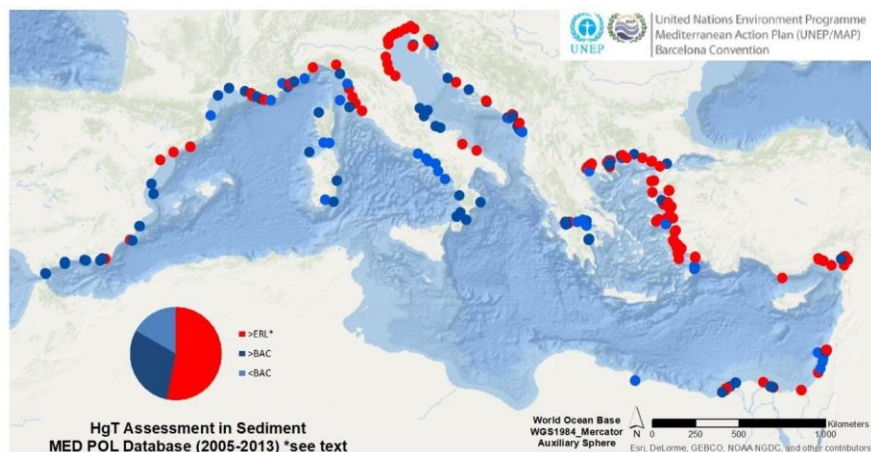


Figure 3. Regional Cadmium and Mercury (total) levels assessment against ERL criteria in sediment for the Mediterranean Sea (After 2017 MED QSR)

Results and Status

14. In terms of GES assessment, acceptable conditions exist for cadmium in coastal sediments with levels below the assessment criteria. These areas correspond to known coastal sites (hotspots) where measures and actions should be further considered to improve the marine environmental quality. The sediment evaluation in terms of GES shows an impacted situation for the coastal benthic ecosystem, especially for HgT, which should be further investigated and assessed against assessment criteria. Therefore, these assessments should consider sub-regional differences across the Mediterranean Sea basin, in terms of natural sources and geological backgrounds. Development of the assessment criteria for sub-regional assessments should be ensured, noting the need to consider the relationships between different policy standards and assessment metrics as well.

Related reduction measures

15. Measures and actions should focus on known hotspots associated to urban and industrial areas along the coasts of the Mediterranean Sea, as well as to include sea-based sources, as these are also important inputs. Riverine inputs and coastal diffuse run-off play also an important role. Background and Environmental Assessment Criteria (BACs and EACs) should be also continuously improved to take into consideration sub-regional specificities for heavy metals and trace elements.

16. The improvements in the limited spatial coverage, temporal consistency and quality assurance for monitoring activities hinder to some extent the regional and sub-regional assessments. The availability of sufficient synchronized datasets for a state assessment should be improved. Sediment sieving and normalization factors also require proper standardization to improve the comparability of monitoring data in sediments.

Annex II

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