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Agenda item 5: Assessment of Marine and Coastal Environment:

Proposed Measures Related to Assessment Findings of the 2023 MED QSR for Pollution and Marine Litter

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Note by the Secretariat

In line with the Programme of Work and Budget for 2018-2019 adopted by the 20th Ordinary Meeting of the Contracting Parties to the Barcelona Convention (COP 20) held in Tirana, Albania; the Programme of Work and Budget for 2020-2021 adopted by the 21st Ordinary Meeting of the Contracting Parties to the Barcelona Convention (COP 21) held in Naples, Italy; the Programme of Work and Budget for 2022–2023 adopted by the 22nd Ordinary Meeting of the Contracting Parties to the Barcelona Convention (COP 22) held in Antalya, Türkiye, MED POL Programme prepared the Proposals for 2023 MED QSR Pollution and Marine Litter Chapters based on the thematic assessments provided for IMAP Common Indicators 13, 14, 17, 18, 20, 21, 22 and 23. REMPEC contributed by providing a thematic assessment for IMAP Common Indicator 19. They built on the following key achievements within the implementation of the 2023 MED QSR Roadmap: a) setting and upgrading the assessment criteria; b) setting the integration and aggregation rules for monitoring and assessment; and c) development, testing and implementation of the GES and alternative environmental assessment methodologies by applying the integration and aggregation rules along with the sales of assessment, the assessment criteria and the DPSIR approach within the IMAP nested scheme. It must be emphasized that the lack of availability of sufficient data adversely affected the delivery of the assessment findings in line with the roadmap of the 2023 MED QSR.

The 2023 MED QSR Pollution and Marine Cluster thematic assessments were provided per sub-divisions i.e. at the sub-regions level, as suitable and feasible for specific Common Indicators, by applying the rules for their integration and aggregation along the IMAP nested scheme. The four Mediterranean sub-regions and related sub-divisions were set as the highest level of IMAP Spatial Assessment Units for Common Indicators of the IMAP Pollution Cluster.

The Proposals of the 2023 MED QSR Pollution and Marine Cluster Chapters were submitted for the review and approval of the Meeting of the Ecosystem Approach Correspondence Group on Pollution Monitoring (1-2 March 2023) and the Meeting of the Ecosystem Approach Correspondence Group on Marine Litter (3 March 2023) with a view of: i) their finalization for consideration of the Meeting of Integrated CorMons which will be held on 27-28 June 2023; and ii) preparation of Section 6 related to the measures for submission to the Meeting of the MED POL Focal Points considering the assessment findings as provided in IMAP Pollution and Marine Litter Cluster assessment findings. The Meeting of the CorMon Pollution found the progress achieved as the impressive achievement.

Further to the conclusions of the Meetings of CorMon Pollution and Marine Litter, follow-up work was undertaken in order to: i) prepare the working document UNEP/MED WG.563/8 providing the policy and technical measures defined per Common Indicators 13&14, 17, 18, 20, 21, 22 and 23; and ii) finalize the assessment findings for the consideration of the Meeting of Integrated CorMons to be held on 27-28 June 2023.

Accordingly, the working document UNEP/MED WG.563/8 is submitted to the present Meeting of the MED POL Focal Points with a view to getting its approval of the policy and technical measures defined per Common Indicators with a view to their integration into the IMAP and Marine Litter Chapters of the 2023 MED QSR which thereafter will be submitted for the approval of the Meeting of Integrated CorMons, 27-28 June 2023. The measures are also aimed at guiding the process of IMAP revision foreseen during the upcoming biennium; therefore, setting the roadmap for IMAP implementation in the framework of MED POL activities in the Programme of Work by 2029.

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List of Abbreviations / Acronyms

ADR	Adriatic Sea Sub-region
AEGS	Aegean Sea sub-division
AEL	Aegean and Levantine Seas Sub-region
ALDFG	Abandoned, Lost and Discarded Fishing Gear
BAT	Best Available Techniques
BEP	Best Environmental Practices
BC	Background Concentration
BAC	Background Assessment Concentration
Chla	Chlorophyll <i>a</i>
CI	Common Indicator
CEN	Central Mediterranean Sea Sub-region
CHASE+	Chemical Status Assessment Tool
COP	Conference of the Parties
CRM	Certified Reference Material
DD	Data Dictionary
DIN	Dissolved Inorganic Nitrogen
DP	Drivers and Pressures
DPSIR	Drivers, Pressures, State, Impact, Response
DS	Data Standard
DW	Dry weight
EAC	Environmental Assessment Criteria
EO	Ecological Objective
EPR	Extended Producer Responsibility
EDI	Estimated Daily Intake
EU	European Union
FAO	Food and Agriculture Organization
GES	Good Environmental Status
GFCM	General Fisheries Commission for the Mediterranean
GPML	Global Partnership on Marine Litter
GPS	Global Monitoring System
HELMEPA	Hellenic Marine Environment Protection Association
HI	Total health risk
IAEA	International Atomic Energy Agency
IE	Intestinal Enterocci
ILC	Inter-Laboratory Comparison
IMAP	Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast
IMO	International Maritime Organization
LOD	Limit of Detection
LOQ	Limit of Quantitation
MAP	Mediterranean Action Plan
MARPOL	International Convention for the Prevention of Pollution from Ships
MB	<i>Mullus barbatus</i>
MED	Mediterranean
MED POL	Programme for the Assessment and Control of Marine Pollution in the Mediterranean Sea
MED QSR	Mediterranean Quality Status Report
MEPC	Marine Environment Protection Committee
MESL	Marine Environment Studies Laboratory of the IAEA Environmental Laboratories in Monaco
MG	<i>Mytilus galloprovincialis</i>
MSFD	Marine Strategy Framework Directive
NAPs	National Action Plans

List of Abbreviations / Acronyms

NEAT	Nested Environmental Status Assessment Tool
NM	Nautical Mile
OSPAR	Convention for the Protection of the Marine Environment for the North- East Atlantic
OWG	Online Working Group
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyl
PET	Polyethylene Terephthalate
PPCP	Pharmaceuticals and Personal Care Products
PT	Proficiency test
PWP	Plastic Waste Partnership
QA	Quality Assurance
QC	Quality Control
RC	Reference Condition
SAU	Spatial Assessment Unit
SCP	Sustainable Consumption and Production
SDG	Sustainable Development Goal
SOPs	Standard Operations and Procedures
SPI	Science-Policy Interface
SUDS	Sustainable Urban Drainage Systems
SUP	Single Use Plastic
THQ	Target Hazard Quotient
TP	Total Phosphorous
UHMWPE	Ultra-high molecular weight polyethylene
UNEA	United Nations Environmental Assembly
UNEP	United National Environment Programme
USWM	Urban storm Water Management
WWTP	Wastewater Treatment Plants

1. The knowledge gaps common to IMAP Ecological Objectives 5 and 9, as well as Ecological Objective 10

I. Lack of data for nutrients, contaminants and biomarkers, as well as the lack of capacities of National IMAP Pollution competent laboratories:

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

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

reported to IMAP IS for CI 17 contaminants in biota, and ii) assessment of the present status based on bibliographic studies, following the same approach applied for preparation of the 2017 MED QSR; however, by using newer available scientific literature. It should also be recognized that due to the lack of data, the rule was not set for assigning the GES/non-GES to the areas assessed further to the use of the EU maximum levels for certain contaminants in foodstuffs, approved as the assessment criteria for CI 20.

- CI 21. Very limited data were available in IMAP IS to undertake GES CI 21 assessment within the preparation of the 2023 MED QSR. Most of the data were available through EEA and not through IMAP IS.

2. The lack of data reporting is likely to be related to:

- Lack of expertise and/or instrumentation and/or funding to perform the sampling and analytical determination of the contaminants and nutrients.
- The mandatory species for monitoring i.e., the mussel *M. galloprovincialis* and the fish *M. barbatus*, may not have a harmonized presence or have low availability in different sub-regions and/or sub-divisions. Therefore, these species could not be sampled and analyzed in all areas, and lack of monitoring data were evident.
- There is an evident lack of accessibility to quality assurance tools, such as interlaboratory comparisons (ILCs), proficiency tests (PTs), or certified reference materials (CRMs), along with a lack of knowledge for use of adequate laboratory equipment.
- Deviations from the IMAP monitoring methodologies, for example, inconsistent biota sampling and discrepancy in the samples preparation negatively affect the performance of IMAP Pollution competent laboratories.

II. Hindered data use by missing database management tools:

3. IMAP IS platform operates as a repository of data in Excel file format. It is not a queryable database, with no data export formats or mapping capability. The platform is easy to use for searching and retrieving files, but no QC/QA categories and data flagging are available. All these imposed additional workloads to create the offline databases in order to ensure data control and use for the preparation of the 2023 MED QSR IMAP Pollution and Marine Litter assessments. The files reported by the CPs do not always report all the necessary metadata and data, as specified in the DDs and DSs. At the same time, the CPs reported that the preparation of the files for an upload into the IMAP IS was complicated and time-consuming, lacking an inter-facing modality to ensure data transfer to IMAP IS from national databases.

III. Absence of optimal integration and aggregation among CIs and EOs:

4. Given the lack of data reporting as required by Decision IG. 23/6 (COP 20), it was impossible to ensure optimal application of the integration and aggregation rules in order to provide the integrated assessments of the EOs and CIs.

2. The measures to address the common knowledge gaps related to IMAP Ecological Objectives 5 and 9, as well as IMAP Ecological Objectives 10

5. The first group of measure includes the policy and technical measures that are common at the level of IMAP Pollution and Marine Litter Cluster, as provided here below.

2.1 The policy measures to address the common knowledge gaps

1. Increase of data availability and capacity building programmes to address the knowledge and technical gaps of national IMAP Pollution competent laboratories:

6. Submission of good quality data, striving for their uniform distribution across the Mediterranean Sub-regions should be encouraged, and support given to the CPs to enable it. A thorough mapping of the specific needs of each CP should be performed and a tailored capacity building process drawn and executed. The following specific knowledge, technical and financial needs of IMAP Pollution competent laboratories should be addressed:

- i) further harmonization of laboratories' performance in line with the IMAP Monitoring Guidelines in order to increase the representativeness and accuracy of the analytical results for generation of quality-assured monitoring data;
- ii) improving availability of appropriate analytical equipment to strengthen technical capacities of national IMAP Pollution competent laboratories;
- iii) increasing consistency of biota sampling along with the application of Quality Assurance measures;
- iv) increasing accessibility to quality assurance tools, such as inter-laboratory comparisons (ILCs), proficiency tests (PTs), or certified reference materials (CRMs).

7. The assessment of the capacities of national IMAP Pollution competent laboratories should continue as a biennial effort aimed at gradual improvement of their performances with a view of reaching optimal compliance of data processing and reporting with the methods provided in Monitoring Guidelines for IMAP Common Indicators 13,14,17, 18, 20 and 21.

8. Further to the results achieved in proficiency testing over a 25-year period, the UNEP/MAP-MED POL in collaboration with the IAEA/MESL continues implementation of the traditional proficient testing (PT) related to the determination of trace metals and organic contaminants in sediment and biota matrixes, along with the organization of the training courses;¹ however, by ensuring their adjustment to the requirements of IMAP CI 17. Along with the continual strengthening of the quality assurance for trace metals and organic contaminants, national capacities need to be further upgraded by undertaking regular inter-laboratory comparisons/proficiency testing for the

¹ UNEP/MED WG. WG.492/10

analysis of nutrients, biomarkers, and contaminants in commonly consumed seafood and intestinal enterococci in bathing waters within ongoing and planned activities of UNEP/MAP - MED POL. The technical missions organized to the IMAP competent laboratories in the greatest need should continue addressing specific technical knowledge gaps.

9. Capacity building needs of the Contracting Parties regarding the use of the IMAP Pollution and Marine Litter assessment methodologies need to be also addressed.² This could be in the form of additional training courses, including the use of environmental assessment tools (NEAT and CHASE+), as well as by supporting the purchase of analytical instrumentation.

II. Improve DPSIR analysis:

10. DPSIR analysis needs to be improved by supporting the CPs to regularly provide relevant information and share the knowledge which in principle may be ensured by i) reporting information on DPSIR, along with national monitoring data, and compatibly with data reporting for National Action Plans` indicators; ii) ensuring assistance of the local experts, through the CPs, regarding the identification of specific DPs and their impacts; and iii) complementing DPSIR information reporting with data from the scientific literature and national reports.

III. Monitor the effectiveness of the technical and policy measures:

11. Areas classified as likely non-GES were identified in the 2023 MED QSR Pollution assessments (UNEP/MED WG. 563/Inf.11) for EOs 5 and 9 in the four Sub-regions of the Mediterranean. However, only for a few non-GES areas, DPs were identified. The CPs should identify DPs affecting the environmental classification along the contaminants found responsible for the non-GES classification, therefore, ensuring responses to be derived from integral consideration of GES/environmental assessment findings and DPSIR analysis. Once the DPs are identified, practical measures, both technical and policy oriented should be put in place. For example, if the area will be found in non-GES due to the high concentration of Hg in sediment, the source of Hg should be traced, and pollution abatement measures undertaken. Following the introduction of the measures, tailored to tracing the DP impacts responsible for the non-GES status of the area, their effectiveness should be monitored, to make sure that they improve the environmental status of the non-GES areas. This needs to be provided through environmental monitoring, and reassessment of the environmental status of the non-GES areas.

IV. Optimally address the impacts of DPs and tailor the responses within the regional plans and national action plans to the needs of continual improvement of the marine environment status:

12. Within the IMAP Pollution Cluster assessments, the most important DPs which negatively impacted the status of the Mediterranean marine environment were related to: agriculture, industry, aquaculture, tourism including sporting and recreational activities, utilization of specific natural resources, infrastructure, energy facilities, ports and maritime works and structures, and maritime

² UNEP/MED WG.556/4/L.2.

activities. Multiple DPs may be present in a specific area, while measures and responses may be common to various DPs. Although the evaluation of the responses i.e. the measures was hindered by the lack of specific local information, the overall responses and measures to abate and prevent pollution, and improve environmental status were already mapped in the UNEP/MAP documents. The regional policies are in place and present a framework for the responses in line with the Barcelona Convention and its Protocols³. The present proposals of the Regional Plan for Agriculture Management, the Regional Plan for Aquaculture Management and the Regional Plan for Stormwater Management, along with the adopted Regional Plan for Urban Wastewater Treatment and the Regional Plan for Sewage Sludge Management, as well as the updated Regional Plan for Marine Litter Management in the Mediterranean and the National Action Plans to implement the LBS Protocol and Regional Plans provide the measures of relevance for addressing impacts of drivers and pressures which badly affect the status of marine environment.

13. Further elaboration of the below proposed overall and specific measures should primarily target the likely non-GES areas found within the assessment of IMAP Pollution Cluster (UNEP/MED WG. 563/Inf.11).

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

14. Pollution prevention needs to be encouraged instead of environmental remediation. This could be achieved by reducing and eliminating the use and discharge of known harmful substances, regulating the emergence of new substances with mandatory environmental and social impact assessments, recycling and using biodegradable green compounds, along with planning emergency responses in case of accidental pollution events.

15. Identification of legacy pollutants⁴ in the environment is needed, whereby it should be ensured that they are not currently being introduced into the environment. While the mitigation of current pollutants entails measures at the source of pollution, the mitigation of legacy pollutants takes place *in situ*. The latter includes the study of transport and distribution of pollutants in the environment, the use of technologies for pollutants removal from the environment, and bioremediation.

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

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

18. Move towards the circular economy and sustainability needs to support the achievement of zero pollution through recycling. It entails markets that give incentives to reusing products, rather than

³ The Land-Based Sources Protocol, Dumping Protocol, Hazardous Wastes Protocol, Offshore Protocol, Prevention and Emergency Protocol and Integrated Coastal Zone Management Protocol.

⁴ Legacy pollutants are substances that remain in the environment long after they were introduced and after pollution abatement measures were applied or their use was banned.

disposing and then extracting new resources. Major changes in production and consumption patterns are needed, with a focus on climate change concerns, biodiversity protection and ecosystem restoration.

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

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

20. Aquaculture. The move towards green/blue technologies for aquaculture should include shifting to innovative integrated multi-trophic aquaculture (IMTA) production systems for sustainable development, using environmentally friendly feeds; reducing energy use and improving waste management to prevent local accumulation of nutrients and waste. The concept of IMTA is based on farming fish together with molluscs and/or crustaceans, algae and/or aquatic plants, with the aim of improving environmental and economic yield.

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

22. Tourism and Coastal urbanization. Measures should focus on the improvement of waste treatment, sustainable management of coastal areas to reduce disruption of coastal ecosystems, investment in habitat conservation and restoration to provide ecosystem services, along with implementation of the ICZM tools. Sustainable tourism and urbanization require monitoring and decision-making feedback, improvement of communal infrastructure, environmental coastal spatial and marine spatial planning, as well as the optimal environmental impact assessments, carrying capacity, adaptation to impacts of climate changes, etc.

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

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

25. Marine traffic and marine and port operations. The responses should focus on improving the technology of ships and ports operations and of ports infrastructure. Use of BAT and BEP to ensure

effective onboard and port pollution control facilities, to prevent accidental discharges and spillages. Specifically, for marine traffic, the designation of restricted areas for anchorage and protection of sensitive areas are encouraged. Implementation of the measures related to the designation of the Mediterranean Sea as a Sulphur emission control area (SECA) is expected to generate significant benefits in both pollution reduction and ecosystem protection.

V. Strengthen the science policy interface:

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

- a) Strengthen the use of unprecedented achievements in science and technology in order to ensure that the growing development demands and a healthy ocean co-exist in harmony by identifying the most relevant innovative knowledge and technologies that are of utmost importance for reliable and cost-effective monitoring and assessment of the state of Mediterranean Sea with a focus on:
 - i) Promotion of inter-disciplinary research aimed at understanding and prediction in the Mediterranean Sea;
 - ii) Mapping of all components of the Mediterranean marine environment, along with the anthropologic pressures across time scales;
 - iii) Application of observing and remote techniques to strengthen the IMAP-based monitoring practices and improve forecasts of the state of the marine environment;
 - iv) Application of holistic view within the “source-to-sea” framework to structure the assessment of the land-based pressures in conjunction with their impacts on the oceans.
- b) Enhance partnerships and support the transfer of ocean knowledge for science-based management, with a focus on strengthening:
 - i) The national capacities related to monitoring and data analysis;
 - ii) The use of the scientific networks to support the objectives of partnerships for the science-policy interface;
 - iii) The synergies for marine science in the Mediterranean.

VI. Update the IMAP Pollution and Marine Litter Cluster:

27. The IMAP Pollution and Marine Litter Cluster needs to be updated to include the following:

- i) The achievements within the implementation of the IMAP initial phase, both regarding the monitoring and assessment practices and methodologies.
- ii) The revision of the list of common indicators and addressing the knowledge gaps as identified within the preparation of the assessments for the 2023 MED QSR.

- iii) The transition from the present five-year assessment cycle to the eight-year assessment cycle; such revised frequency of Mediterranean marine assessment should be guided by the current practice of most CPs which set their national programmes based on a 3 years cycle of data collection and reporting which is not in line with the present phase of IMAP implementation.
- iv) A multi-fold increase of the resources of the Secretariat, as well as the support to CPs' capacity building within the implementation of the IMAP Pollution and Marine Litter.

2.2 The technical measures to address the common knowledge gaps

VII. Increase the efficiency of IMAP implementation regarding Pollution and Marine Litter Cluster:

28. To increase the efficiency of the monitoring and assessment of the Mediterranean marine environment, the following specific actions need to be enforced:

- Advance integrated implementation of the National IMAPs pertaining to Pollution, Biodiversity and Coast and Hydrography Clusters, as well as the GES assessments at the regional/sub-regional level by applying the rules for integration of monitoring efforts within relevant monitoring units. For example, integration can be explored between EO9 and EO1. If based on monitoring of EO1, CI 2 – Condition of the habitat's typical species and communities, an effect on the benthic community is found, EO9, CI 17 can be useful to complement the findings, in terms of the identification of pressures. Conversely, if contamination is identified based on CI 17 monitoring, it could guide the selection of monitoring areas for the species and communities within EO1. Moreover, any impact on the infaunal community structure can be considered a biological effect and be integrated with EO9, CI18. The importance of the interrelation between seafood safety and quality i.e., EO9, CI 20 and the presence of microplastics in the marine environment i.e., EO10, CI 23 should be further pursued. In addition, there may be an interrelation between EO9, CI 13 and EO9, CI 21. Namely, the introduction of nutrients into the marine environment can be attributed to the marine discharge of untreated domestic waste, which in turn can introduce intestinal enterococci (IE) to the bathing waters.
- Pilot implementation of the Joint Monitoring Surveys within the specific sub-divisions, as appropriate, to increase equitable access to resources and balance in strengthening of human and technical capacities of the CPs.
- Support collaboration among the countries to promote a transfer of knowledge.

VIII. Improve IMAP IS database management:

29. IMAP-IS should be significantly improved. It should be restructured from the repository of data reported by the CPs into an advanced information system which supports integrated assessments

and ensure the validation of uploaded data, first technically and then scientifically. It needs to provide a queryable database, with export formats (vertical and horizontal) for scientific evaluation and presentation, therefore allowing IMAP users and data evaluators to sort, retrieve and export data based on any available parameter of the metadata and data. The formats of the extracted data should be compatible, to the extent possible with other standard analysis methodologies and presentation/mapping tools.

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

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

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

IX. Improve the GES assessment:

33. For further improvement of the integrated GES assessment of IMAP Pollution and Marine Litter Cluster, it is necessary to continue streamlining the assessment methodologies applied for the environmental status assessment for the Pollution and Marine Litter Cluster within the 2023 MED QSR. To that effect the following priority needs should be addressed:

- Revise/update the Spatial Assessment Units (SAUs) in close collaboration and in agreement with the CPs.
- Eliminate uneven presentation of the assessment findings in different areas of assessment, associated not only with an inhomogeneity of monitoring data both in terms of quality and quantity, but also with the lack of the present assessment methodologies in particular related to pending agreement on :
 - i) The size of the offshore areas of assessment, by considering for example presently applied guiding principle of demarcating IMAP offshore assessment units by the most distant monitoring station set by the CPs in the offshore (open) waters;
 - ii) The representativeness of the number of stations in the areas of assessment; for example, in large pristine areas, a low number of stations might be adequate in contrast to small areas with pressures where a higher number of stations might be needed.
- Expand the monitoring to include the deep-sea environment. Although IMAP already includes offshore areas, defined as areas more than 1 nautical miles (NM) distance from the coastline, monitoring of the offshore is rarely implemented, and when implemented, is of limited areal scope. Monitoring of offshore areas in the deep-sea is especially important when non-GES areas are identified, in order to trace the possible impact of pressures away from the coastline.

- Revise the use of data reported from different types of monitoring stations for assessments. For example, this action should address the use of data reported from a) reference and master monitoring stations located in i) marine and ii) transitional waters; b) (hot spot) monitoring stations located in the modified water bodies (e.g., ports), in order to define the rules for use of data reported from different types of monitoring stations. This needs to be followed by setting the rules for the classification of monitoring stations by considering the guiding principles presently applied within the initial phase of IMAP implementation.
- Apply additional assessment tools. In that context, remote sensing (e.g., for CI 14 and CI 21) and modelling tools should be standardized for future use. Remote sensing can strengthen monitoring practices and data acquisition nationally and sub-regionally. These observations can in turn be integrated into existing assessment methodologies not only to contribute to the assessment of the present status, but also to forecast the trends in the marine environment.

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

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

2.3.1 Common Indicators 13 and 14

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

35. Upon setting the reference conditions and boundary values for DIN and TP in the Adriatic Sea Sub-region, actions need to be undertaken to improve the availability of the assessment criteria for nutrients in the AEL, the CEN and the WMS Sub-regions. To that purpose the three continuous years of monitoring need to be provided with a minimum monthly frequency for Water types I and II and bimonthly to seasonal for Type III. It should also be noted that other supporting parameters (i.e., temperature, salinity and dissolved oxygen) need to be available for defining the water typology. Further update of the assessment criteria for CI 14 should be undertaken as appropriate. The specific knowledge needs to be also built regarding the use of statistical tools for data validation and calculation of the assessment criteria.

XI. Improve the GES assessment:

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

XII. Upgrade present policy measures:

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

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

2.3.2 Common Indicator 17

XIII. Update of Environmental Assessment Criteria (EACs):

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

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

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

40. The methodology for BACs calculation should be revised and updated. BACs are calculated from BCs by applying the multiplication factors. Due to the lack of Mediterranean data, UNEP/MAP adopted the pragmatic methodology used by OSPAR.⁵ Therefore, the precision of monitoring per CP should be calculated and used to set the multiplication factors specific for the Mediterranean.

⁵OSPAR calculated the ratio between BAC and BC (the multiplication factor) from known parameters. The pragmatic approach used in order to have 90% probability of concluding that concentration is below provided for BAC, $BAC = BC \exp(3.18 CV)$, where CV is the precision of the monitoring program (per determinant and matrix). In the case of OSPAR, temporal monitoring data from the UK National Marine Monitoring Programme was considered.

XV. Improve the GES assessment:

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

- Update list of priority pollutants. Measurements of known contaminants of concern, such as As and Cu, and emerging contaminants of concern, such as pharmaceuticals and flame retardants should be considered for inclusion in the IMAP Pollution monitoring. This process should follow the initial steps undertaken in 2019.⁶ The updated List of Priority Contaminants could provide the basis for a prioritization of substances to be further included in the IMAP Guidance Factsheets related to Ecological Objective 9, and complement presently agreed mandatory or recommended substances for CIs 17 and 20. The decision on which contaminant to add should be based on pilot studies checking the probability of their presence in the Mediterranean Sea sub-regions.
- Extend the list of commonly agreed IMAP Pollution mandatory species. Species, other than species (*M. galloprovincialis* and *M. barbatus*) presently mandatory, should be added to the IMAP list. The species should be chosen based on their presence in the Sub-regions and their relevance as pollution indicators, which in turn will allow for an improved environmental assessment. Harmonization of the use of different species in different Sub-regions needs to be followed by setting the criteria (BCs and BACs) specific to each species.
- Utilize tools to perform Environmental Risk Analysis, to integrate chemical and biological data, as elaborated here-below for CI 18.
- Revise sediments` temporal monitoring requirements. For hot spot stations, the monitoring should remain every year or 2 years, while for other stations, the monitoring once or twice during the 6-year cycle should be considered.
- Harmonize national efforts regarding contaminants monitoring. As a minimum, it is necessary to ensure that every CP reports all mandatory parameters in mandatory matrixes, including the wet weight for mussels, LOD or LOQ values, the grain size of samples for sediments, and spatial and temporal monitoring requirements. The significant differences among the countries in terms of LOD and LOQ values, as well as differences among the areas of monitoring in the same CP, need to be analyzed and drivers of the unsatisfactory analytical performance identified.

2.3.3 Common Indicator 18

XVI. Ensure the GES assessment for CI 18:

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

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

- Review and update the list of CI 18 biomarkers, along with the monitoring species;
- Review and update, as appropriate, the assessment criteria as adopted by Decisions IG.22/7 (COP 19) and IG.23/6 (COP 20), as well as the assessment methodologies;
- Further to the initial work undertaken in 2021⁷ towards the development of the Biomonitoring related to IMAP CI 18, the following further actions should be tested:
 - i) An application of new biomarkers should be explored to support the strengthening of CI 18 monitoring and assessment.
 - ii) Use of the Environmental Risk Analysis should be provided by combing the chemical and ecotoxicological data, to support the evaluation of the risk related to marine organisms exposed to contaminated waters and sediments. It should result in objective risk values which allow national and regional policymakers and environmental managers to decide on the actions to decrease marine contamination, or to remediate a polluted area.

2.3.4 Common Indicator 20

XVII. Ensure the GES assessment for CI 20:

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

- Agree on the maximal percentage of detected regulated contaminants exceeding regulatory limits in seafood, above which non-GES needs to be assigned to the area assessed;
- Incorporate the risk assessments to human health from consumption of seafood by calculating the estimated daily intake (EDI), the target hazard quotient (THQ), the total health risk (HI), and the cancer risk, among others;
- Incorporate into the overall evaluation the suite of contaminants analyzed, together with other factors such as synergy among contaminants, and temporal and spatial scales.
- Harmonize the choice of species among the CPs, whereby data from national reports on seafood safety and cooperation with national health authorities should be used to complement data reporting to IMAP IS;
- Examine and coordinate monitoring protocols, risk-based approaches, analytical testing, and assessment methodologies between the CPs; the national food safety authorities; research organisations and/or environmental agencies;

⁷ UNEP/MED WG.492/6

- Determine the applicability of CI 20 beyond food consumer protection and public health, although it intuitively reflects the health status of the marine environment in terms of delivery of benefits (e.g., fisheries industry).

2.3.5 Common Indicator 21

XVIII. Improve the GES assessment for CI 21:

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

2.4 The measures specifically related to the knowledge gaps identified for IMAP Ecological Objective 10 (EO10) – Marine Litter

2.4.1 Common Indicators 22 and 23

XIX. Increase the efficiency of the technical measures to address the knowledge gaps related to marine litter:

45. Wastewater treatment plants (secondary + tertiary levels of treatment with adequate sludge management) are proposed to efficiently remove microplastics from sewage, trapping the particles in the sludge and preventing of entrance into aquatic environments. Treatment plants are essentially taking the microplastics out of the wastewater and concentrating them in the sludge (Corradini et al., 2019). Therefore, sludge management is of great importance for microplastic removal. Controls should be exercised however on the subsequent use of sludge.

46. A Conceptual flow of plastic from production to consumption, waste management and leakage into the environment (i.e., land, rivers and ocean) with possible points of action for policies should be considered. Minimizing leakage on land will subsequently minimize the riverine inputs deriving from wind and rain transportation, as well as from direct dumping and sewerage, and will further reduce the amount of plastics (incl. microplastics) entering the ocean.

47. The updated Regional Plan on Marine Litter Management in the Mediterranean:

- a) Takes into consideration the occurrence and extent of marine litter accumulations, and calls for identification and assessment by the year 2025, on the impacts of these accumulations in upstream regions of rivers and their tributaries, and to apply measures to prevent or reduce their leakage into the Mediterranean, particularly during flood seasons and other extreme weather events;

- b) Envisages the application of enforcement measures to prevent, reduce and sanction illegal dumping and illegal littering in accordance with national and regional legislation, in particular on coastal zones and rivers, in the areas of application of the Regional Plan; and
- c) Couples the aforementioned provisions with aspects related to monitoring of marine litter originating from riverine inputs.

48. Storm water is an important contributor of riverine inputs of marine litter especially for the Mediterranean where seasonal, on several occasions extreme, weather events take place such as flash floods. And with the impacts of climate change, this aspect is becoming more significant as the Mediterranean is experiencing rainfalls, more intense and in shorter periods of time, the impact of which is less infiltration into the ground and more surface run-off. A regional plan for stormwater management is currently under preparation for adoption by COP 23.

49. A more systematic approach should be also offered when developing urban storm water management plans. Urban storm water management (USWM) plans have been developed to a various extent across the Mediterranean. This ranges from major cities having USWM Plans to smaller municipalities where such plans are non-existent, or at best are under preparation. USWM Plans in the Mediterranean mostly include only flooding control segments, i.e., no pollution control, while segments on risk management and information on location of land-based activities are covered only on a basic level. In some cases, some elements of the USWM plans are incorporated into Urban Plans but only to a limited extent, such as collection systems layout, principles and recommended techniques regarding flood and pollution control management, as well as principles on how to achieve environmental water quality goals for water bodies.

50. The Establishment of separate collection systems for surface water run-off should be also promoted. A separate collection prevents the overflow of sewer systems and treatment stations during rainy periods and the mixing of the relatively little polluted surface run-off with chemical and microbial pollutants from municipal wastewater. Separate storm water systems allow for design of sewers and treatment plants that consider the volume of the wastewater only, while surface run-off and rainwater can be reused after a simplified treatment (e.g., for landscaping or agriculture).

51. Measures for combined collection systems are of great importance. Combined collection systems are sewer networks designed to collect rainwater runoff, domestic sewage, and industrial wastewater in the same pipe. During periods of heavy rainfall, however, the wastewater volume in a combined collection system can exceed the capacity of the sewer system or the treatment facilities, for which reason the combined collection systems are designed to overflow occasionally and discharge excess wastewater directly into nearby streams, flood drainage canals rivers, lakes or coastal waters.

52. A variety of additional measures could be also proposed with the aim of reducing the occurrence and impacts of storm water overflows and associated floods and pollution (Milieu, 2016), including the following:

- a) End-of-pipe solutions such as building water storage capacity to optimizing the use of the wastewater treatment plant and sewer system (e.g., using sewer networks for additional storage and optimizing pumping operations);
- b) Reduction of clean storm water entering a sewer system (e.g., de-connecting impervious areas from combined sewer systems);
- c) Alternative green infrastructures as potentially cost-effective measures to reduce storm water (e.g., retention basins, infiltration trenches).

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

54. The Fisheries sector, including both fishing and aquaculture activities have a contribution on marine litter generation.

55. In the past years, considerable attention has been brought to the scale of abandoned, lost and discarded fishing gear (ALDFG), the impacts on the marine environment through ghost fishing, and possible measures for reducing its occurrence like the [FAO Voluntary Guidelines on the Marking of Fishing Gear](#).

XX. Upgrade policy measures related to marine litter management:

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

57. The vast presence of plastic bottles is documented by the third main item on the Mediterranean beaches, comprising of plastic caps and lids. The introduction of sound alternatives and

incentivizing the use of re-use caps could be among the possible options. Strengthening recycling and Extended Producer Responsibility schemes, targeted and tailored to tackle plastic bottles are also part of the solution, including the minimization of the small-sized bottles (<0.5 liters) which are easier to escape in the marine and coastal environment.

58. Microplastics of various types and shapes are escaping into the marine and coastal environment through wastewater treatment plants (WWTP). At the Mediterranean level, the Contracting Parties to the Barcelona Convention in their 22nd COP (Antalya, Turkey, 7-10 December 2021) adopted Decision IG.25/8 related to the [Regional Plans on Urban Wastewater Treatment and Sewage Sludge Management](#) in the framework of Article 15 of the Land-based Sources Protocols. Among several measures, the Regional Plan on Sewage Sludge Management gives particular attention to the presence and effective management of microplastics on Pharmaceuticals and Personal Care Products (PPCP) (e.g., lotions, soaps, facial and body scrubs and toothpaste) being present in sewage sludge and proposes methods for reduction at the source as provided hereunder:

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

59. Measures that can contribute toward reducing sewage concentrations of microplastics include:

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

60. There are several strategies and guidelines developed by FAO/GFCM to assist a sustainable growth for aquaculture sector in, including the Ecosystem-based Approach to Fisheries and Aquaculture aiming to assist and set limits for aquaculture production given the environmental limits and social acceptability of sector. The strategy is led by three key principles:

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

61. The 5R's' (i.e., Reduce, Re-use, Recycle, Recover and Refuse) principle does perfectly fit when touching upon the measures targeting the reduction of the contribution of aquaculture on marine litter plastic generation (Huntington, 2019):

- a) Reduce:
 - i. Replace to the extent possible plastic infrastructure components with other of physical nature;
 - ii. Use higher density plastics (e.g., Polyethylene terephthalate (PET) or Ultra-high molecular weight polyethylene (UHMWPE)) which are more resistant to fragmentation, UV-irradiation;
 - iii. Develop and intensify maintenance schemes to reduce equipment failure, and contingency plans for equipment being susceptible to extreme weather conditions;
 - iv. Re-design aquaculture operations to reduce intentional or unintentional dumping of plastic into the marine environment (e.g., plastic bag feed sacks) and put in place mitigations plans and actions; and
 - v. Develop awareness raising trainings for aquaculture staff similar to those offered from the shipping sector (e.g., HELMEPA).
- b) Re-use:
 - i. Reduce single-use plastic with the introduction of relevant alternatives and invest in developing recovery, cleaning and re-distribution schemes;
 - ii. Establish mandatory plastic waste collection points connected with the recycling schemes being placed in the mainland; and
 - iii. Train aquaculture staff for maintaining and fixing, rather than replacing, appropriate equipment.
- c) Recycle:
 - i. Establish partnerships with aquaculture industry to develop recycling schemes from which industry could benefit from lower-cost primary material;
 - ii. Develop mandatory recycling policies and schemes, including the establishment of plastic inventory and Standard Operations and Procedures (SOPs) for inactive and damaged equipment stored on the sea cages and along the shorelines for long periods; and
 - iii. Establish mandatory recycling schemes for aquaculture sites/firms that are closing.
- d) Recover:

- i. Locate and assess hotspot areas where aquaculture gear is accumulating on the seafloor and propose environment sound ways to remove them (e.g., Fishing-for-litter based schemes, campaigns with scuba divers);
 - ii. Recover lost or damaged equipment right after extreme weather events; and
 - iii. Introduce GPS tracking systems for heavy material (e.g., plastic cage rings, cage nets, etc.);
- e) Refuse:
- i. Reduce to the extent possible the use of single-use plastics and establish relevant policies;
 - ii. Minimize the use of plastic types with low levels of recyclability;
 - iii. Reduce to the extent possible the use of equipment consisting of different types of plastic (i.e., different lifespan and different approach for collection and recycling).

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

63. With regards to plastic pollution, the updated Regional Plan on Marine Litter Management calls for:

- a) Innovative business practices to prevent plastic waste generation in line with the Extended Producer Responsibility approach through the establishment of Deposit/Refund System for expandable polystyrene boxes in the commercial and recreational fishing and aquaculture sectors; and
- b) Prevention measures aiming to achieve, to the extent possible, a circular economy for plastics (Regulate the use of primary microplastics, Implement Sustainable Procurement Policies, Establish voluntary agreements, Establish procedures and manufacturing methodologies, Identify single-use plastic products, Set targets to phase out production and use, increase the reuse and recycling, Phase-out chemical additives used in plastic products, Promote the use of recycled plastics, substitute plastics, Implement standards for product labelling, Establish dedicated collection and recycling schemes, minimize the amount of marine litter associated with fishing/aquaculture, Scale-up and replicate sustainable models).

64. Shipping is particularly evident in the Mediterranean; thus, contributing proportionally to waste and marine litter generation. Although most of the marine litter in the Mediterranean region originates from land-based sources, studies confirmed that ship-originated litter are found at sites under major shipping routes and lost fishing gear are also recognized as an important source of marine litter in the region (UNEP/MAP 2015). The MARPOL Annex V seeks to eliminate and reduce the amount of garbage being discharged into the sea from ships, which means all ships operating in the

marine environment, from merchant ships to fixed or floating platforms to non-commercial ships like pleasure crafts and yachts must follow the same regulation.

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

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

67. Under the Prevention and Emergency Protocol of the Barcelona Convention in its article 14 relevant to the provision of adequate Port Reception Facilities, the Contracting Parties to the Barcelona Convention are invited to explore ways to charge reasonable costs for the use of Port facilities.

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

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

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

Annex I
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