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MEDITERRANEAN ACTION PLAN

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Meeting of the MED POL Focal Points

Istanbul, Turkey, 29-31 May 2019

Report of the Meeting

UNEP/MAP
Athens, 2019

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Introduction

1. In accordance with the UNEP/MAP Programme of Work 2018-2019 adopted by the 20th Ordinary Meeting of the Contracting Parties to the Barcelona Convention and its Protocols (Tirana, Albania, 17-21 December 2017), the Secretariat organized a Meeting of the MED POL Focal Points from 29-31 May 2019, in Istanbul, Turkey at the Radisson Blu Hotel, at the kind invitation of the Government of Turkey.

2. The main objectives of the Meeting were to:

a) Review the activities carried out during the 2018-2019 biennium and the implementation of the three pollution related Protocols under the MED POL Programme responsibility.
b) Discuss a number of important documents and address issues related to key aspects of the MED POL mandate such as the main elements of the new Pollution Reduction Regional Plans; mid-term evaluation of implementation of existing Regional Plans; updating annexes of the pollution-related Protocols; developments with regards to IMAP implementation pollution, litter and noise clusters; and technical guides and guidelines addressing pollution control measures and pollution assessment.
c) Discuss and agree upon the activities to be implemented during the next biennium for inclusion in the MAP Programme of Work 2020-2021 under the Land-Based Pollution Core Theme including its Governance related aspects.

Agenda item 1: Opening of the Meeting

3. The Meeting was opened by Deputy Coordinator, Mrs Tatjana Hema. In her opening remarks, she thanked Turkey for hosting the Meeting. She provided a summary overview of work undertaken by MAP in the biennium 2018-2019 including support provided to Contracting Parties and technical documents produced; explaining at the same time the institutional and decision-making process of relevance to the Meeting for approval of these documents prior to submission to COP 21 for adoption. She provided information on the planned decisions to be presented to the COP. She highlighted the important decisions taken in UNEA4 confirming that these have been reflected in the MAP Programme of Work for the 2020-2021 biennium.

4. Mr. Ahmet Varir, Head of the Department of Marine and Coastal Management at the Ministry of Environment and Urbanization in Turkey, appreciated the selection of Istanbul, Turkey, for organization of the Meeting of the MED POL Focal Points and welcomed all participants on behalf of the Government of Turkey. He highlighted the work and major achievements made by Turkey in the field of marine and coastal environment and sustainable development including the initiative undertaken by the Secretariat for launching the 2nd Edition of the Istanbul Environment Friendly City Award, and the Zero Waste Project in line with UN Environment/ MAP marine litter activities. He also recalled Turkey's decision to continue collaborating with the Secretariat on IMAP-related activities with the aim of preventing pollution of the Mediterranean Sea.

5. The Meeting was attended by representatives from the following Contracting Parties: Albania, Algeria, Bosnia and Herzegovina, Croatia, Cyprus, European Union, Egypt, France, Greece, Israel, Italy, Lebanon, Libya, Malta, Monaco, Montenegro, Morocco, Slovenia, Spain, Tunisia and Turkey.

6. The following United Nations bodies, specialized agencies, Convention Secretariats and Intergovernmental Organizations were represented as observers: The Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS); the Commission on the Protect6ion of the Black Sea Against Pollution Permanent Secretariat and the European Environment Agency were also present.

7. The following non-governmental organizations and other institutions were represented: the World Wildlife Fund for Nature International (WWF International).

8. The United Nations Environment Programme (UNEP), including the Secretariat of the Mediterranean Action Plan and the Barcelona Convention represented by the MAP Coordinating Unit and the Programme for the Assessment and Control of Marine Pollution in the Mediterranean (MED POL); the Regional Activity Centre for Sustainable Consumption and Production (SCP/RAC); as well as the Regional Activity Centre for Information and Communication (INFO/RAC). The full list of participants is attached to the present report as Annex I.

Agenda items 2 and 3: Adoption of the Agenda and Organization of Work

a) Rules of Procedure for the Meeting on IMAP Implementation: Best Practices, Gaps and Common Challenges

9. The rules of procedure for meetings and conferences of the Contracting Parties to the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean and its Protocols applied mutatis mutandis to the present Meeting (UNEP/IG.43/6, Annex XI).

b) Election of officers

10. In accordance with the Rules of procedures for meetings and conferences of the Contracting Parties, the Meeting elected one (1) President, three (3) Vice-Presidents and one (1) Rapporteur from among the participants, as follows:

Chair:	Mrs Asli Topalak, Turkey
Vice-Chair:	Mrs Marta Martinez-Gil Pardo de Vera, Spain
Vice-Chair:	Mr. Samir Kaabi, Tunisia
Vice Chair:	Mr. Rani Amir, Israel
Rapporteur :	Mrs Ledjana Bojaxhi, Albania

c) Adoption of the Provisional Agenda

11. The proposed Provisional agenda appearing in document UNEP/MED WG.473/1, was presented by the Secretariat, and adopted without changes.

d) Organization of Work

12. Discussions were held in plenary sessions in line with the provisional agenda. Simultaneous interpretation into English and French was provided during the Meeting.

Agenda item 4: Progress Achieved regarding the Implementation of the Programme of Work 2019-2020 related to Land Based Pollution and Governance Themes

13. Under this agenda item, the Secretariat introduced document UNEP/MED WG. 473/3 which summarizes the progress made on the implementation of the main activities carried out by MED POL, in accordance with the MAP Mid-term Strategy 2016-2021 and the Programme of Work 2018-2019. The Secretariat presented achievements made with regards to projects and initiatives carried out under the pollution and governance themes, specifically noting the involvement of MED POL in the Med Programme, IMELS, H2020/NAP indicators under ENI SEIS II Project, and support provided on national implementation of IMAP under ECAP Med II Project, in addition to pilots for marine litter management under Marine Litter Med Project. The Secretariat presented an overview of guidance documents and technical reports produced by MED POL during this biennium.

14. The Meeting acknowledged the work undertaken by MED POL and achievements made during the biennium 2018-2019, particularly with regards to national implementation of IMAP and

Marine Litter pilots in the Countries, with specific mention of national benefits acquired from implementation of these projects and related Small-Scale Financing Agreements (SSFA).

15. The Secretariat encouraged the Contracting Parties to fulfill their commitments for timely implementation of activities as foreseen in the SSFAs signed with UN Environment/MAP; noting that successful implementation by the Countries of these activities is crucial for successful completion of the Programme of Work.

16. The Secretariat also highlighted the obligation for timely submission of data for the 4th NBB cycle by the Countries due to the importance of these inputs for validating the evaluation of the existing Regional Plans and fulfilling the reporting requirements of the Contracting Parties.

17. The Meeting's final conclusions related to this agenda item(s) are presented in Annex III of this report.

Agenda item 5: Implementation status and Development of the Regional Plans under Article 15 of the LBS Protocol

18. Under this agenda item, the Secretariat presented a comprehensive overview of the process for development of the main elements of the six Regional Plans as elaborated in the Working Document UNEP/MED WG.473/4 on the main elements of the six new Regional Plans on Municipal Wastewater Treatment; Sewage Sludge Management; Agriculture Nutrients Management; Aquaculture Nutrients Management; Urban Storm Water Management; and Marine Litter (upgrade), including proposed timetable for their preparation. The Secretariat noted that the document has undergone two key revisions proposed by experts nominated by the Countries in the framework of two Regional Meetings held in November 2018 and May 2019 with the view to elaborating further the proposed elements.

19. The Contracting Parties shared their views on specific technical aspects of each Regional Plan, recommending changes and modifications. The Secretariat provided answers and explanations where appropriate. Following are key issues raised by the Meeting on each of the Regional Plans:

20. With regards to the Regional Plan on Municipal Wastewater Treatment, comments were raised of lack of reference on sampling/monitoring and treatment of microplastics from WWTPs; need to delete reference to pathogenic micro-organisms; appropriateness of including a reference to EQS; need to include priority contaminants in the annex of the Regional Plan; need to define coastal zone in line with ICZM Protocol or river basin management approach; and need to consider developing specific Regional Plans for the industrial sectors.

21. Concerning the Regional Plan on Sewage Sludge Management, comments were raised on the need to include pathogenic microorganisms and microplastics when setting ELVs; clarifying that sludge can be used also as a source of energy in addition to its use in agriculture; and the need to clarify the stages to be adopted in WWTPs for reuse of sludge.

22. In relation to the Regional Plan on Agriculture Nutrients Management, comments were raised on the need to modify the scope of the plan to specify discharge of pollutants to Sea; and ban/restriction of use of pesticides through aircrafts with strictly regulated exemptions.

23. With regards to the Regional Plan on Aquaculture Nutrients Management, comments were raised on the need to establish monitoring programmes based on local oceanographic conditions, taking into account acceptable nutrients ELVs; need to establish treatment of nutrients from effluents; need to specify that relate permits for aquaculture installations to pollution affecting the maintenance of achievement of GES; and adding to monitoring parameters dissolved and particulate organic matter and TRIX index.

24. Concerning the Regional Plan on Urban Storm Water Management, comments were raised on the need to modify the objective of Regional Plan to specify minimization of input of suspended solids, contaminants in addition to marine litter in receiving water; specifying aspects of risk management information; need to promote Sustainable Urban Drainage Systems, and to incorporate management schemes of storm water run-off into ICZM plans.

25. Finally, with regards to introducing possible elements for upgrading the Regional Plan on Marine Litter, comments were raised on the need to "phase out" single use plastic items (in lieu of banning); the need to consult measures related to SPAMIs with SPA/RAC; promoting research related to micro litter particles; limiting ban on microplastics addition to certain products; encouraging and promoting the replacement of plastics; including measures addressing and accelerating safer material innovation and less toxic plastic additives; exploring methodologies to monitor and assess riverine inputs of marine litter; and the need to consider application of incentives to promote transformation of informal recycling networks around the Mediterranean. The Meeting also requested to elaborate the appropriate concepts for incorporating the principles of circular economy into the Regional Plan. Accordingly, a group of experts led by Spain was formed by the Secretariat. The group recommended that "circular economy models that consider the whole lifecycle of products are facilitated and promoted; increasing resource efficiency; facilitating recycling; and avoiding waste release into the environment."

26. The Meeting's final conclusions related to this agenda item are presented in Annex III of this report.

27. With regards to development of a Regional Plan for the Industrial Sector, the Secretariat will undertake detailed analysis and assess the need based on which it will prepare a paper to be presented for review of the MED POL Focal Points Meeting in 2021.

28. Following presentation by the Secretariat of the way forward for developing the six Regional Plans, the Meeting expressed the need to have in place a monitoring system to ensure implementation of the Regional Plans. The Meeting also indicated that the timetable set by the Secretariat to develop the new Regional Plans should be amended such as to end by COP23 instead of COP 24.

29. In response, the Secretariat noted that a careful but realistic approach was adopted in prioritizing and setting a timetable for completion. The Secretariat pointed out the limited available human resource and the need for convening a considerable number of experts' meetings for development of the new Plans. Taking into account the revised timeline as requested by the meeting; the commitment of the Contracting Parties is crucial to timely nominate experts in the various fields related to the Regional Plans and ensure active participation and contribution.

30. Under this same agenda item, the Secretariat introduced four presentations covering the contents of the Document UNEP/MED WG.473/14 on the mid-term implementation status of the legal, institutional and technical measures contained in the Regional Plans for (i) reduction of BOD5 from Urban Wastewater and in the Food Sector; (ii) reduction of inputs of Mercury; (iii) elimination/phase out of POPs; and (iv) management of Marine Litter. Presentations focused on the methodology for the evaluation; structure of the evaluation; status of implementation with regards to each of the aforementioned measures; followed by trends in pollutants releases and recommendations.

31. The Meeting acknowledged the work undertaken for preparation of the draft evaluation reports and brought about a number of issues with regards to evaluation findings including use of up-to-date data and information. The European Environment Agency (EEA) acknowledged the report's findings and highlighted the need to undertake proper coordination with ongoing initiatives/projects in order to avoid duplication of work and to reduce the burden of double-reporting. In this respect, the Meeting agreed to the need to provide data and inputs on the 4th NBB Cycle, PRTR, IMAP, H2020/NAP indicators as this information is crucial for undertaking a proper and accurate evaluation of the status of implementation of the regional plans.

32. The Meeting further agreed to set deadlines for the process of review of data and information included in the annexes to the evaluation report as indicated in the final conclusions presented in Annex III of this report. Agreed deadlines commit the Contracting Parties to provide additional information, data or sources of information by early September 2019. In turn, the Secretariat would validate, update and finalize the evaluation reports by mid-October 2019. By end of October 2019, the Secretariat will share the revised reports with the MED POL Focal Points for their final comments, with the view to concluding the work and presenting it at COP 21 in December 2019.

Agenda item 6: Proposals for updating the annexes of the LBS, Hazardous Waste and Dumping Protocols

33. Under this agenda item, the Secretariat introduced document UNEP/MED WG.473/5, comprising an analysis of the annexes of the LBS, Dumping and Hazardous Waste Protocol in light of recent developments at regional and global levels. The Secretariat explained that the review of possible updates to the annexes of the three Protocols and proposed suggestions aim to better account for GES and to enhance synergies with the relevant regional and global developments.

34. The Meeting requested that updates are limited to LBS and Dumping Protocols only, as the Hazardous Waste Protocol is almost identical to the text of the Basel Convention for which regular reporting is undertaken. The Meeting was also of the opinion that updating the annexes should be prioritized.

35. The Secretariat noted that recent revisions by the Basel Convention could not be accurately reflected in the analysis undertaken for possible updating the annexes of the Hazardous Waste Protocol as the official report of the Basel Convention COP had not been published yet.

36. Following questions by the floor, the Secretariat provided information in the process for possible update of Annexes to the Protocols indicating the need for the establishment of groups of experts nominated by the Contracting Parties. These Groups would present concrete proposals on the required revisions to be submitted to the MED POL Focal Points Meeting in 2021, and to COP 22 for consideration. A mandate to initiate this process, including the establishment of the Groups (i.e. LBS, Dumping or Hazardous Waste Protocols) will be sought from COP 21 if recommended by the present MED POL FP meeting and agreed by MAP Focal Points meeting in September 2019.

37. The Meeting's final conclusions related to this agenda item are presented in Annex III of this report.

Agenda item 7: Implementation of IMAP and MED POL Monitoring Programme

38. Under this agenda item, the Secretariat presented for the consideration of the meeting five documents related to IMAP and MED POL Monitoring Programme, namely:

i. Cross-Cutting Issues and Common Challenges: The Methodological Approach for Mapping the Interrelations between Sectors, Activities, Pressures, Impacts and State of Marine Environment for EO5 and EO9 *[UNEP/MED WG.473/6]*.
ii. IMAP Guidance Factsheets: Update for Common Indicators 13, 14, 17, 18, 20 and 21; New proposal for Candidate Indicators 26 and 27 *[UNEP/MED WG.473/7]*.
iii. Data Standards and Data Dictionaries for Common Indicators related to Pollution and Marine Litter *[UNEP/MED WG.473/8]*.
iv. Schemes for Database Quality, Quality Assurance and Quality Control (QA/QC) of Data related to Pollution *[UNEP/MED WG.473/9]*.
Defining the Most Representative Species for IMAP Candidate Indicator 24 and related Monitoring Protocols *[UNEP/MED WG.473/11]*

39. The Meeting acknowledged the work undertaken by the Secretariat, and approved the proposed revision of the Guidance Factsheets for Common Indicators 13, 14, 17, 18, 20 and 21 related to Ecological Objectives 5 and 9, acknowledging that they are in line with the IMAP COP Decision and consistent with the Data Standards (DSs) and Data Dictionaries (DDs) of the IMAP (Pilot) Info System currently in development. The Meeting noted reservation expressed by Morocco related to the proposed example for sampling frequency determination.

40. The Meeting also approved Guidance Fact Sheets for Candidate Indicators 26 and 27 related to Ecological Objective 11. However, the Meeting was not in agreement about the need to include them into the IMAP monitoring programme noting the need to exercise caution before introducing additional indicators to be regularly monitored within IMAP, before having properly established monitoring processes for existing Common Indicators included already in IMAP. The Meeting proposed to gather all available information of relevance for IMAP Candidate Indicators 26 and 27 before agreeing to including them as IMAP Common Indicators; noting **also** the need to monitor impacts of pressures to the marine environment.

41. The Meeting approved the proposed Data Standards and Data Dictionaries (DSs and DDs) for IMAP Common Indicators 13, 14, 17, 21, 22 and 23 upon amending them as presented in Annex III. The Meeting noted a need to ensure synergy between IMAP Pilot system and present MED POL Database, as well as other platforms under development such as NBB. At the same time, functional and users' friendly interface of IMAP Info System with national database must be ensured.

42. The Meeting approved implementation of the new Schemes for Database Quality and Quality Assurance and Quality Control of Data related to Pollution, emphasizing a need to continue building the QA/QC within Database Quality Management of the IMAP Info System.

43. The Meeting approved the methodologies proposed for GES-integrated assessment based on DPSIR approach, as well as Protocol for monitoring interactions between marine litter and marine turtles with a view to harmonizing methods of data collection for monitoring and assessment in the Mediterranean.

44. Following outcomes of discussions by the Meeting, the Secretariat updated the relevant documents as indicated in the final conclusions of the Meeting related to this agenda item contained in Annex III.

Agenda item 8: Technical Guidelines

45. Under this agenda item, the Secretariat presented three technical guidelines for the consideration of the meeting, namely:

i. Guidelines for the Implementation of the Adopt-a-Beach Measures in the Mediterranean *[UNEP/MED WG.473/10]*.
ii. Practical Implementation Guidelines on PRTR *[UNEP/MED WG.473/12]*.
iii. Legal Template on PRTR *[UNEP/MED WG.473/13]*.

46. With regards to the "Guidelines for the Implementation of the Adopt-a-Beach Measures," The Meeting requested to clearly identify the beaches to be included in this guideline and related selection criteria. The Meeting discussed possibility of incorporating monitoring of marine litter jointly with monitoring of bathing waters; hence making use of existing institutional set-up for monitoring bathing waters in order to monitor marine litter; however, there was no clear consensus on this course of action. With regards to the lower size limit that should be considered for monitoring beach marine litter, and further to Countries' discussions, the Meeting decided to retain the IMAP lower size limit of 0.5 cm.

47. Concerning the "Practical Implementation Guidelines on PRTR," the Meeting introduced minor changes including a request to further highlight the activity which will be designated by the competent authorities as the main activity in case an installation has more than one activity which is subject to reporting. The Meeting requested the Secretariat to continue to follow-up and support implementation of the PRTR Guidelines, especially capacity building activities.

48. With regards to the "Legal Template on PRTR," the Meeting acknowledged the fact that a unified wording regarding "Operators/Owners" is used throughout the entire text of the Legal Template document; ensuring consistency with the Kiev PRTR Protocol, and giving a broader possibility to include the cases where owners are also operators of the facility. The Meeting requested further capacity building activities to be undertaken by the Secretariat focusing on some of the main prevailing sectors already designated during the 4th Cycle of NBB update process.

49. Further to the outcomes of discussions by the Meeting, the Secretariat revised the aforementioned Guidelines with the view to have it submitted for approval to the MAP Focal Points Meeting in September 2019.

50. Further to the outcomes of discussions by the Meeting, the Secretariat revised the aforementioned documents with the view to have the Adopt-a-Beach Guidelines submitted for approval to the MAP Focal Points Meeting in September 2019. The final conclusions and recommendations of the Meeting related to this agenda item are presented in Annex III.

Agenda item 9: Programme of Work 2020-2021

51. Under this Agenda item, the Secretariat presented document UNEP/MED WG.473/15 describing the proposed MED POL Programme of Work for the biennium 2020-2021. The Secretariat explained the rationale for developing the Programme of Work, its targets and key activities. A presentation of each output planned under the land-based pollution theme and its governance-related aspects was made.

52. Under the Governance-related aspects theme, the Meeting requested an update of planned projects for the biennium 2020-2021, particularly focusing on the GEF-funded Child 1.1 Project and beneficiary countries. The Meeting requested that planned activities should focus on the needs of eligible countries, while stressing the need to prioritize Programme of Work activities in view of limited budget. The Meeting also requested that MAP establishes local units to assist the Countries fulfilling the reporting requirements for the pollution-related Protocols.

53. Under the Land-Based Pollution theme, the need of sampling and analysis of microplastic in WWTPs and for developing the related Protocol was raised. The Meeting indicated that priority should be given to IMAP implementation, noting the need for having consistency reliability in data reporting among the Contracting Parties for addressing Candidate Indicator 26 (noise). The Meeting indicated also the need for establishing a monitoring programme that is well interrelated with all the pollution reduction measures that are planned in the Regional Plans. The Meeting requested support and capacity building for IMAP implementation, particularly with regards to purchasing laboratory equipment. The Meeting highlighted also the need to involve civil society in aspects related to implementation of activities foreseen in the Programme of Work. Turkey requested the Secretariat to provide additional information about the CAMPs activities in the Mediterranean specifically with regards to access to documents such as maps of working areas, countries included, details of studies, etc., noting that on the basis of the contents of these documents. Turkey may also give additional comments (participating to the projects etc.) on the MED POL lead/executed Programme of Work 2020-2021 on Land-Based Pollution in the MAP Focal Points meeting.

54. The Secretariat provided answers to inquiries raised by the Meeting with regards to the two aforementioned themes. The Secretariat confirmed that the proposed Programme of Work for the biennium 2020-2021 gives priority for funding activities related to IMAP, NBB/PRTR, NAPs and

development of the new Regional Plans. Regarding capacity building activities, the Secretariat noted that this can be covered under the CorMon meetings. ACCOBAMS indicated that it foresees participation of the Mediterranean Countries in the capacity building workshops planned in the region.

55. With regards to establishing local support units for reporting purpose, the Secretariat pointed out that limited resource availability does not allow for establishing individual support units for assisting the Countries in their reporting requirements. The Secretariat indicated that it no longer is capable of supporting purchases of laboratory equipment as was the case in the past, noting that it will attempt to find other modalities for supporting the Countries in the future (e.g. with EU bilateral cooperation).

56. The Meeting acknowledged the extensive activities planned in the proposed Programme of Work for MED POL for the 2020-2021 biennium. The Meeting mandated the Secretariat to raise the issue of upgrading and expanding MED POL in terms of human capacities to the MAP Focal Points Meeting in September 2019 for approval.

57. The Meeting approved as appropriate the proposed Programme of Work after incorporating the Countries' inputs and comments, particularly with regards to activities to be executed directly by MED POL and mandated the Secretariat to integrate the PoW in the UNEP/MAP Programme of Work proposal for submission to the MAP Focal Points Meeting in September 2019.

Agenda item 10: Any Other Business

58. Under this agenda item, a presentation was given by Israel on INTERPOL and its Pollution Crime Working Group currently planning the global Operation 30 Days at Sea 2.0, to be carried out in October 2019. In its presentation, Israel noted that that an operational plan and official invitation to join the operation will be sent in the upcoming weeks to all member countries. The Operation will target pollution from vessels and offshore installations; land-based and river pollution impacting the marine environment; and waste trafficking through ports.

Agenda item 11: Conclusions and Recommendations

59. The Meeting reviewed, commented on and approved the draft Conclusions and Recommendations as amended and attached to the present report as Annex III including its appendixes as revised as appropriate by the meeting.

Agenda item 12: Closure of the Meeting

60. After expressing the usual courtesies, the Chair declared the Meeting closed at 17:00 on Friday, 31 May 2019.

Annex I
List of Participants

LIST OF PARTICIPANTS / LISTES DES PARTICIPANTS

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SECRETARIAT TO THE BARCELONA CONVENTION AND COMPONENTS OF THE MEDITERRANEAN ACTION PLAN
SECRETARIAT DE LA CONVENTION DE BARCELONE ET COMPOSANTES DU PLAN D'ACTION POUR LA MEDITERRANEE

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Annex II
Agenda of the Meeting

Agenda of the Meeting

Agenda item 1: Opening of the Meeting

Agenda item 2: Election of Officers

Agenda item 3: Organizational Matters and Adoption of the Agenda

Agenda item 4: Progress achieved regarding implementation of the Programme of Work 2018-2019 related to Land-Based Pollution and Governance Themes

Agenda item 5: Implementation status and development of the Regional Plans under Article 15 of the LBS Protocol

a) Main elements of the new Pollution Reduction Regional Plans.
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Agenda item 6: Proposals for updating the annexes of the LBS, Hazardous Waste and Dumping Protocols

Agenda item 7: Implementation of IMAP and MED POL Monitoring Programme

a) Data Standards and Data Dictionaries and for Common Indicators related to Pollution and Marine Litter with Data Sharing Policy.
b) IMAP Guidance Factsheets: Update for Common Indicators 13, 14, 17, 18, 20 and 21; New proposal for Candidate Indicators 26 and 27.
c) Defining the Most Representative Species for IMAP Candidate Indicator 24 and Related Monitoring Protocols
d) Cross-Cutting Issues and Common Challenges: The Methodological Approach for Mapping the Interrelations between Sectors, Activities, Pressures, Impacts and State of Marine Environment for EO5 and EO9.
e) Data quality management.

Agenda item 8: Technical Guidelines:

a) Guidelines for the Implementation of the Adopt-a-Beach measures.
b) Practical Implementation Guidelines on PRTR.
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Agenda item 9: Programme of Work 2020-2021

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Annex III
Conclusions and Recommendations

Conclusions and Recommendations

The MED POL Focal Points Meeting was held on 29 to 31 May 2019, in Istanbul, Turkey at the Radisson Blu Hotel at the kind invitation of the Government of Turkey. The meeting was organized by UN Environment/MAP Secretariat (MED POL Programme).

The Meeting agreed on the following conclusions and recommendations:

Agenda item 4: Progress Achieved regarding the Implementation of the Programme of Work 2018-2019 related to Land Based Pollution and Governance Themes

1. Following the presentation from the Secretariat of Working document UNEP/MED WG.473/3/Corr.1: "Progress achieved regarding implementation of the Programme of Work 2018 - 2019 related to Land-Based Pollution and Governance Themes"; the Meeting acknowledged the progress achieved and appreciated the work undertaken by MED POL and the Contracting Parties to achieve the planned outputs as mandated in the PoW for the biennium 2018-2019.

2. The meeting took note of the recommendation of the second meeting of the experts on RP to consider the possibility for formulating Regional Plans under art 15 of the LBS protocol addressing Industrial pollution and Circular Economy and requested MEDPOL to analyze this issue for the consideration by the next MED POL FP meeting.

3. The Meeting acknowledged the need to conclude the work by the Contracting Parties on NBB/PRTR 2018 cycle reporting and upload the respective data by September 2019 further to ensuring the full functionality of the PRTR/NBB Info System under finalisation by INFO/RAC by July 2019. The meeting also recalled the obligation for submission of marine pollution data without further delay for the missing years and in particular from the Contracting Parties that have not done yet so for a long time.

4. The Meeting encouraged further work to ensure the finalization of national monitoring programmes in line with IMAP by all Contracting Parties in order to report to COP 21 the results of this work. In this respect the Meeting also highlighted the need to strengthen IMAP implementation at the national level including step-wise increase in number of monitoring stations and parameters and capacity building. In this regard, the Meeting noted the importance of undertaking regular Proficiency Tests and emphasized the need for reporting good quality data to IMAP Info System.

Agenda item 5: Implementation status and Development of the Regional Plans under Article 15 of the LBS Protocol

5. The Meeting endorsed the proposed Main Elements for the Preparation of the Six Pollution Reduction Regional Plans," as amended and presented in Annex I to these conclusions and recommended their submission to the MAP Focal Points Meeting.

6. Appreciating the work undertaken by the Secretariat for the preparation of the Mid-term Evaluation Reports of the Regional Plans adopted since 2009 by the Meetings of the Contracting Parties, the CPs raised a number of concerns on the sources of data and information used for their preparation and agreed to provide additional information, data or sources of information by early September 2019 at the latest. This would allow the Secretariat to update and finalize these reports and complete them with the analysis of data coming from PRTR/NBB submissions expected by early September 2019. The revised reports will be shared with the MED POL Focal Points by mid October 2019 at the latest for their final comments by end of October 2019 with the view to concluding the work and present it at COP 21 in a timely manner.

Agenda item 6: Proposals for updating the annexes of the LBS, Hazardous Waste and Dumping Protocols

7. The Meeting thanked the Secretariat for bringing this matter to the attention of the MED POL Focal Points and took note of the fact that the analysis undertaken by the Secretariat is presented to gain full insight for the need to possibly amend the annexes of the three pollution-related Protocols with the view to streamlining them with the most recent relevant development at global and regional level as well as ensuring to the extent possible harmonization of work of the Contracting Parties which have multiple legal obligations. The Meeting recommended the Secretariat to seek a mandate by the MAP Focal Points Meeting and COP21, as appropriate, to work in this direction during next biennium in line with the established procedure for assessing and making proposals as appropriate related to amendments of Annexes to Protocols, with a particular focus on LBS and Dumping Protocol Annexes.

Agenda item 7: Implementation of IMAP and MED POL Monitoring Programme

8. Following the work undertaken by the Meeting of CorMon on Pollution Monitoring, and the review of Working Document UNEP/MED WG.473/8, the Meeting agreed on the Data Standards and Data Dictionaries (DSs and DDs) related to IMAP Common Indicators 13, 14, 17, 21, 22 and 23, as contained in Annex II to these conclusions for submission to the 7th Meeting of EcAp Coordination Group.

9. Following the review of UNEP/MED WG.473/7 and taking into account evolving needs to fill the gaps related to assessment component of the IMAP Common Indicators Guidance Factsheets, the Meeting approved the proposed revision of the Guidance Factsheets for Common Indicators 13, 14, 17, 18, 20 and 21 related to EO5 (Eutrophication) and EO9 (Contaminants), as contained in Annex III of these conclusions and recommended their submission to the 7th Meeting of EcAp Coordination Group. [1]

10. The Meeting expressed its appreciation for the work undertaken by ACCOBAMS and the Secretariat to prepare the Guidance Factsheets for Candidate Indicators 26 and 27 (UNEP/MED WG.473/7) related to EO11 (Energy including underwater noise). The Meeting approved these guidance fact sheets, included in Annex III to these conclusions and recommended their submission to the 7th Meeting of EcAp Coordination Group. The Meeting pointed out the need for further work to gather relevant knowledge, including through the testing of the Guidance Factsheets for Candidate Indicators 26 and 27 on an indicative basis as appropriate, prior to incorporating them into IMAP upon completion of its initial phase.

11. The Meeting reviewed Document UNEP/MED WG.473/11 and agreed on the proposed selection of indicator species for monitoring ingestion of marine litter by marine organisms in the Mediterranean, as well as the related Protocol for monitoring interactions between marine litter and marine turtles with a view to harmonizing methods of data collection for monitoring and assessment in the Mediterranean, as contained in Annex IV to these conclusions, and recommended their submission to the 7th Meeting of EcAp Coordination Group.

12. The Meeting reviewed and approved the methodologies proposed for GES-integrated assessment based on DPSIR approach (UNEP/MED WG.473/6), as contained in Annex V to these conclusions and recommended its submission to the 7th Meeting of EcAp Coordination Group. The Meeting recommended testing the proposed methodologies by the Contracting Parties in an integrated manner for Pollution, Biodiversity, and Coast and Hydrography Clusters of IMAP with the aim to present related main findings to the next meetings of respective CORMONs.

[1] The Meeting took note on the reservation expressed by Morocco with regards to the elaborated example for sampling frequency definition through the discriminant limit of two adjacent mean values for Common Indicators 13 and 14 included within subsection related to temporal scope guidance.

13. The Meeting agreed with the recommendation of CORMONs to re-establish Online Working Groups (OWG) for Eutrophication (EO5) and Contaminants (EO9) encompassing scientists from around the Mediterranean working in collaboration with MED POL to work on the scales of monitoring and assessment.

14. Building on the experience of managing the MED POL Monitoring Database for almost 20 years, the Meeting reviewed and agreed on the proposed Schemes for Database Quality and Quality Assurance and Quality Control of Data related to Pollution (UNEP/MED WG.473/9), as contained in Annex VI to these conclusions. The Meeting agreed to submit this document to the 7th Meeting of the EcAp Coordination Group.

15. The Meeting requested the MED POL and INFO/RAC to further work to guide the Contracting Parties to deliver satisfactory quality data in IMAP Info System in a harmonized way; as well as to build QA/QC within Database Quality Management of the IMAP Info System to estimate validity of datasets submission for EO5 and EO9.

Agenda item 8: Technical Guidelines

16. The Meeting reviewed the Practical Implementation Guidelines on PRTR and agreed on the changes introduced following the comments received by the Contracting Parties with minor modifications, as contained in Annex VII to these conclusions.

17. The Meeting reviewed the document on the Legal Template on PRTR and introduced minor editorial changes, as contained in Annex VIII to these conclusions. The Meeting requested the Secretariat to continue supporting the Contracting Parties for the implementation of PRTR at national level, by using the aforementioned tools, with priority given to prevailing large industries in each country.

18. The Meeting reviewed and discussed the guideline 'Adopt a Beach' and introduced a number of changes and minor modifications, as contained in Annex IX to these conclusions.

Agenda item 9: Programme of Work 2020-2021: Land-Based Pollution Core Theme including pollution-related aspects of the Governance Theme

19. The Meeting reviewed the proposed Programme of Work for the new biennium 2020-2021 and recommended the submission of MED POL lead/executed activities to the MAP Focal Points Meeting for their consideration as revised and contained in Annex X to these Conclusions and Recommendations. The Meeting took note of the expected activities and contribution of SCP/RAC to Theme 2 of MAP Midterm Strategy.

20. The Meeting clearly pointed out that the PoW for the next biennium should focus on the following main priorities: (i) implementation of IMAP, (ii) advancing the work on assessing and inventorizing the loads of pollutants through NBB/PRTR system, and NAP indicators, (iii) implementation of the Regional Plans, (iv) implementation of the NAP, and (v) formulation of the new Regional Plans as well as(vi) sharing of Best Practices and Capacity Building in the above directions.

21. Appreciating the effort made by MED POL to present the PoW which includes all activities of the MAP components in the field of marine pollution control and prevention, as well as the contribution of MED POL to the implementation of related aspects of the Governance and SCP themes of the MAP MTS, the Meeting pointed out the need to make a clearer distinction between the activities directly executed by MED POL to those for which MED POL is a contributor.

22. The Meeting acknowledged the need for a number of Contracting Parties to upgrade laboratory techniques and equipment to enable the implementation of IMAP and requested the Secretariat to

provide its support including means and ways to help these Contracting Parties in mobilizing resources in this direction.

23. Noting with concern the limited human resources of the MED POL team for effectively delivering its mandate and the proposed Programme of Work, the Meeting highlighted the need for allocating additional human resources and upgrading its structure and requested the Secretariat to make a proposal in this direction.

24. The Meeting requested MED POL to bring to the attention of the Coordinating Unit innovative means and ways to ensure a better involvement of civil society and MAP partners in the implementation of the MED POL Programme of Work.

25. The Meeting appreciated and thanked the Government of Turkey for their hospitality and support for the organization of the MED POL Focal Points Meeting.

Appendix I

Main elements of six Pollution Reduction Regional Plans on Municipal WWTP, Sewage Sludge Management, Agriculture nutrients Management, Aquaculture nutrients Management, Urban Storm water Management and Marine Litter

Table of Contents

List of Abbreviations/Acronyms

BAT	Best Available Technique
BEP	Best Environmental Practice
BOD5	Biochemical Oxygen Demand
COP	Conference of the Parties
ELV	Emission Limit Value
GES	Good Environmental Status
LBS Protocol	Land-Based Sources Protocol
MAP	Mediterranean Action Plan
MED POL	Programme for the Assessment and Control of Marine Pollution in the Mediterranean Sea
NAPs	National Action Plans
PoW	Programme of Work
SCP	Sustainable Consumption and Production
SPAMI	Special Protected Areas of Mediterranean Importance
WWTP	Wastewater Treatment Plant

1. Outline of the Elements of the six Regional Plans

1. Based on the approach already in place for the development of the 10 existing Regional Plans, the table of contents and provisions for the six Regional Plans may replicate the same outline, as follows:

a. Definition of terms
b. Scope and objectives of the Regional Plan
c. Proposed measures including:
    i. Regulatory measures (including where appropriate economic incentives):
    ii. Technical measures (including efficient use of resources and energy): and
    iii. Other type of measures (including monitoring, reporting and enforcement).
d. Timetable for implementation of measures
e. Support to implementation which may include:
    i. Technical and financial assistance;
    ii. Scientific cooperation and research;
    iii. Guidelines; and
    iv. Stakeholders participation.
f. Entry into force
g. Annexes including:
    i. Reporting templates[2]; and
    ii. Other technical matters.

2. With regards to the geographical scope of the Regional Plans and taking into consideration that the legal basis for their development is the LBS Protocol (Art. 5 and 15), the geographical extent of the Regional Plans will apply to the area defined by Article 3 of the LBS Protocol, namely:

a. The Mediterranean Sea Area as defined in Article 1 of the Convention;
b. The hydrologic basin of the Mediterranean Sea Area;
c. Waters on the landward side of the baselines from which the breadth of the territorial sea is measured and extending, in the case of watercourses, up to the freshwater limit;
d. Brackish waters, coastal salt waters including marshes and coastal lagoons; and ground waters communicating with the Mediterranean Sea.

[2] The Meeting recommended to avoid double reporting while considering the strong linkages to the Barcelona Convention Reporting System and the NAP Follow-up Indicators/NBB

2. Possible Elements of the Regional Plan on Municipal Wastewater Treatment[3]

3. The existing Regional Plan on the Reduction of BOD5 from Urban Wastewater may be expanded in scope/ upgraded in view of integrating the newly identified measures related to municipal wastewater treatment needed to ensure the achievement and/or maintaining of GES and addressing additional pressures and new elements, such as multiple benefits approach and stricter standards.

4. The scope of the Regional Plan covers "collection, treatment, reuse and discharge of municipal wastewaters and the treatment, reuse and discharges of biodegradable industrial wastewater from certain industrial sectors."

5. The objective of the Regional Plan is to "protect the coastal and marine environment and health from the adverse effects of the above-mentioned waste water direct and or indirect discharges, in particular regarding adverse effects on the oxygen content of the coastal and marine environment and eutrophication phenomena as well as promote resource efficiency."

6. The upgraded Regional Plan should address priority substances identified in Annex I-C of the LBS Protocol (Categories of substances) with a particular focus on the list of priority substances, indicated in Annex I to the Decision IG. 21/3[45] adopted by COP 18 (Istanbul, Turkey, December 2013).

7. The proposed measures may include:
   a. Reuse treated municipal wastewater in agriculture (reclaiming nutrients as appropriate) or industry;
   b. Reuse/recycle treated wastewater to address regional water scarcity (e.g. aquifer recharge);
   c. Set appropriate quality standards for water reuse in agriculture irrigation, aquifer recharge or other uses;
   d. Apply BAT and BEP, including energy saving or renewable/ alternative energy sources in operating wastewater treatment plants (WWTP);
   e. Promote nature-based solutions (e.g. constructed wetlands) in small agglomerations as appropriate;
   f. Set Emission Limit Values (ELVs) for BOD, COD, TOC, TN, TP, pathogenic microorganisms as indicated in IMAP and other priority substances/emerging contaminants including microplastics, as appropriate, based on sensitivity and related EQS of the receiving environment, as need be;
   g. Set pre-treatment ELVs for industries to discharge their effluents to collection systems that can be treated in municipal wastewater treatment plants, particularly for small industries located in urban areas;
   h. Set timeframe(s) for implementation of technologies to reach ELVs (BOD, COD, TOC, TN, TP, pathogenic microorganisms as indicated in IMAP, and other priority substances/emerging contaminants, including microplastics, as appropriate; fully considering the need for developing respective sampling and analysis protocols with regards to emerging contaminants and other guidance documents.
   i. Ensure that reuse of wastewater from urban wastewater treatment plants is subject to prior regulations and/or specific authorization by competent authorities or appropriate bodies;
   j. Ensure that competent authorities or appropriate bodies monitor reclaimed water to verify compliance with these quality requirements taking into account the minimum frequencies included;

[3] Discussion is ongoing on the need to develop a separate regional plan addressing the wastewater treatment from industrial facilities

[5] The Meeting recommended to include this Annex to the Regional Plan.

k. Ensure that urban wastewater collection and treatment is subject to appropriate monitoring and reporting systems;
l. Ensure that the discharge of industrial wastewater into collecting systems and urban wastewater treatment plants are subject to prior regulations and/or specific authorizations by competent authorities or appropriate bodies.
m. Ensure that operators and competent authorities or appropriate bodies monitor and control discharges from municipal WWTP to verify compliance with ELV;
n. Set Environmental Impact Assessment procedures prior to issuing discharge permits considering specific biodiversity species and ecosystems;
o. Establish specific and periodic measures to manage the collection and treatment of urban wastewater in tourist destination cities.

8. Support to measures' implementation:
   a. Guidance and standards on the application of BAT and BEP in municipal wastewater treatment (including sewage sludge management) that support reduced cost of energy and water saving, specifically addressing:
      i. Energy performance.
      ii. Water consumption.
      iii. Wastewater treatment efficiencies.
      iv. Treatment efficiency of flue gas treatment.
   b. Technical guidance for water reuse, specifically addressing:
      i. Uses of reclaimed water.
      ii. Health and environment risk analysis for water reuse in agricultural irrigation and aquifer recharge.
      iii. Disinfection and filtration techniques.
      iv. Classes of reclaimed water quality and allowed agricultural use and irrigation method.
      v. Optimal treatment stages/technologies necessary to reuse wastewater.
      vi. Minimum quality requirements.
   c. Provision of support to Countries in technology transfer and related capacity building.

9. In preparation for the development of this Regional Plan, the following assessments may be undertaken:
   a. Assessment of level of collection and treatment of agglomerations of more than 2,000 inhabitants in the Mediterranean coastal zone as defined in line with the ICZM Protocol or using River Basin Management approach, including wastewater characterization;
   b. Assessment of the state of play of existing WWTP in agglomerations of more than 2,000 inhabitants in the Mediterranean coastal zone as defined in line with the ICZM Protocol or using River Basin Management approach.

3. Possible Elements of the Regional Plan on Sewage Sludge Management

1. The scope of the Regional Plan covers "management of sewage sludge from municipal wastewater treatment plants"

2. The objective of the Regional Plan is to "ensure maximum effective use of valuable substances and energy potential from sewage sludge, while preventing harmful effects on human health and the marine environment."

3. The proposed measures may include:
   a. Prioritize management alternatives for sewage sludge with a view to minimizing landfilling and limiting it only in cases where is the following options are not feasible:
      vii. Reuse/valorization of treated sludge as fertilizer
      viii. Energy recovery (incineration)
   b. Set ELVs for the use of sewage sludge as fertilizer and soil conditioner, as well other potential uses (e.g. concrete), including pathogenic microorganisms and microplastics pollution where appropriate.
   c. Ensure that sewage sludge is treated/stabilized before using in agriculture or as a source of energy.
   d. Ensure that maximum limit values for heavy metal concentration in sludge for use in agriculture or as a source of energy are met (further to specific standards)
   e. Provide for measures addressing the whole chain of the sludge treatment, including dewatering, digestion, stabilization, microbiological disinfection, and energy recovery, taking into account the necessary stages that need to be adopted in the WWTP in order to allow the reuse of the sludge;
   f. Provide for enforcement measures, i.e. control, inspection, sanctions;
   g. Set conditions for the temporary/permanent storage for sludge and measures to prohibit their discharge to the sea

4. Support to measures' implementation:
   a. Technical guidelines for sewage sludge use in agriculture:
      i. Characteristics of sewage sludge
      ii. Characteristics of soil
      iii. Sludge treatment
      iv. Sludge application
      v. Effects of sludge on soils and crops
      vi. Planting, grazing and harvesting constraints
      vii. Environmental protection
   b. Guidance and standards on the application of BAT and BEP on municipal wastewater treatment (including sewage sludge management) that support reduced cost of energy and water saving, specifically addressing: [6]
      i. Energy performance.
      ii. Water consumption.
      iii. Wastewater treatment efficiencies.
      iv. Treatment efficiency of flue gas treatment.

5. In preparation for the development of this Regional Plan, an assessment may be undertaken of the state of play of existing sludge treatment, reuse and disposal facilities in municipal wastewater treatment facilities around the Mediterranean.

[6] *Common guidance document recommended for use in the preparation of the Regional Plan for Municipal Wastewater Treatment Plants*

4. Possible Elements of the Regional Plan on the prevention and reduction of pollutant releases in the Mediterranean Sea from agriculture

1. The scope of the Regional Plan covers the agricultural sector in the coastal regions or hydrologic basins discharging pollutants into the Mediterranean Sea.

2. The objective of the Regional Plan is to "minimize water pollution caused or induced by the agricultural sector, and promote various aspects related to circular economy, resource efficiency and nature-based solutions."

3. The proposed measures may include:
    a. Minimize/ prevent agricultural runoff, which can include the following measures:
        i. Apply irrigation BAT (drip irrigation, humidity sensors);
        ii. Apply buffer zones and irrigation depending on cultivation patterns, land surface, geomorphology and climate (to minimize runoff impacts on water bodies). Transition to appropriate irrigation systems in economically irrigable areas, especially for sensitive areas and hotspots.
        iii. Identify waters which could be affected or have been affected by pollution (vulnerable zones) in accordance with set criteria.
        iv. Establish and implement action programmes in order to reduce water pollution from nitrogen compounds in vulnerable zones including:
            1. Periods when the land application of certain types of fertilizer is prohibited;
            2. The capacity of storage vessels for livestock manure;
            3. Limitation of the land application of fertilizers, consistent with good agricultural practice and taking into account the characteristics of the vulnerable zone concerned;
            4. Transition to appropriate irrigation systems in economically irrigable areas.

    b. Fertilizers management, which may include the following measures:
        i. Set standards on the use of fertilizers depending on type of plants, nitrogen needs, soil properties, quality and quantity of irrigation water, and climate conditions;
        ii. Set restrictions to the use of fertilizers near water bodies, or seasonal bans
        iii. Set requirements for proper storage of fertilizers (addressing distance from water bodies, packaging, waterproof storages, etc.);
        iv. Enforce the maintenance of records of purchases by farmers of fertilizers;
        v. Apply catch crops/ nitrogen fixing crops under specific conditions; and
        vi. Apply organic farming under specific conditions.

    c. Pesticides management, which may include the following measures:
        i. Provide training to farmers on pesticides labelling instructions and when/ how to apply pesticides in line with good agricultural practices (GAP);
            a) Relevant legislation regarding pesticides and their use;
            b) Risks of illegal plant protection products;
            c) The hazards and risks associated with pesticides;
            d) Integrated pest management strategies and techniques;
            e) Procedures for preparing pesticide application equipment for work and its maintenance;
            f) Safe working practices for storing, handling and mixing pesticides, and disposing of empty packaging;
            g) Record keeping of any use of pesticides;
            h) Special care in vulnerable zones;
            i) Emergency action in case of accidental spillage.

ii. Provide for marketing and sale of pesticides to professional organizations (conditional to training/ certification);
iii. Restrict the use of pesticides during rainfall;
iv. Set targets and timetables for reduction of pesticides use;
v. Conduct regular inspection of farmers' equipment;
vi. Ban/restrict [7] the use of pesticides through aircrafts, with strictly regulated exemptions;
vii. Monitor drinking water sources, protected areas and public spaces close to agricultural areas where pesticides are applied;
viii. Apply integrated pest management.
ix. Ensure that appropriate monitoring programmes related to the above measures are established in line with criteria to be set for that purpose.

d. Manure management (livestock breeding), which may include the following measures:
i. Apply adequate management techniques for cattle breeding, digestion and manure reuse;
ii. Apply BAT for large farms including anaerobic digestion and bio-energy production, followed by separation of liquid and solid fractions;
iii. Apply aerobic digestion for liquids, followed by evaporation lagoons or usage for soil improvement.
iv. Take the necessary measures to provide that livestock breeding installations are operated in accordance with the Best Available Techniques (BAT), e.g. through permits for those livestock breeding installations exceeding certain threshold capacities.

4. BAT and BEP for the agriculture sector (farm and land management):
a) BEP for product groups and farm types.
b) Sustainable management: Land, energy, water and waste.
c) Soil quality management.
d) Nutrient management.
e) Soil preparation and crop planning.
f) Grass and grazing management.
g) Animal husbandry.
h) Manure management: anaerobic digestion and bio-energy production
i) BAT and BEP for irrigation practices in arid regions.
j) Crop protection products.
k) Protected horticulture (greenhouses).

5. In preparation for the development of this Regional Plan, an assessment may be undertaken of the state of play of agricultural practices and discharged pollutants reaching the Mediterranean marine environment.

[7] Further assessment is required to decide during the negotiation process on this measure

5. Possible Elements of the Regional Plan on Aquaculture Management

1. The scope of the Regional Plan covers aquaculture activities in the Mediterranean.
2. The objective of the Regional Plan is to "minimize water pollution caused or induced by aquaculture sector."
3. The proposed measures may include:
    a. Minimization of impacts from onshore (including hatcheries) aquaculture, which may include the following measures:
        i. Alternative efficient feeding practices (this shall be based on a study in the field)
        ii. Provide for installation of settlement tanks (to collect suspended soils) and filters (drum filters); and
        iii. Optimize discharge systems, including:
            - Development of submarine pipeline systems.
            - Definition of appropriate sea depth.
            - Installment of diffusers at the end of the pipelines and pumps.
            - Improved abatement measures for the collection of oily residue.
        iv. Establish monitoring programmes based on local oceanographic conditions both in discharge areas and on the end of the settlement tank taking into account acceptable nutrients ELVs[8].
        v. Establish recirculating closed systems (allowing for cleaning and recycling of the same water).
        vi. Plant blue catch crops (e.g. mussels).
        vii. Reuse/recycle of water for irrigation purposes (possible treatment requirement).
        viii. Establish treatment of nutrients from effluents
        ix. Adopt all measures necessary to ensure that, before development consent is given, aquaculture projects likely to have significant effects on the environment by virtue, inter alia, of their nature, size or location are made subject to environmental impact assessment.
        x. Ensure that the competent authority grants a permit for aquaculture installations and takes the necessary measures to provide that installations are operated in accordance with the following principles:
            a) all the appropriate preventive measures are taken against pollution
            b) the best available techniques (BAT) are applied
            c) no significant pollution is caused affecting the maintenance or achievement of GES.

    b. Minimize impacts from offshore aquaculture, which may include the following measures:
        i. Establish criteria to be met in the selection of aquaculture site, including carrying capacity, appropriate species, and pollution baseline. and Environmental Impact Assessment (where applicable),
        ii. Apply Marine Spatial Planning for the identification of the appropriate zones for establishment of aquaculture plants;
        iii. Implement permitting schemes setting operational conditions;
        iv. Alternative efficient feeding practices (this shall be based on a study in the field)
        v. Control discharges through monitoring based on local oceanographic conditions
            a) Sediments: phosphorus, carbon and nitrogen content, redox potential

[8] The Meeting recommended taking into account the reporting mechanism: IMAP NBB, etc.

b) Water column: oxygen, nutrients (inorganic nitrogen and phosphorus, total nitrogen and phosphorus), dissolved and particulate organic matter, chlorophyll a, TRIX index, etc.

vi. Establish Multitrophic Aquaculture Systems;
vii. Control escapes for prevention of harmful aquatic organisms, including Invasive Alien Species and pathogens introduction;
viii. Use new environmentally friendly antifouling agents (TBT-free, preferably also copper free);
ix. Ensure regular movement of cages in aquaculture sites to avoid development of anoxic zones if needed; and
x. Promote alternative disposal/ re-use of offal.
xi. Ensure that appropriate monitoring programmes are established.

4. Guidance on BAT and BEP for the aquaculture sector (onshore and offshore).
   a. Benthic impacts and nutrients: efficient feeding practices, settlement tanks (to collect suspended soils) and filters (drum filters), regular movement of cages, optimization of discharge systems, blue catch crops (e.g. mussels);
   b. Water: recirculating closed systems and reuse/recycle of water for irrigation purposes in onshore aquaculture;
   c. Disease and parasites;
   d. Chemical discharges: use of environmentally benign antifouling agents;
   e. Escapees and prevention of Invasive Alien Species (IAS);
   f. Physical impacts, disturbance and predator control;
   g. Alternative disposal/ re-use of offal.

5. In preparation for the development of this Regional Plan, an assessment may be undertaken of the state of play of aquaculture practices in the Mediterranean and their impact on the marine environment. If decided to be undertaken, this assessment should build on existing work undertaken by the Contracting Parties and relevant Regional Organizations.

6. Possible Elements of the Regional Plan on Urban Storm Water Management

1. The scope of the Regional Plan covers "management of urban storm water in urban agglomerations in the coastal areas."

2. The objective of the Regional Plan is to "minimize input of suspended solids, contaminants and marine litter into receiving waters due to storm water."

3. The proposed measures may include:
    a) Develop storm water management plans, including risk management also including information on the location of land-based activities, e.g. industrial installations and civil infrastructures such as municipal wastewater treatment plants and landfills, potentially discharging contaminated run-off or wastewater to waterways so as to minimize their discharges and to protect the quality of ground and surface water including rivers, streams, wetlands, estuaries and the marine environment;
    b) Establish separate collection systems for run-off water under specific conditions;
    c) In case of combined collections system, install storm water treatment tanks which include decantation and filtering;
    d) Promote Sustainable Urban Drainage Systems (SUDS) such as green infrastructure for small medium cities, such as wetlands, retention ponds, recharge of aquifers, etc.;
    e) Incorporate management schemes of storm water run-off into the integrated coastal zone management (ICZM) plans;
    f) Set technical standards for drainage of storm water to outlets on the beach; and
    g) Ensure that storm water systems are kept clean and functioning correctly to prevent flooding during rain events.
4. Development of a Manual/Guidance on Stormwater Management including:
    a) Integrating Stormwater Management;
    b) Stormwater management plans;
    c) Recommended structural controls: storage, use, infiltration; and
    d) Recommended non-structural best management practices: maintenance, awareness.

5. In preparation for the development of this Regional Plan, various studies and assessments may be undertaken at national level to:
    a) Evaluate the locations of effluent points of storm water sewers along the coastline; and
    b) Prepare drainage features plans to illustrate the broad geographic pattern of key drainage features.

7. Possible Elements of the Regional Plan on Marine Litter (upgraded)

1. The ongoing evaluation of the status of implementation of the existing Regional Plan on Marine Litter Management in the Mediterranean (Decision IG.21/7), adopted by COP 18 (Istanbul, Turkey, 2013) is expected to provide substantive evidence that should be taken into account while defining the need for additional measures, as described above.

2. The main objectives of the Regional Plan are to:

a) Prevent and reduce to the minimum marine litter pollution in the Mediterranean and its impact on ecosystem services, habitats, species in particular the endangered species, public health and safety;
b) Enhance knowledge on marine litter;
c) Achieve that the management of marine litter in the Mediterranean is performed in accordance with accepted international standards and approaches as well as those of relevant regional organizations and as appropriate in harmony with programmes and measures applied in other seas; and
d) Facilitate and promote sustainable production and consumption patterns, in particular, circular economy models which consider the whole lifecycle of products, increase resource efficiency, facilitate recycling and avoid waste release into the environment.[9]

3. Principle related to the Sustainable Consumption and Production of the Regional Plan to consider the following:

> Sustainable Consumption and Production by virtue of which current unsustainable patterns of consumption and production must be transformed to sustainable ones that decouple human development from environmental degradation, **with particular attention to circular economy models.[10]**

4. The proposed measures may include:
a) Phase out single use plastic items most found in the Region;
b) Set targets for plastic recycling and other waste items to avoid ending-up as marine litter in the marine and coastal environment;
c) Introduce environmental taxes, e.g. plastic tax on virgin plastic, extended producer responsibility schemes, refund schemes;
d) Promote new technologies for the removal of marine litter from the marine and coastal environment in an environmentally sound way, particularly the retrieval, recycling and reuse of ghost gears;
e) Strengthen sanctions in case of non-compliance with the respective national regulations;
f) Include in the SPAMIs measures to combat marine litter and related monitoring; [11]
g) Reduce packaging;
h) Promote voluntary agreements with industry at national and regional levels in line with international practices and standards;
i) Strengthen measures related to SCP programmes to raise awareness and enhance education;
j) Introduce a concrete measure on microplastics reduction, e.g.
    i. Promote research and identification of the different sources of primary and secondary microplastics (industrial pellets and micro litter particles related to personal care products, fibers from clothing,).

[9] This proposal further strengthens circular economy dimension of the objectives of the Regional Plan
[10] This proposal strengthens the circular economy dimension at the level of the principles of the Regional Plan
[11] Any measure related to SPAMI management and monitoring should be consulted with and reviewed by the National Focal Points of SPA/RAC

ii. [Restrict/][12]Ban on microplastics addition to certain products, e.g. cosmetics and promoting the use by industries of environmentally friendly alternatives.
iii. Assess if primary and secondary microplastics are covered or not by legislation, and act, if appropriate, to influence the legal framework, or identify other necessary measures such as the promotion of voluntary commitment (e.g. Assess potential of certification schemes)

k) Set targets for plastic waste collection;
l) Encourage and promote the replacement of plastics in accordance with national waste management systems, i.e. taking into consideration availability of compositing facilities in the case of substituting with biodegradable plastics';
m) Investigate and promote with appropriate industries the use of Best Available Techniques (BAT) and Best Environmental Practice (BEP) to develop sustainable and cost-effective solutions to reduce and prevent sewage and storm water related waste and entering the marine environment, including micro particles as well as improving current management in waste water treatment plants.
n) Include measures addressing and accelerating safer material innovation and less toxic plastic additives, promoting industry collaboration and increasing access to information on chemical composition of plastic articles.
o) Explore methodologies to monitor and assess riverine inputs of marine litter in the Mediterranean and identify specific relevant measures upstream in order to minimize these inputs.
p) Consider the application of regulatory measures including incentives and circular economy approaches to combat/ the existing informal/illegal recycling networks around the basin and promote their transformation to formal/legal waste management schemes.

[12] Additional assessment is required to define the respective measure

Way forward

1. The process of development, negotiation and adoption may take two to three years for each of the six Regional Plans, although aggregated in terms of substance; and some may even require a specific thematic assessment prior to elaboration. In this respect, several approaches may be followed to set priorities in view of their timely and differentiated development and negotiations.

2. The time required for the implementation of the technical measures at national level is a crucial consideration and key factor taking into account that the implementation of some measures may require important investments and long processes for both public and private sectors.

3. Based on the conclusions of the present Regional Meeting of Experts, the Secretariat will continue the work to define and finalize the main elements of the technical measures and related timetable for their implementation. It is safe to anticipate an overall assessment, to the extent possible, of the potential impacts (GES and SDG targets related) of their implementation in a time frame extending between 2024 and 2030. This maybe an approach for setting priorities in terms of development and negotiation timing for each Regional Plan.

4. There are several existing Regional Guidelines related to the management of obsolete chemicals, hazardous waste and environmental management of industrial sectors already adopted by the Contracting Parties. A possible approach would be to start developing the Regional Plans that address issues not yet covered by the existing Guidelines already adopted by the Contracting Parties.

5. Another approach would be to start upgrading the existing Regional Plans with the new elements/measures and/or to transform, modify, and upgrade the provisions of the existing Regional Guidelines to fulfill the requirements of the relevant Regional Plans.

6. The Table below proposes possible scenarios regarding the time frame for the development, negotiation and adoption of the Regional Plans for a first preliminary exchange of views with the Contracting Parties:

Regional Plan	**2018- 2019 COP 21**	**2020-2021 COP 22**	**2022-2023 COP 23**	**2024-2025 COP 24**
Municipal Wastewater Treatment	Develop the main elements of the Regional Plan. Mandate to upgrade the BOD Regional Plan.	Upgraded Regional Plan developed and submitted to COP 22.		
Sewage Sludge Management	Develop the main elements of the Regional Plan. Mandate to develop the new Regional Plan. Mandate to develop technical annexes (2020 - 2023).	Regional Plan developed and submitted to COP 22 (without technical annexes). Work ongoing to finalize the technical annexes.	Technical annexes of the Regional Plan finalized and submitted to COP 23.	
Agriculture Nutrients Management	Develop the main elements of the Regional Plan. Mandate to undertake an Overall Assessment.	Mandate to develop the Regional Plan/Guidelines.	Regional Plan/Guidelines developed and submitted to COP 23	

Regional Plan	2018- 2019 COP 21	2020-2021 COP 22	2022-2023 COP 23	2024-2025 COP 24
Aquaculture Nutrients Management	Develop the main elements of the Regional Plan. Overall Assessment and mandate to develop technical standards for Aquaculture.	Mandate to develop the Regional Plan. Work ongoing on technical standards.	Regional Plan and its technical standards developed and submitted to COP 23.	
Urban Storm Water Management	Develop the main elements of the Regional Plan. Sharing of best practices ongoing. State of play report and exchange of best practices; capacity building activities.	Mandate to develop the Regional Plan.	Regional Plan developed and submitted to COP 23.	
Marine Litter (upgraded)	Preparations of relevant Guidelines as provided for in the existing Marine Litter Regional Plan ongoing. Mandate to upgrade the Marine Litter Regional Plan or to add technical annexes to incorporate the new elements.	Upgraded Marine Litter Regional Plan or technical annexes to the existing Regional Plan submitted to COP 22.		

Appendix II
Data Standards and Data Dictionaries for Common Indicators related to Pollution and Marine Litter

Table of Contents

List of Abbreviations / Acronyms

CI	Common Indicator
CORMON	Correspondence Group on Monitoring
DDs	Data Dictionaries
DSs	Data Standards
EcAp	Ecosystem Approach
EEA	European Environmental Agency
EO	Ecological Objective
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
MED QSR	Mediterranean Quality Status Report
MSFD	Marine Strategy Framework Directive
PoW	Programme of Work
QA	Quality Assurance
QC	Quality Control

1. DATA STANDARDS AND DATA DICTIONARIES FOR IMAP COMMON INDICATORS 13, 14, 17, 21, 22 AND 23

1. The Data Standards and Data Dictionaries (DSs and DDs) are presented in tabular forms in the next sections and should guide the data providers into filling the future Metadata Templates, the formats to be developed in accordance with this basic information on data reporting. The Data Standards (DDs for Stations and DDs for characteristic parameters and the List of reference under each Common Indicator) are taken from related Excel files prepared by INFO/RAC, in close consultations with MED POL. Further extended instructions and in-depth details will be provided to facilitate the submission of the datasets by the Contracting Parties when the IMAP (Pilot) Info System will be launched, and related Metadata Templates will be operational.

2. The current MED POL Metadata Templates (excel spreadsheet formats), were designed for a relational database (SQL) containing metadata (e.g. station, year, coordinates, country, dates, QA/QC, etc.) associated to the data (namely, parameter) to be measured and reported (i.e. Chlorophyll-a, nutrients, contaminants, etc.). To this regard, the alignment of new IMAP Metadata Templates for the IMAP (Pilot) Info System with the current MED POL Metadata Template formats, will be provided through Data Standards and Data Dictionaries presented in this document. Even more, new IMAP Metadata Templates will offer enlarged possibilities for the Contracting Parties that are measuring additional parameters to report those to the IMAP (Pilot) Info System, as well.

3. Specifically, regarding Common Indicators 13 and 14, as a variety of methods (e.g. Chlorophyll *a* concentration - spectrophotometer, fluorometer, HPLC, in situ.) used for measurements with different underlying variability exists, an alignment of the initial proposal of Data Dictionaries by INFO/RAC was proposed. A coding list for the used Analytical Methods corresponding to a combination of analyte, matrix and method in the general case is suggested. This list was obtained through a harvesting data tool from the SeaDataNet Project, which reference vocabulary is currently maintained by the BODC (British Oceanographic Data Center). The list is provided in an Excel file (List_P01) presented at the IMAP Best Practices Meeting.

4. The list of reference for the Common Indicator 17 on chemicals is also in use by the European Environmental Agency (EEA, WISE-Marine) and includes either the CAS numbers (Chemical Abstract Service reference number) or the EEA reference number (for particular EEA requirements). The IMAP Guidance Factsheets related to Common Indicator 17 (EO9) contain the agreed chemical compounds and those can be found in the EEA list (with its CAS number). Similarly, for eutrophication (EO 5) there is a list of parameters (as Data Dictionaries) aligned with the parameters for Common Indicators 13 and 14 provided in Guidance Factsheets for respective Common Indicators. The mandatory reporting is foreseen only for the biota and sediment matrices as agreed under IMAP Guidance Factsheets and for specific compounds under each Common Indicator, despite any other substance and matrix can be reported by applying then harmonized CAS number.

5. For Common Indicator 17, a list of biota matrices (e.g. species) is the major difference with the reference list for species from MED POL. However, this MED POL`s list has also been checked against the EEA reference list. Finally, the List _Dictionary P01 (in accordance with EMODNET data policy) is also provided to include, if available, the pertinent code corresponding to a combination of analyte, matrix and method in the general case. This list is created similarly as for Common Indicators 13 and 14. However, this requirement is on a voluntary basis.

6. In line with the Guidance Fact Sheet for IMAP Common Indicator 21, related DDs establish reporting of required data i.e. CFU (Intestinal enterococci per 100 mL) / Number of Colony-formation-unit per analysis.

8. For Common Indicators 22 and 23, the proposed DDs reflect the elements included in the Metadata Reporting Templates to facilitate the population of corresponding data in the IMAP (Pilot) Info System. For beach marine litter (i.e. Common Indicator 22), the DDs are structured based on the

approved Beach ID Form and Beach Survey Form providing information and metadata on the beach profile, link to the potential sources, recorded marine litter items, effect to biota etc. For seafloor marine litter, the DDs include a number of information related to the vessel/trawling characteristics as well as the list of marine litter items. For floating microplastics, the DDs provide information about the methodological approach for monitoring floating microplastics (i.e. manta net), and the list and types of microplastics that may be found in the marine environment.

ECOLOGICAL OBJECTIVE 5

9. In close consultations with MED POL, INFO/RAC developed the Data Standards and Data Dictionaries for Common Indicators 13 and 14 for EO5 within the Pollution cluster of the IMAP, as explained above. Below are the characteristics of the proposed Data Dictionaries which will create the basis for new Metadata templates structure for reporting on these Common Indicators.

1.1 Common Indicators 13 and 14

Table 1: Data Dictionaries (stations information) for CI13 and CI14.

Field	Description	List of values
Country Code	Enter member country code as ISO two digits, for example "IT" for Italy.	
National Station ID	Station code	
National Station Name	Station name	
Region	Administrative first level subdivision to which the station belongs to	
Latitude	Latitude of the station in the WGS84 decimal degrees reference system with at least 5 digits (xx.xxxxx).	
Longitude	Longitude of the station in the WGS84 decimal degrees reference system with at least 5 digits (xx.xxxxx). Use positive values without '+' before numbers (for ex. 13.98078) for coordinates east of the of the Greenwich Meridian (0°) and negative values with '-' for coordinates west of the Greenwich Meridian (0°) (for ex. -2.6893).	
Closest Coast	Station distance from the coast in km	
TCM Matrix	Measure of seawater at the station	W = Sea water column
Sea Depth	Sea depth in meters	
Area Typology	Typology of the monitored area enter one of the values in the list	R = Reference C = Coastal HS = Hot spot O = Other
Pressure Type	If the monitoring station id dedicated to monitor pressure, indicate the typology of pressure monitored, enter one of the values in the list	AP = Aquaculture plant RP = River Plume UWWTP = Urban Waste Water Treatment Plant IP = Industrial Plant O = Others
Remarks		

*non-mandatory

Table 2: Data Dictionaries (physicochemical information) for EO5 Common Indicator 13 and 14.

Field	Description	List of values
Country Code	Enter member country code as ISO two digits, for example "IT" for Italy.	
National Station ID	Station code	
Year	Year of sampling in AAAA format	
Month	Month of sampling in 1-12 format	
Day	Day of sampling in 1-31 format	
Time	Hour-minutes-seconds of sampling in HH:MM:SS format	
Sample ID	Sample Code if multiple replies are made with the same value as Year, Month, Day and Time	
Determin_Nutrients	Name of the physico-chemical parameter or of the nutrient, enter one of the values in the list in the "List_PhysicoChemical"	
Nutrients Seawater_unit	Unit of measurement of the physiochemical parameter or nutrient, enter one of the values in the list	% = Oxygen saturation m = Secchi disks depth pH = pH °C = Temperature µg/L = Chlorophyll *a* µmol/L = Ammonium, Nitrate, Nitrite, Total Nitrogen µmol/L = Dissolved Oxygen µmol/L = Orthophosphate, Total Phosphorus µmol/L= Orthosilicate µS/cm = Conductivity
LOD_LOQ_Flag	Enter the value LOQ in case the concentration value is less than the quantification limit or the value LOD in case the concentration value is less than the detection limit. In the other cases, leave the field empty.	"LOQ = Concentration value below the quantification limit LOD = Concentration value below detection limit
Concentration	Concentration measure	
Sample Depth	Sampling depth in meters	
Analytical Method	Analytical method List of analytical methods, in line with IMAP, will be completed. Suggestion to use code from List_P01 provided in an Excel file	
Remarks		

Table 3: List of physicochemical parameters under IMAP Guidance Factsheets EO5 and provided as mandatory in Data Dictionaries for Common Indicators 13 and 14.

Field	Description	Remarks
Temperature (water)	Water Temperature (°C)	
Salinity	Salinity (psu)	
Conductivity	Conductivity (µS/cm)	
Dissolved oxygen	Dissolved Oxygen (µmol/L)	
Oxygen saturation	Dissolved Oxygen - saturation percentage (%)	
pH	pH	
Chlorophyll *a*	Chlorophyll-*a* (µg/L)	
Secchi disk depth	Secchi disk (m)	
Nitrate	Nitrate (µmol/L)	
Nitrite	Nitrite (µmol/L)	
Ammonium	Ammonium (µmol/L)	
Total phosphorus	Total Phosphorus (µmol/l)	
Orthophosphate	Orthophosphate (µmol/L)	
Total nitrogen	Total Nitrogen (µmol/L)	
Orthosilicate	Reactive silicate (µmol/L)	

ECOLOGICAL OBJECTIVE 9

10. The INFO/RAC in close consultations with MED POL has developed the Data Standards and Data Dictionaries for Common Indicator 17 for EO9 within the Pollution cluster of the IMAP, as explained above. Below the characteristics of the proposed Data Dictionaries are shown which will create the basis for new Metadata templates structure for the reporting on this Common Indicator. In addition, Data Dictionaries for Common Indicator 21 are shown.

1.2 Common Indicator 17

Table 4: Data Dictionaries (Stations Information) for Common Indicator 17 within EO9.

Field	Description	List of values
Country Code	Enter member country code as ISO two digits, for example "IT" for Italy.	
National Station ID	Sation code	
National Station Name	Station name	
*Region	Adminstrative subdivision after country which the station belongs to (according to the country subdivision)	
Latitude	Latitude of the station in the WGS84 decimal degrees reference system with at least 5 digits (xx.xxxxx).	
Longitude	Longiitude of the station in the WGS84 decimal degrees reference system with at least 5 digits (xx.xxxxx). Use positive values without '+' before numbers (for ex. 13.98078) for coordinates east of the of the Greenwich Meridian (0°) and negative values with '-' for	

	coordinates west of the Greenwich Meridian (0°) (for ex. -2.6893).	
*Closest Coast	Station distance from the coast in km	
TCM Matrix	Environmental matrix measured in the station, enter one value of the list	B = Biota BS = Biota and sediment BSW = Biota, sediment and sea water column BW = Biota and sea water column S = Sediment SW = Sediment and sea water column W = Sea water column
Sea Depth	Sea depth in meters	
Area Tipology	Indicate the typology of the monitored area, enter one of the values in the list	R = Reference C = Coastal HS = Hot spot O = Others
PressureType	If the monitoring station id dedicated to monitor pressure, indicate the typology of pressure monitored, enter one of the values in the list	IP = Industrial Plants MT = Maritime Traffic

*non-mandatory

Table 5: Data Dictionaries (contaminants information)

Field	Description	List of values
Country Code	Enter member country code as ISO two digits, for example "IT" for Italy.	
National Station ID	Station code	
Year	Year of sampling in YYYY format	
Month	Month of sampling in 1-12 format	
Day	Day of sampling in 1-31 format	
Time	Hours-minutes-seconds of sampling in HH:MM:SS format	
Sample ID	Sample Code if multiple replies are made with the same value as Year, Month, Day and Time	
Matrix	Sample matrix, enter one value of the list	W = Water S = Sediments B = Biota
Determin Haz Subs Name	Name of the contaminant, enter one value of the column 'Label' of the list 'List contaminants'	
Determin Haz Subs ID	ID of the contaminant, enter one value of the column 'ID_Contaminant' of the list 'List_contaminants'	

CAS Number	CAS number of contaminant, enter one value of the column CAS Number of list 'List_contaminants'	
Haz Subs_unit	Unit of measurement for the contaminant, enter one value of the list	µg/l = water matrix µg/kg = sediments and biota matrices
Haz Subs_WD	For sediment or biota, specify dry or wet weight, enter one value of the list	WW = Wet weight DW = Dry weight
LOD_LOQ_Flag	Enter the value '<' in case the concentration value is less than the quantification limit or the value '[' in case the concentration value is less than the detection limit. In the other cases, leave the field empty.	<= Concentration value below the quantification limit [= Concentration value below detection limit
Concentration	Concentration value. In the case of analytes sums in which at least one is not less than the LOQ, use the Concentration field with the sum of solely quantifiable analytes (i.e. not lower than the LOQ). In case the concentration value of the single analyte or all the analytes constituent the sum is less than the LOQ, the LOD_LOQ_Flag field and the Concentration field should be used as follows: in the case of a single analyte enter the value of LOQ/2; in the case of analytical additions, enter the zero value taking into account that the individual substances below the quantification limit do not contribute to the value of the sum.	
Sample Depth	Sampling depth in meters	
Salinity	For water matrix: Salinity (psu)	
Temperature	For water matrix: Temperature (°C)	
Dissolved oxygen	For water matrix: dissolved oxygen (µmol O2/l)	
*Grain Type	For sediment matrix: tipology of sediment, enter one value of the list	CS = Coarse Sand FS = Fine Sand G = Gravel M = Mud MS = Middle Sand
Fraction	Per sediment matrix: maximum size of sediment particles in µm	

Sediment Depth	For the sediment matrix: Depth of the collected sample of sediment, measured as a range, in centimeters, starting at the seafloor surface. The range would start by zero if the top of the sediment sample is the seafloor surface. For ex. insert '0-10' if 10 cm of sediments have been sampled starting from seafloor surface or insert '5-15' if 10 cm of sediments have been sampled starting from 5 cm from the seafloor surface.	
*TC	For sediment matrix: Total carbon content in % unit	
*TOC	For sediment matrix: Total organic carbon in % unit	
*TIC	For sediment matrix: Total inorganic carbon in % unit	
*TN	For sediment matrix: Total nitrogen content in % unit	
Species ID	For the biota matrix: monitored species. Enter one value of the column 'ID_Species' of the list 'List_species'	
Species Name	For the biota matrix: monitored species. Enter one value of the column 'Label' of the list 'List_species'	
Specimen_lenght	For the biota matrix: length of specimen in cm. In case of pooling, indicate mean length	
Specimen_length_sd	For the biota matrix: Standard deviation of average length of specimens in a pool in cm.	
Specimen_weight	For the biota matrix: weight of specimen in g. In case of pooling, indicate mean weight.	
Specimen_weight_sd	For the biota matrix: Standard deviation of average weight of specimens in a pool in g.	
Pooling	In case of pooling, describe the content of pooling as number of specimens and other methodological issues	
Extractable Organic Matter	Extractable Organic Matter in mg/g	

Tissue	For biota matrix: tissue element of the monitored species, enter one of the list values	**BL** = Fluids - Blood. Includes haemolymph, erythrocytes, haemocytes, serum (blood component without cells and clotting factors) and plasma (serum including clotting factors) **EG** = Eggs. Includes bird eggs and fish eggs (roe). Use the remarks field to provide additional information, if necessary. **FA** = Tissues - Fat. Any type of adipose tissue or organ. Includes the form code BB for "Blubber". GO = Organs - Gonads. Includes female gonads (ovaries) and male gonads (testes). Use the remarks field to provide additional information, if necessary. **KI** = Organs - Kidney. Use the remarks field to provide additional information, if necessary. **LI** = Organs - Liver. Includes hepatopancreas. Use the remarks field to provide additional information, if necessary. **MU** = Tissues - Muscle. Any type of muscle tissue or organ. Includes the former code TM for "Tail muscle". **OT** = Other. Use the remarks field to provide additional information, if necessary. **ST** = Tissues - Soft tissue. Includes any body tissue except mineralized tissue (hard tissue)
Fat Content	Fat content as percentage of total wet matter	
Analytical Method	Analytical method	
LOQ	Limit of quantification	
EmodnetCodeP01	Code of the parameter/ EMODNet method according to the dictionary P01,enter one value of the list "List_dictionary_P01"	
Remarks	Notes	

*non-mandatory under IMAP Guidance Factsheets

Table 6: Example of the List of physicochemical parameters under IMAP Guidance Factsheets EO9, that are also available in the EEA reference list of contaminants (Code list), showing compounds provided as mandatory in the Data Dictionaries for Common Indicator 17 (PAHs not shown). The full list is provided with related Excel files presented at the IMAP Best Practices Meeting.

ID_Contaminant	Label	CAS Number	Matrix	Mandatory	Additional
CAS_309-00-2	Aldrin	309-00-2	Sediments	Y	
CAS_7429-90-5	Aluminium and its compounds	7429-90-5	Sediments	Y	
CAS_7440-43-9	Cadmium and its compounds	7440-43-9	Biota, Sediments	Y	
CAS_60-57-1	Dieldrin	60-57-1	Sediments	Y	
CAS_58-89-9	Gamma-HCH (Lindane)	58-89-9	Biota, Sediments	Y	
CAS_118-74-1	Hexachlorobenzene	118-74-1	Biota, Sediments	Y	
CAS_7439-92-1	Lead and its compounds	7439-92-1	Biota, Sediments	Y	
CAS_7439-97-6	Mercury and its compounds	7439-97-6	Biota, Sediments	Y	
CAS_37680-73-2	PCB 101 2,2',4,5,5'-pentachlorobiphenyl)	37680-73-2	Biota, Sediments	Y	
CAS_32598-14-4	PCB 105 (2,3,3',4,4'-pentachlorobiphenyl)	32598-14-4	Biota, Sediments	Y	
CAS_31508-00-6	PCB 118 (2,3',4,4',5-pentachlorobiphenyl)	31508-00-6	Biota, Sediments	Y	
CAS_35065-28-2	PCB 138 (2,2',3,4,4',5'-hexachlorobiphenyl)	35065-28-2	Biota, Sediments	Y	
CAS_35065-27-1	PCB 153 (2,2',4,4',5,5'-hexachlorobiphenyl)	35065-27-1	Biota, Sediments	Y	
CAS_38380-08-4	PCB 156 (2,3,3',4,4',5-hexachlorobiphenyl)	38380-08-4	Biota, Sediments	Y	
CAS_35065-29-3	PCB 180 (2,2',3,4,4',5,5'-heptachlorobiphenyl)	35065-29-3	Biota, Sediments	Y	
CAS_7012-37-5	PCB 28 (2,4,4'-trichlorobiphenyl)	7012-37-5	Biota, Sediments	Y	
CAS_35693-99-3	PCB 52 (2,2',5,5'-tetrachlorobiphenyl)	35693-99-3	Biota, Sediments	Y	
EEA_33-38-5	Polychlorinated biphenyls(7 PCB: 28,52,101,118,138,153,180)		Biota, Sediments	Y	
EEA_32-03-1	Total DDT (DDT, p,p' + DDT, o,p' + DDE, p,p' + DDD, p,p')		Biota, Sediments	Y	
CAS_7440-66-6	Zinc and its compounds	7440-66-6	Biota, Sediments		Y

Table 7: Example of the List of available reference species (Code list) for Data Dictionaries and Data Standards of the IMAP (Pilot) Info System for EO9 (CI17 and CI20).

Species code	Species
2279156	Holothuria tubulosa
2357093	Hoplostethus atlanticus
2481126	Larus
2481156	Larus glaucoides
2481127	Larus hyperboreus
2409391	Lepidorhombus whiffiagonis
2419875	Leucoraja naevus
5213960	Limanda limanda
2301117	Littorina littorea
2415070	Lophius budegassa
2415075	Lophius piscatorius
2291262	Lymnaea palustris
2286995	Macoma balthica
5214420	Mallotus villosus
2415822	Melanogrammus aeglefinus
2415788	Merlangius merlangus
2415643	Merluccius merluccius
2415777	Micromesistius poutassou
5214022	Microstomus kitt
5214883	Molva dypterygia
5214880	Molva molva
5220008	Monodon monoceros
4284897	Mullus barbatus
7791733	Mya arenaria
7865139	Mya truncata
2333785	Myoxocephalus scorpius
8288896	Mytilus edulis
2285683	Mytilus galloprovincialis
2303019	Nassarius reticulatus
2226962	Nephrops norvegicus
5193449	Nucella lapillus
2286060	Ostrea edulis

1.3 Common Indicator 21

Table 8: Data Dictionaries (stations information)

Field	Description	List of values
Country Code	Enter member country code as ISO two digits, for example "IT" for Italy.	
National StationID	Station code	
National Station Name	Station name	
*Region	Administrative subdivision after country which the station belongs to	
Latitude	Latitude of the station in the WGS84 decimal degrees reference system with at least 5 digits (xx.xxxxx).	
Longitude	Longitude of the station in the WGS84 decimal degrees reference system with at least 5 digits (xx.xxxxx). Use positive values without '+' before numbers (for ex. 13.98078) for coordinates east of the of the Greenwich Meridian (0°) and negative values with '-' for coordinates west of the Greenwich Meridian (0°) (for ex. -2.6893).	
*Closest Coast	Station distance from the coast in km	
Matrix	Environmental matrix measured in the station, enter one value of the list	W = Water column
Beach name	Name of the beach or coastal area	
Sea Depth	Sea depth in meters	
Mixing	Mixing property of the water column at the station point, enter one of the values in the list	FM = Fully mixed PM = Partially mixed VS = Vertically stratified

*non-mandatory

Table 9: Data Dictionaries for Microbiological parameters.

CFU (Intestinal Enterococci per 100 mL)	Number Colony-Formation-Unit per analysis	

DATA STANDARDS AND DATA DICTIONARIES FOR IMAP EO10 COMMON INDICATORS 22 AND 23

11. The characteristics of the proposed DSs and DDs are hereunder presented which will create a basis for new Metadata templates structure for the reporting on the two IMAP Common Indicators for Marine Litter.

1.4 IMAP EO10 Common Indicator 22

12. For IMAP EO10 Common Indicator 22, the following Tables 10 to 12 are proposed. Table 10 is aimed to be completed only at the beginning of the program, when the station (i.e. the selected beach) is incorporated and simultaneously with the first survey data. Table 10 should be renewed once every year, or if/when a new development is altering the beach characteristics. In contrast, Tables 11 and 12 should be filled for each individual survey.

Table 10: Data Dictionaries (Beach ID Form) for IMAP Common Indicator 22

Field	Description	List of values
Country Code	Enter country (contracting Party) code as ISO two digits, for example "IT" for Italy.	
National Station ID	Station code	
Beach National ID	Beach Code	
Beach Name	Beach Name	
Region	First level administrative subdivision to which the station belongs to	
Municipality	Indicate the township which the beach belongs to	
Beach Width	Average beach width (m)	
Beach Width Low Tide	Beach width at mean low spring tide (m)	
Beach Width High Tide	Beach width at mean high spring tide (m)	
Beach Length	Total length of the beach (m)	
Back of Beach	What kind/type exists at the back of the beach? e.g. sand dune	
Latitude Start 100m	Latitude of the starting point of 100m transect of the beach in the WGS84 decimal degrees reference system with at least 5 digits (xx.xxxxx).	
Longitude Start 100m	Longitude of the starting point of 100m transect of the beach in the WGS84 decimal degrees reference system with at least 5 digits (xx.xxxxx). Use negative values for coordinates west of the Greenwich Meridian (0°).	
Latitude End 100m	Latitude of the ending point of 100m transect of the beach in the WGS84 decimal degrees reference system with at least 5 digits (xx.xxxxx).	
Longitude End 100m	Longitude of the ending point of 100m transect of the beach in the WGS84 decimal degrees reference system with at least 5 digits (xx.xxxxx). Use negative values for coordinates west of the Greenwich Meridian (0°).	
Prevailing Currents	Prevailing currents off the beach	N = North E = East S = South W = West

Field	Description	List of values
Prevailing Winds	Prevailing winds	N = North E = East S = South W = West
Beach Orientation	When you look from the beach to the sea, what direction is the beach facing?	N = North E = East S = South W = West
Sand	Percentage of beach coverage with sand (0-100)	
Pebbles	Percentage of beach coverage with pebbles (0-100)	
Rocky Coast	Percentage of beach coverage with rocky coastline (0-100)	
Slope	Slope of the beach in percentage (0-100)	
Currents Influencer	Are there any objects in the sea (e.g. a pier) that influence the currents?	Y =Yes N = No
Currents Influencer Spec	In case Currents Influence = Y, specify which currents influencer	
Local People Use	Is it used by local people?	Y =Yes N = No
Local People Use Season	In case of Yes, enter one value of the list	S = Seasonal WY= Whole Year Round
Sun Bathing Use	Is it used by people (e.g. beach goers, tourists etc.)	Y =Yes N = No
Sun Bathing Use Season	In case of Yes, enter one value of the list	S = Seasonal WY= Whole Year Round
Fishing Use	Is the beach used for recreational fishing?	Y =Yes N = No
Fishing Use Season	In case of Yes, enter one value of the list	S = Seasonal WY= Whole Year Round
Surfing Use	Is it used for surfing?	Y =Yes N = No
Surfing Use Season	In case of Yes, enter one value of the list	S = Seasonal WY= Whole Year Round
Sailing Use	Is it used for sailing?	Y =Yes N = No
Sailing Use Season	In case of Yes, enter one value of the list	S = Seasonal WY= Whole Year Round
Other Use	Specify which other use	
Other Use Season	In case of Yes, enter one value of the list	S = Seasonal WY= Whole Year Round
Pedestrian Access	Beach accessible to pedestrians (Yes / No), enter one of the values in the list	Y = Yes N = No
Boat Access	Beach accessible by boat (Yes / No), enter one of the values in the list	Y =Yes N = No
Vehicle Access	Beach accessible by vehicle (Yes / No), enter one of the values in the list	Y =Yes N = No

Field	Description	List of values
Nearest Town close to the beach	Beach adjacent (< 5 km) to urban areas (Yes / No), enter one of the values in the list	Y = Yes N = No
Nearest Town Name close to the beach	Enter the name of the nearest town or village	
Nearest Town Location close to the beach	Describe the location of the nearest town with regards to the beach (i.e north, south, east or west)	North South East West
Nearest Town Distance close to the beach	Distance of the nearest town from the beach (km)	
Nearest Town Population close to the beach	Population of the nearest urbanized area	
Nearest Aquaculture site close to the beach	Beach adjacent (< 5 km) to aquaculture site , enter one of the values in the list	Y = Yes N = No
Nearest Aquaculture site close to the beach	Describe the location of the aquaculture site with regards to the beach (north, south, east or west)	
Nearest Aquaculture site Distance close to the beach	Distance of the aquaculture site from the beach (km)	
Developments Behind Beach	Is there any development behind the beach?	Y =Yes N = No
Developments Behind Beach Spec		
Outlets Beach	Are there food and/or drink outlets on the beach?	Y = Yes N = No
Outlets Distance	Distance of the outlets from the survey area (m)	
Outlets Year Presence	Number of months during food and drink outlets are on the beach	
Outlets Position	Position of food and drink outlets in relation to the survey area	N = North E = East S = South W = West
Shipping Lane Distance	Distance of the beach to the nearest shipping lane in km	
Shipping Lane Position	Position of the shipping lane in relation to survey area	N = North E = East S = South W = West
Traffic Density	What is the estimated traffic density: number of ships/year passing from the area of interest	
Traffic Type	Is it mainly used from which type of vessels?	Merchant ships Fishing vessels All kinds
Harbour	Is the beach located near a harbour, a port or a marina (Yes/NO)? Enter one of the values in the list and further specify	Y = Yes N = No Specify:
Harbour Name	Enter the name of the nearest harbour, port or marina	Specify: Harbour, Port, Marina[4]

Field	Description	List of values
Harbour Distance	Distance between the sampling area and the harbour in km	
Harbour Entrance	Is the harbour entrance facing the survey area?	Y = Yes N = No
Harbour Position	Position of harbour in relation to survey area	N = North E = East S = South W = West
Harbour Type	What is the main type of vessels using the harbour? e.g. passenger ships, merchant/cargo ships, fishing vessels?	
Harbour Size	Number of ships/vessels using the harbour every day	
River Mouth	Beach adjacent to river mouths or drains of water (Yes / No), enter one of the values in the list	Y = Yes N = No n/a
River Mouth Name	Enter the name of the nearest rivers / drains	
River Mouth Distance	Distance between the sampling area and nearest river mouths / drains of water in km	n/a
River Mouth Position	What is the position of nearest river mouth in relation to survey area?	N = North E = East S = South W = West n/a
Waste Water Discharge Distance	Distance between sampling area and industrial sites / landfills in km	
Waste Water Discharge Position	Position of discharge points in relation to survey area	N = North E = East S = South W = West
Clean Up Frequency	Cleaning frequency during all year round	D = Daily W = Weekly M = Monthly O = Other
Clean Up Seasonal	Seasonal Cleaning: please specify in months	
Clean Up Method	Main method that was used for Clean-up	Manual Mechanical
Clean Up Responsible	Who is responsible for the cleaning	
Amendment	Is this an amendment of an existing Beach ID form already submitted in the system?	Y = Yes N = No
Additional Comments	Please include any additional comments that you find important and of relevance	
Beach Map ID	Naming the shapefile associated with the map, e.g. "12202005.shp". Specify the following information in the map: Nearest town Nearest harbour Nearest river mouth Nearest shipping lane	

Field	Description	List of values
	Food/drink outlets Discharge or waste water Discharges	
Regional Map ID	Naming the shapefile associated with the map, e.g. "12202005.shp"	

Table 11: Data Dictionaries (Beach Survey Form) for IMAP Common Indicator 22

Field	Description	List of values
Country Code	Enter country (contracting Party) code as ISO two digits, for example "IT" for Italy.	
Beach National ID	Beach Code	
Beach Name	Beach Name	
ID Survey	Survey code	
Latitude Start 100m[13]	Latitude of the station in the WGS84 decimal degrees reference system with at least 5 digits (xx.xxxxx). Put new value if you diverted from the predetermined 100 m.	
Longitude Start 100m[1]	Longitude of the station in the WGS84 decimal degrees reference system with at least 5 digits (xx.xxxxx). Use negative values for coordinates west of the Greenwich Meridian (0°).	
Latitude End 100m[1]	Latitude of the station in the WGS84 decimal degrees reference system with at least 5 digits (xx.xxxxx).	
Longitude End 100m[1]	Longitude of the station in the WGS84 decimal degrees reference system with at least 5 digits (xx.xxxxx). Use negative values for coordinates west of the Greenwich Meridian (0°).	
Year	Year of sampling in YYYY format	
Month	Month of sampling in 1-12 format	
Day	Day of sampling in 1-31 format	
Time	Time of sampling in HH:MM:SS format	
Surveyors Num	Number of surveyors	
Surveyor Contact Info	Please indicate the contact details of the surveyor (e.g. institute, mail, telephone)[9]	
Weather Conditions	Did any of the following weather conditions affect the data of the survey?	Wind Rain Sand storm Fog Snow Exceptionally high tide Exceptionally low tide Storm surge
Animals	Did you find stranded or dead animals?	Y = Yes N = No
Animals Species	If Animal = Yes, describe the animals, or note the species name if known	
Animals Number	If Animals is = Yes put the number of animals for each species	
Animals State	If Animal = Yes, Describe the stranded animal state, enter a value of the list	Dead Alive

[13] Put new value if you diverted from the predetermined 100 m

Field	Description	List of values
Entangled Animals	Is the animal entangled in litter?	Y = Yes N = No
Entangled Animals Litter	If Yes enter one value of the List_Beach_Litter_Categories	
Special Circumstances	Were there any circumstances that influenced the survey? For example, tracks on the beach, recent replenishment of the beach or other	Y = Yes N = No
Special Circumstances Type	If no, enter a value of the list	tracks on the beach, recent replenishment of the beach description of the new circumstance
Unusual Items	Were there any unusual marine litter items and/or marine litter loads?	Y = Yes N = No
Unusual Items Description	If Yes enter description of the unusual item	
Last Cleaning Date[9]	Last beach cleaning date in DD / MM / YYYY format[9]	
Photo ID	Naming the file associated with the photo, e.g. "12202005.jpg"	

Table 12: Data Dictionaries (Beach Litter Items) for IMAP Common Indicator 22

Value	Description	MacroCategory
G1	4/6-pack yokes, six-pack rings	Plastic/Polystyrene
G3	Shopping bags incl. pieces	Plastic/Polystyrene
G4	Small plastic bags, e.g. freezer bags incl. pieces	Plastic/Polystyrene
G5	The part that remains from rip-off plastic bags	Plastic/Polystyrene
G7/G8	Drink bottles	Plastic/Polystyrene
G9	Cleaner bottles & containers	Plastic/Polystyrene
G10	Food containers incl. fast food containers	Plastic/Polystyrene
G11	Beach use related cosmetic bottles and containers, e.g. Sunblocks	Plastic/Polystyrene
G13	Other bottles, drums and containers	Plastic/Polystyrene
G14	Engine oil bottles & containers <50 cm	Plastic/Polystyrene
G15	Engine oil bottles & containers >50 cm	Plastic/Polystyrene
G16	Jerry cans (square plastic containers with handle)	Plastic/Polystyrene
G17	Injection gun containers (including nozzles)	Plastic/Polystyrene
G18	Crates and containers / baskets (excluding fish boxes)	Plastic/Polystyrene
G19	Vehicle parts (made of artificial polymer or fiber glass	Plastic/Polystyrene
G21/24	Plastic caps and lids (including rings from bottle caps/lids)	Plastic/Polystyrene
G26	Cigarette lighters	Plastic/Polystyrene
G27	Cigarette butts and filters	Plastic/Polystyrene
G28	Pens and pen lids	Plastic/Polystyrene
G29	Combs/hair brushes/sunglasses	Plastic/Polystyrene
G30/31	Crisps packets/sweets wrappers/Lolly sticks	Plastic/Polystyrene
G32	Toys and party poppers	Plastic/Polystyrene
G33	Cups and cup lids	Plastic/Polystyrene
G34	Cutlery, plates and trays	Plastic/Polystyrene
G35	Straws and stirrers	Plastic/Polystyrene

Value	Description	MacroCategory
G36	Heavy duty sacks (e.g. fertilizer or animal feed sacks	Plastic/Polystyrene
G37	Mesh bags (e.g. vegetables, fruits and other products) excluding aquaculture mesh bags	Plastic/Polystyrene
G40	Gloves (washing up)	Plastic/Polystyrene
G41	Gloves (industrial/professional rubber gloves)	Plastic/Polystyrene
G42	Crab/lobster pots and tops	Plastic/Polystyrene
G43	Tags (fishing and industry)	Plastic/Polystyrene
G44	Octopus pots	Plastic/Polystyrene
G45	Mesh bags (e.g. mussels nets, net sacks, oyster nets including pieces and plastic stoppers from mussel lines	Plastic/Polystyrene
G46	Oyster trays (round from oyster cultures)	Plastic/Polystyrene
G47	Plastic sheeting from mussel culture (Tahitians)	Plastic/Polystyrene
G49	Rope (diameter more than 1cm)	Plastic/Polystyrene
G50	String and cord (diameter less than 1 cm)	Plastic/Polystyrene
G53	Nets and pieces of net < 50 cm	Plastic/Polystyrene
G54	Nets and pieces of net > 50 cm	Plastic/Polystyrene
G56	Tangled nets/cord	Plastic/Polystyrene
G57/G58	Fish boxes	Plastic/Polystyrene
G59	Fishing line/(tangled and not tangled)	Plastic/Polystyrene
G60	Light sticks (tubes with fluid) incl. Packaging	Plastic/Polystyrene
G62/G63	Buoys (e.g. marking fishing gear, shipping routes, mooring boats etc.)	Plastic/Polystyrene
G65	Buckets	Plastic/Polystyrene
G66	Strapping bands	Plastic/Polystyrene
G67	Sheets, industrial packaging, plastic sheeting (i.e. non-food packaging/transport packaging) excluding agriculture and greenhouse sheeting[14]	Plastic/Polystyrene
G68	Fibre glass items and fragments	Plastic/Polystyrene
G69	Hard hats/Helmets	Plastic/Polystyrene
G70	Shotgun cartridges	Plastic/Polystyrene
G71	Shoes and sandals made of artificial polymeric material	Plastic/Polystyrene
G73	Foam sponge items (i.e. matrices, sponge, etc.)	Plastic/Polystyrene
G75	Plastic/polystyrene pieces 0 - 2.5 cm	Plastic/Polystyrene
G76	Plastic/polystyrene pieces 2.5 cm > < 50 cm	Plastic/Polystyrene
G77	Plastic/polystyrene pieces > 50 cm	Plastic/Polystyrene
G91	Biomass holder from sewage treatment plants and aquaculture	Plastic/Polystyrene
G124	Other plastic/polystyrene items (identifiable) including fragments	Plastic/Polystyrene
	Please specify the items included in G124	Plastic/Polystyrene
G125	Balloons, balloon ribbons, strings, plastic valves and balloon sticks	Rubber
G127	Rubber boots	Rubber
G128	Tyres and belts	Rubber
G134	Other rubber pieces	Rubber
	Please specify the items included in G134	Rubber
G137	Clothing / rags (clothing, hats, towels)	Cloth
G138	Shoes and sandals (e.g. Leather, cloth)	Cloth

[14] Meeting requested to consider defining separate categories for greenhouse for agriculture and greenhouse sheeting; polystyrene and irrigation pipes

Value	Description	MacroCategory
G141	Carpet & Furnishing	Cloth
G140	Sacking (hessian)	Cloth
G145	Other textiles (including pieces of cloths, rags, etc.)	Cloth
	Please specify the items included in G145	Cloth
G147	Paper bags	Paper/Cardboard
G148	Cardboard (boxes & fragments)	Paper/Cardboard
G150	Cartons/Tetrapack Milk	Paper/Cardboard
G151	Cartons/Tetrapack (non-milk)	Paper/Cardboard
G152	Cigarette packets (including transparent covering of the cigarette packet)	Paper/Cardboard
G153	Cups, food trays, food wrappers, drink containers	Paper/Cardboard
G154	Newspapers & magazines	Paper/Cardboard
G158	Other paper items (including non-recognizable fragments)	Paper/Cardboard
	Please specify the items included in G158	Paper/Cardboard
G159	Corks	Paper/Cardboard
G160/161	Pallets / Processed timber	Processed/Worked Wood
G162	Crates and containers / baskets (not fish boxes)	Processed/Worked Wood
G163	Crab/lobster pots	Processed/Worked Wood
G164	Fish boxes	Processed/Worked Wood
G165	Ice-cream sticks, chip forks, chopsticks, toothpicks	Processed/Worked Wood
G166	Paint brushes	Processed/Worked Wood
G171	Other wood < 50 cm	Processed/Worked Wood
	Please specify the items included in G171	Processed/Worked Wood
G172	Other wood > 50 cm	Processed/Worked Wood
	Please specify the items included in G172	Processed/Worked Wood
G174	Aerosol/Spray cans industry	Metal
G175	Cans (beverage)	Metal
G176	Cans (food)	Metal
G177	Foil wrappers, aluminium foil	Metal
G178	Bottle caps, lids & pull tabs	Metal
G179	Disposable BBQ's	Metal
G180	Appliances (refrigerators, washers, etc.)	Metal
G182	Fishing related (weights, sinkers, lures, hooks)	Metal
G184	Lobster/crab pots	Metal
G186	Industrial scrap	Metal
G187	Drums and barrels (e.g. oil, chemicals)	Metal
G190	Paint tins	Metal
G191	Wire, wire mesh, barbed wire	Metal
G198	Other metal pieces < 50 cm	Metal
	Please specify the items included in G198	Metal
G199	Other metal pieces > 50 cm	Metal
	Please specify the items included in G199	Metal
G200	Bottles (including identifiable fragments)	Glass
G202	Light bulbs	Glass
G208a	Glass fragments >2.5cm	Glass
G210a	Other glass items	Glass
	Please specify the items included in G210a	Glass
G204	Construction material (brick, cement, pipes)	Ceramics
G207	Octopus pots	Ceramics

Value	Description	MacroCategory
G208b	Ceramic fragments >2.5cm	Ceramics
G210b	Other ceramic/pottery items	Ceramics
	Please specify the items included in G210b	Ceramics
G95	Cotton bud sticks	Sanitary Waste
G96	Sanitary towels/panty liners/backing strips	Sanitary Waste
G97	Toilet fresheners	Sanitary Waste
G98	Diapers/nappies	Sanitary Waste
G133	Condoms (incl. packaging)	Sanitary Waste
G144	Tampons and tampon applicators	Sanitary Waste
G--	Other sanitary waste	Sanitary Waste
	Please specify the other sanitary items	Sanitary Waste
G99	Syringes/needles	Medical Waste
G100	Medical/Pharmaceuticals containers/tubes	Medical Waste
G211	Other medical items (swabs, bandaging, adhesive plaster etc.)	Medical Waste
	Please specify the items included in G211	Medical Waste
G101	Dog faeces bag	Faeces
G213	Paraffin/Wax	Paraffin/Wax
Presence of pellets	Please say Y or N	
Presence of oil tars	Please say Y or N	
Number Items	Number of items in the category expressed as number of objects / 100m	

1.5 IMAP EO10 Common Indicator 23

1.5.1 Seafloor Marine Litter

Table 13: Data Dictionaries (Station Information) for IMAP Common Indicator 23 (Seafloor Marine Litter)

Field	Description	List of values
Country Code	Enter member country code as ISO two digits, for example "IT" for Italy.	
National Station ID	Station Code	
National Station Name	Station Name	
Area	Administrative subdivision/sea compartment where the sampling station is located and also reference to EcAp Subdivision Code"	
Closest Coast	Distance station from the coast in km	
Additional Comments	Please include any additional comments that you find important and of relevance	

Table 14: Data Dictionaries (Sampled Seafloor) for IMAP Common Indicator 23 (Seafloor Marine Litter)

Field	**Description**	**List of values**
Country Code	Enter member country code as ISO two digits, for example "IT" for Italy.	
National Station ID	Station code	
Year	Year of sampling in YYYY format	
Month	Month of sampling in 1-12 format	
Day	Day of sampling in 1-31 format	
Time	Hours-minutes-seconds of sampling in HH:MM:SS format	
Haul Number ID	Sample Code if multiple replies are made with the same value as Year, Month, Day and Time	
Sampled Surface	Sampled surface of seafloor (km2)	
Latitude Start	Latitude of the Seafloor area in the WGS84 decimal degrees reference system with at least 5 digits (xx.xxxxx).	
Longitude Start	Longitude of the Seafloor area in the WGS84 decimal degrees reference system with at least 5 digits (xx.xxxxx). Use negative values for coordinates west of the Greenwich Meridian (0°).	
Latitude End	Latitude of the Seafloor area in the WGS84 decimal degrees reference system with at least 5 digits (xx.xxxxx).	
Longitude End	Longitude of the Seafloor area in the WGS84 decimal degrees reference system with at least 5 digits (xx.xxxxx). Use negative values for coordinates west of the Greenwich Meridian (0°).	
Depth Start	Depth in metres (m)	
Depth End	Depth in metres (m)	

Field	Description	List of values
Haul Duration	Indicate the total duration of the haul (start till end) in minutes	
Covered Distance	Indicate the total length of the haul in km	
Objects Number	Indicate the number of objects per square kilometers of seafloor (items/km^2). See Seafloor_ML_List	
Object Weight	Indicate the weight for each object per square kilometers of seafloor (weight/km^2). See Seafloor_ML_List	
Gear	Type of gear (e.g. bottom trawl, etc.9	
Speed	Indicate the constant speed of the vessel during the haul duration in knots	
Net Opening	Opening of the net in metres or use the figure obtained from the trawl sensors (e.g. SCANMAR, SIMRAD) if available	
Cod-end mesh size	Cod-end mesh size (mm) measured as stretched mesh (diamond shap)	
Surveyor Contact Info	Add surveyor's name and contact details (name, e-mail, etc.)	Non-Mandatory
Campaign Name	Add the name of the mission/cruise/project with which the survey is linked to	Non-Mandatory
Vessel Name	Add the name of the vessel	Non-Mandatory
Vessel Length	Add the length of the Vessel (m)	Non-Mandatory
Vessel Engine Power	Add the engine power of the Vessels (KW of HP)	Non-Mandatory
IMO Number	Add the International Maritime Organization (IMO) number of the Vessel	Non-Mandatory
Additional Comments	Please include any additional comments that you find important and of relevance	

Table 15: Data Dictionaries (Sampled Seafloor) for IMAP Common Indicator 23 (Seafloor Marine Litter)

Value	Description	Macro Category
L0	**No Litter**	Yes, no litter found No, go to other items)
L1a	Plastic bags	Plastic
L1b	Plastic bottles	Plastic
L1c	Plastic food wrappers	Plastic
L1d	Plastic sheets	Plastic
L1e	Hard plastic objects	Plastic
L1f	Fishing nets (polymers)	Plastic
L1g	Fishing lines (polymers)	Plastic
L1h	Other synthetic fishing related	Plastic
L1i	Synthetic ropes/strapping bands	Plastic
L1j	Other plastic	Plastic

Value	Description	Macro Category
L1	Total Plastic	Plastic
L2a	Tyres	Rubber
L2b	Other Rubber (gloves, floats, etc.)	Rubber
L2	Total Rubber	Rubber
L3a	Beverage cans (metal)	Metal
L3b	Other food cans/wrappers	Metal
L3c	Middle size containers (paint, etc.)	Metal
L3d	Large metallic objects	Metal
L3e	Cables	Metal
L3f	Fishing related (hooks, spears, etc.)	Metal
L3g	Remnants from war	Metal
L3	Total metal	Metal
L4a	Glass/ceramic bottles	Glass/Ceramic
L4b	Piece of glass	Glass/Ceramic
L4c	Ceramic jars	Glass/Ceramic
L4d	Large objects	Glass/Ceramic
L4	Total Glass/Ceramic	Glass/Ceramic
L5a	Clothing (other than polymers)	Textils / Natural fibers
L5b	Large pieces (carpets, etc.)	Textils / Natural fibers
L5c	Natural fishing ropes	Textils / Natural fibers
L5d	Sanitaries (non-polymers)	Textils / Natural fibers
L5	Total textils / Natural fibers	Textils / Natural fibers
L6	Total processed wood	Processed wood
L7	Total paper and cardboard	Paper and cardboard
L8	Total other	Other
L9	Total unspecified	Unspecified
	Total litter	Total litter
	Total fishing gears (sum of L1f to L1i, L3f, L5c)	Fishing gears

1.5.2 Floating Microplastics

1. All tables and relevant information which are presented hereunder are presented to the Contracting Parties to the Barcelona Convention for first time and thus should be considered as totally new.

Table 16: Data Dictionaries (Station Information) for IMAP Common Indicator 23 (Floating Microplastics) (Fields in red are not mandatory).

Field	Description	List of values	Remarks
Country Code	Enter member country code as ISO two digits, for example "IT" for Italy.		
National Station ID	Station Code		
National Station Name	Station Name		
Region	Administrative subdivision after country which the station belongs to		
Data Owner	Name of Institution carrying out the monitoring surveys		
Latitude	Latitude of the station in the WGS84 decimal degrees reference system with at least 5 digits (xx.xxxxx).		Latitude of the station is essential for the GIS representation and joined to the monitoring network. It is independent from the sampling point.
Longitude	Longitude of the station in the WGS84 decimal degrees reference system with at least 5 digits (xx.xxxxx). Use negative values for coordinates west of the Greenwich Meridian (0°).		Longitude of the station is essential for the GIS representation and joined to the monitoring network. It is independent from the sampling point.
Closest Coast	Distance station from the coast in km		
TCM Matrix	Floating microplastics with the use of Manta Net are only referred to water column (**W**). If other measures of other environmental matrix are performed in the same station enter one of the values in the list (information not related to floating microplastic monitoring but useful to characterize the station)	B = Biota BS = Biota and sediment BSW = Biota, sediment and water column BW = Biota and water column S = Sediment SW = Sediment and water column W = Water column	Values in the list in red are not mandatory
Sea Depth	Sea depth of the station in meters (information not related to floating microplastic monitoring but useful to characterize the station)		Not mandatory

Field	Description	List of values	Remarks
Mixing	Mixing property of the water column at the station point, enter one of the values in the list	FM = Fully mixed PM = Partially mixed VS = Vertically stratified	Not mandatory Reference method to be added
Area Typology	Typology of the monitored area enter one of the values in the list	RP = River Plume PF = Port Facility US = Urban Settlement IS = Industrial Settlement	RP = Turbid freshwater flowing from land and generally in the distal part of a river (mouth) outside the bounds of an estuary or river channel.
Remarks	Notes		

Table 17: Data Dictionaries (Microplastic Mesh) for IMAP Common Indicator 23 (Floating Microplastics) (Fields in red are not mandatory).

Field	Description	List of values	Remarks
National Station ID	Station code		
Year	Year of sampling in YYYY format		
Month	Month of sampling in 1-12 format		
Day	Day of sampling in 1-31 format		
Time	Hours-minutes-seconds of sampling in HH:MM:SS format		Start time of sampling (duration not less than 20 minutes)
Sample ID	Sample Code if multiple replies are made with the same value as Year, Month, Day and Time		
Latitude START	Latitude of the station in the WGS84 decimal degrees reference system with at least 5 digits (xx.xxxxx).		
Longitude START	Longitude of the station in the WGS84 decimal degrees reference system with at least 5 digits (xx.xxxxx). Use negative values for coordinates west of the Greenwich Meridian (0°).		
Latitude END	Latitude of the station in the WGS84 decimal degrees reference system with at least 5 digits (xx.xxxxx).		
Longitude END	Longiitude of the station in the WGS84 decimal degrees reference system with at least 5 digits (xx.xxxxx). Use negative values for coordinates west of the Greenwich Meridian (0°).		
Sea Depth	Sea depth of the station in meters		
Temp	Temperature (°C)		Not Mandatory
Salinity	Salinity (psu)		Not Mandatory

Field	Description	List of values	Remarks
Transparency	Indicate the depth of shallows in meters (m)		Not Mandatory
DO	Dissolved oxygen - percentage of saturation (%)		Not Mandatory
pH	pH		Not Mandatory
Sea State	State of the sea according to Douglas scale (from 0 to 9 degrees)		
Wind Intensity	Intensity of the wind according to Beaufort scale (from 0 to 12 degrees)		
Wind Direction	Wind direction measured in degrees (angle unit) regard to the magnetic north, as reported on the compass		
Boat Speed	Average speed held by the boat during the sampling operations expressed in nodes		
Length Way	Length of the sampled linear way (m)		
Width Manta Trawl	Width of manta trawl (m)		
Surface Sampled	Surface sampled of seawater (m2)		
Remarks	Note		

Table 18: Data Dictionaries (Sampled Microplastics) for IMAP Common Indicator 23 (Floating Microplastics) (Fields in red are not mandatory).

Field	Description	List of values
National Station ID	Station code	
Year	Year of sampling in YYYY format	
Month	Month of sampling in 1-12 format	
Day	Day of sampling in 1-31 format	
Time	Hours-minutes-seconds of sampling in HH:MM:SS format	
Sample ID	Sample Code if multiple replies are made with the same value as Year, Month, Day and Time	
Microplastic Morph Type	Indicate the type of morphology of the microplastics, enter one of the values in the list	Foam Filament Fragment Granule Pellet Sheet

Field	Description	List of values
Color	Indicate the color of microplastics, enter one value of the list	White Black Red Blue Green Other colors
Transparency	Indicate if the object is transparent or opaque, enter one value of the list	T = Transparent O = Opaque
Number of objects	Indicate the number of objects (sampled according to color and form indicated) per square meter of seawater	
Remarks	Notes	

Appendix III
IMAP Guidance Factsheets: Update for Common Indicators 13, 14, 17, 18, 20 and 21; New proposal for Candidate Indicators 26 and 27

Table of Contents

List of Abbreviations / Acronyms

ACCOBAMS	Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and Contiguous Atlantic Area
CI	Common Indicator
COP	Conference of the Parties
CORMON	Correspondence Group on Monitoring
DDs	Data Dictionaries
DSs	Data Standards
EcAp	Ecosystem Approach
EEA	European Environmental Agency
EO	Ecological Objective
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
GES	Good Environmental Status
HELCOM	Baltic Marine Environment Protection Commission - Helsinki Commission
ICES	International Council for the Exploration of the Sea
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
MED QSR	Mediterranean Quality Status Report
MSFD	Marine Strategy Framework Directive
OSPAR	Convention for the Protection of the Marine Environment for the North-East Atlantic
PoW	Programme of Work
SoED 2019	2019 State of Environment and Development Report
US EPA	United States Environmental Protection Agency
WFD	Water Framework Directive

1. INTRODUCTION

1. The update of the Guidance Factsheets for Common Indicators 13,14,17,18, 20 and 21 strictly follows the structure of the IMAP Common Indicator Guidance Factsheets as approved by the 6th Meeting of the Ecosystem Approach Coordination Group. This update also includes the assessment maps realized in 2019 for the purpose of preparation of the SoED 2019. The update is consistent with the Data Standards (DSs) and Data Dictionaries (DDs) of the IMAP (Pilot) Info System currently under development by INFO/RAC with the overall coordination of the Secretariat.

2. The updated IMAP Guidance Factsheets for Common Indicators 13, 14, 17, 18, 20 and 21 were considered and welcomed by the Meeting of CorMon on Pollution Monitoring. They are provided in Annex I of this document.

3. In line with Decision IG.22/7, the Secretariat and ACCOBAMS prepared a proposal of the Guidance Factsheets for Common Indicators 26 and 27 of Ecological Objective 11 that was considered and welcomed by the Meeting of CorMon on Pollution Monitoring. It is presented in the following section.

2. THE GUIDANCE FACTSHEET FOR THE CANDIDATE INDICATOR 26

4.. The Guidance Factsheet for **Common Indicator 26 (EO11): "**Proportion of days and geographical distribution where loud, low and mid-frequency impulsive sounds exceed levels that are likely to entail significant impact on marine animals" is presented in the following tabular form.

Indicator Title	Common indicator 26: Proportion of days and geographical distribution where loud, low and mid-frequency impulsive sounds exceed levels that are likely to entail significant impact on marine animals	
Relevant GES definition	**Related Operational Objective**	**Proposed Target(s)**
Noise from human activities causes no significant impact on marine and coastal ecosystems.	Energy inputs into the marine environment, especially noise from human activities, are minimized	Number of days with impulsive sounds sources, their distribution within the year and spatially within the assessment area, are below thresholds
Rational		
Justification for indicator selection Anthropogenic energy introduced by human activities into the marine environment includes sound, light and other electromagnetic fields, heat and radioactive energy. The most widespread and pervasive is underwater sound (Dekeling et al., 2013a). Sound energy input can occur at varying spatial and temporal scales. Anthropogenic sounds may be of short duration (i.e. impulsive) or be long lasting (i.e. continuous). Lower frequency sounds can be transmitted far (tens to thousands of kilometres), whereas higher frequency sounds transmit less well in the marine environment (hundreds of meters to few kilometres (Urick, 1996). Most common sources of marine noise pollution include ship traffic, geophysical exploration and oil and gas exploitation, military sonar use and underwater detonations, telemetry devices and acoustic modems, scientific research involving the use of active acoustic sources,		

and offshore and inshore industrial construction works. Such activities are growing throughout the Mediterranean Sea (e.g. DeMicco; OWEMES, 2012; US Energy Information administration, 2013).

Marine organisms can be adversely affected both on short and long timescales (and include acute or chronic impact and temporary or permanent effects (Richardson et al, 1995). Adverse effects can be subtle (e.g. temporary reduction in hearing sensitivity, stress effects causing reduced immunity, reproduction success or survival), or more obvious (e.g. injury, death). The former may be difficult to observe and evaluate while the latter may in some circumstances be related to acute short-range noise exposures. Concerning noise source-specific impact, it has been demonstrated that naval exercises involving the use of mid-frequency active sonars caused several mass stranding events of Cuvier's beaked whales along the coasts of the Mediterranean Sea and in other sea areas at least during the last 20 years (e.g. Frantzis, 1998; Fernandez et al., 2004; Martin et al., 2004; Agardy et al., 2007; Filadelfo et al., 2009). Further, this correlation is suspected also for the case of geophysical surveys (e.g. Southall et al., 2013; Castellote and Llorens 2013), although definite results are not available yet. Further, displacement and/or acoustic behavioural disruption may occur for Mediterranean fin whales in response to low frequency impulsive noise at very long ranges, reaching more than 200 km (Borsani et al., 2008; Castellote et al., 2012). Finally, sperm whales and beaked whales have been identified to be highly sensitive to mid-frequency impulsive sounds (e.g. Aguilar de Soto et al., 2006; Weir, 2008).

Management concern is primarily associated to the negative effects of noise on sensitive protected species, such as some species of marine mammals.

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Policy Context and targets

Policy context description

Generalities:

In the marine environment, the term pollution is defined in several legal frameworks by the following statement: "the introduction by man, directly or indirectly, of substances or energy into the marine environment […]". This definition includes anthropogenic noise as a form energy caused by human activities. As such, underwater noise pollution is addressed by Regional Seas Conventions, where the following initiatives are considered the most relevant for the management of activities generating noise, and the mitigation of their adverse effects on the marine environment:

- For the Barcelona Convention, the Ecosystem Approach process (EcAp), started in 2008;
- For the OSPAR and HELCOM Conventions, the adoption for their respective monitoring and assessment processes of the indicators related to underwater noise as proposed in the framework of the MSFD (2011 and 2012).

In parallel, the European Union adopted the same definition of pollution given in the paragraph above in the text of the Marine Strategy Framework Directive (MSFD, 2008/56/EC, adopted in 2008). The

MSFD gave a considerable impulse to the undertaking of actions, programs, measures, as well as scientific research to cover the knowledge gaps on underwater noise, and hence develop appropriate guidance on the management of man-made noise in the marine environment.
With regards to the MSFD, underwater noise is addressed by Descriptor 11, and two criteria were selected for monitoring and assessment purposes, one addressing loud impulsive signals produced by several coastal and offshore works (pile driving, explosions, seismic pulses, etc.), the other targeting the contribution of anthropogenic sources, especially shipping, to ambient noise levels. Since the adoption of the MSFD (2008), the European Commission issued two Decisions addressing methodological standards for the monitoring and assessment of underwater noise: Commission Decision 2010/477/EU on criteria and methodological standards on good environmental status of marine waters, and Commission Decision 2017/848/EU laying down criteria and methodological standards on good environmental status of marine waters and specifications and standardised methods for monitoring and assessment, and repealing Decision 2010/477/EU.

Concerning the EcAp process, among the eleven Ecological Objectives (EOs), and respective operational objectives and indicators agreed through Decision 20/4 (17th Meeting of Contracting Parties, COP 17), EO11 addresses underwater noise produced by human activities. However, during the COP 18 (Istanbul, 2013), Decision 21/3 provided a specific list of descriptions of good environmental status and targets for the other EOs, contrary to EO11, considered not yet sufficiently understood to allow a proper definition of good environmental status. Therefore, in 2014-2015 ACCOBAMS in cooperation with the UNEP/MAP Secretariat developed the "Basin-wide Strategy for underwater noise monitoring in the Mediterranean" thanks to its working group on noise (Joint ASCOBANS/ACCOBAMS/CMS Noise Working Group).This strategy proposed to address two types of noise for the monitoring and assessment purposes, as for the MSFD process: loud impulsive signals produced by several coastal and offshore works (pile driving, explosions, seismic pulses, etc.), and the contribution of anthropogenic sources, especially shipping, to ambient noise levels. The strategy was included in the Integrated Monitoring and Assessment Programme (IMAP) during the CORMON Meeting in Athens (March 30 – April 01, 2015), which was finally adopted by Parties during the COP19.Finally, during the COP19, ACCOBAMS and the UNEP/MAP signed an MoU covering the issue of underwater noise.

Several other legal frameworks have addressed anthropogenic underwater noise and its impact on the marine environment and wildlife: The International Whaling Commission (IWC), the Convention on Biological Diversity (CBD), the Convention on Migratory Species (CMS), ACCOBAMS and ASCOBANS, as well as the European Parliament, and more. Almost all the initiatives undertaken by such legal frameworks deal with the impact of noise on some environmental element (usually sensitive marine fauna such as cetaceans and fish, turtles, crustaceans, etc.), while in the MSFD and EcAp processes emphasis is put on the human activities generating noise. This is likely due to the fact that managing human activities in the sea is theoretically easier than managing impact. However, the effectiveness of such an approach rely on a good understanding of the relationship between noise and impact, which is very often not the case.

With specific regards to impulsive noise:

In EU Member States, human activities producing loud impulsive signals into the marine environment are managed nationally through licensing systems, and the consideration of the impact of noise in such management processes is especially due to the European Directive on the Environmental Impact Assessment (EIA Directive). However, the EIA Directive is "project-bases", contrarily to the MSFD and EcAp, which are "ecosystem-based". The main difference between project-based and ecosytem-based approach is that in the case of an EIA, the project developer (e.g. an industry) is responsible for assessing and mitigating the impact of its own activities, while in the case of the EcAp and MSFD

processes, country's governments are responsible for the achievement and/or maintenance t of the good environmental status, which include addressing and managing the potential adverse impact of all pressures in the marine environment.

The transposition in national legislation of the EIA Directive resulted in different national management systems. For instance, in the UK a standard mitigation framework applies to a list of well-defined activities; in Germany, impulsive sound signals are allowed as far as they do not exceed legal thresholds (a certain received noise level at 750 m from the source); in Italy the project developer need to implement 60 days monitoring before and after the activity to understand whether or not the activity caused any impact.

Again, while the EIA Directive gave considerable results in managing the impact of single activities introducing noise into the sea, a framework addressing the ecosystem scale has been in need of development in the past decade. This Factsheet addressed exactly this point and provides elements for the implementation of the ecosystem approach to the management of activities producing impulsive noise.

Targets

The primary activity under common indicator 26 should be the setting up by countries of a database ("a noise register[15]") for the registration of "noise events", where a noise event is the occurrence of loud impulsive signals (in low and mid frequency bands) on a given day and in a given place. Once the register is built, it is possible to obtain an overview of the spatial and temporal distribution of noise-producing activities, as well as set the specific thresholds to achieve defined targets. During the QUIETMED project (DG ENV/MSFD Second Cycle/2016) an interim list was drawn of possible targets addressing especially regulatory and management aspects of underwater noise. Possible target shall deal indeed with (not exhaustive list): increasing the number of mitigation measures applied to activities potentially causing impact, decreasing the number of activities generating loud noise in habitats of sensitive cetacean species, applying time-space closures (set on biological and ecological bases) to the occurrence of activities with the highest potential of causing impact to mention few.

Policy documents

Report of the following Meetings: COP17-18-19

- http://www.unepmap.org/index.php?module=events&action=detail&id=65
- http://rac-spa.org/nfp12/documents/reference/13ig21_9_eng.pdf
- http://195.97.36.231/dbases/MEETING_DOCUMENTS/12IG20_8_Eng.pdf

Reports of the 4th and 5thEcAp Coordination Unit meeting:
http://195.97.36.231/dbases/MEETING_DOCUMENTS/14WG401_8_ENG.pdf
Report of the Meeting of the CORMONs, Athens 30 March – 01 April 2015

Report of the Meeting of MED POL and joint-session MED POL/REMPEC, Malta 16-19, June 2015.
http://195.97.36.231/dbases/MEETING_DOCUMENTS/15WG417_17_ENG.pdf

[15] See for example: http://underwaternoise.ices.dk/map.aspx ; http://accobams.noiseregister.org/

DIRECTIVE 2008/56/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCILof 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive)

Commission Decision of 1 September 2010 on criteria and methodological standards on good environmental status of marine waters (2010/477/EU)

Commission Decision 2017/848/EU of 17 May 2017 laying down criteria and methodological standards on good environmental status of marine waters and specifications and standardised methods for monitoring and assessment, and repealing Decision (2010/477/EU)

Council Directive 85/337/EEC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment; and successive amendments in 1997 (97/11/EC), 2003 (2003/35/EC), and 2009 (2009/31/EC). This Directive was repealed and replaced by the following: Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment; also amended in 2014 (2014/52/EU).

Indicator analysis methods

Indicator Definition

The indicator is defined by the number of days with impulsive sound sources in an assessment area and over a defined period. Such areas may be the cells of a spatial grid, or larger scale areas such as the subdivision, sub regional and regional scales. Not all impulsive noise sources are to be accounted for, only those exceeding thresholds considered as having a significant impact on populations of sensitive wildlife. The impact is considered significant when severe displacement of animals from their habitats occurs due to noise. Thresholds for the onset of significant impact are defined in the “Basin-wide Strategy for underwater noise monitoring in the Mediterranean” (ACCOBAMS, 2015).

Methodology for indicator calculation

The calculation is given by the sum of all days where noise events occurs over a defined period (one year or temporal window such as month or trimester), and for an assessment unit. As described above, a noise event is the occurrence of loud impulsive signals (in low and mid frequency bands) on a given day and in a given place.

A spatial grid with a regular cell size is proposed to compute the number of days with impulsive sound sources. The calculation is done for each grid cell using common GIS software or more sophisticated web applications. Also, the calculation may be done in assessment areas as a whole: sub-regions, the whole region, or subdivisions decided at the country level.

The “Basin-wide Strategy for underwater noise monitoring in the Mediterranean” (ACCOBAMS, 2015) proposed to use a 20x20 km spatial grid. However, recent developments (especially thanks to the QUIETMED project) led to propose different options, including: the spatial grid already used by the General Fisheries Commission for the Mediterranean (GFCM statistical rectangles), which is has a dimension of 30 min in latitude and longitude, or the adoption for all noise sources of spatial grids already used by countries to manage human activities nationally (e.g. Oil&Gas licenced areas).

Indicator units

The indicator unit is called ***pulse-block days*** (PBDs), meaning the number of days of occurrence of impulsive noise events in an area (block), in a given period.

List of Guidance documents and protocols available

ACCOBAMS, 2015. A basin-wide strategy for underwater noise monitoring in the Mediterranean. Report prepared by Alessio Maglio, Manuel Castellote and Gianni Pavan.

Dekeling, R.P.A., Tasker, M.L., Van der Graaf, A.J., Ainslie, M.A, Andersson, M.H., André, M., Borsani, J.F., Brensing, K., Castellote, M., Cronin, D., Dalen, J., Folegot, T., Leaper, R., Pajala, J., Redman, P., Robinson, S.P., Sigray, P., Sutton, G., Thomsen, F., Werner, S., Wittekind, D., Young, J.V., 2014. Monitoring Guidance for Underwater Noise in European Seas, Part II: Monitoring Guidance Specifications, JRC Scientific and Policy Report EUR 26555 EN, Publications Office of the European Union, Luxembourg, 2014b, doi: 10.2788/27158.

Recommendations to Member States to set up the national registers of impulsive noise according to criterion D11C1 of the Commission Decision 2017/848/EU and ACCOBAMS premises, and generalisation for the EcAp process. Deliverable 3.4, QUIETMED project. DG ENV/MSFD Second Cycle/2016.

Data Confidence and uncertainties

Data confidence is expected to be high due to the simplicity of the data themselves. To meet minimum objectives of monitoring Common Indicator 26, only the location (geographical coordinates or area), the period (dates) and intensity of noise sources used are necessary. All such information, including the intensity of the noise source, should be obtained from declarative data, i.e. it is not necessary to measure the real noise level with any equipment, or to carry out fieldwork to locate noise-producing activities.

Declarative data can be sought in the national institutes already centralising data on marine activities (e.g. institutions managing Oli & Gas licensing procedures; or environmental impact assessment procedures; etc.). This system, on the one hand result in very low costs for obtaining data, while in the other hand add some uncertainty.

Uncertainty is mainly due to the fact that declarative data maybe not available (e.g. sensitive data such as data on military activities), not well specified or with important gaps, or not completely suitable for impulsive noise monitoring as described in this Factsheet. There is little chance that no data be available at all, or with important gaps, concerning the position and the period of marine activities, while this may be the case concerning information on the intensity of noise sources. Therefore, this fact may be overcome by setting conservative thresholds for up taking marine activities in the noise register.

Methodology for monitoring, temporal and spatial scope

Available Methodologies for Monitoring and Monitoring Protocols

Monitoring Methodology: A register of the use of noise sources is the necessary tool enabling a monitoring programme. The register is a database fed with data on the use of underwater noise sources (noise events).

Tools for monitoring impulsive noise sources (i.e. tool for setting the noise register): the joint use of a spreadsheet (MS Excel or similar) and common GIS software is considered as the recommendation to meet the minimum requirements of Common Indicator 26, where the spreadsheet is used to record noise events, and the GIS software to perform spatial analysis of these areas (e.g. to compute the number of pulse-block days).

What noise sources should be registered:

- **Pile driving**. Pile driving is a conventional technique employed in many coastal and offshore constructions, such as wind farms, offshore platforms, harbour extensions etc. The growth of the wind energy sector caused a great increase in the use of this technique both in coastal and offshore environments.
- **Airgun**. The airgun is presently the most employed technology for carrying out marine seismic exploration. Such surveys are pervasive worldwide, in shallow and deep water as well as in coastal or offshore environments
- **Explosives**. Underwater detonations may occur for the disposal of explosives or may be planned during maritime construction, e.g. to fragment rock prior to dredging. This is the loudest source of underwater noise and need to be treated with particular care.
- **Sonar**. Low-, mid- and high frequency active sonars (LFAS, MFAS, HFAS) are employed during military exercises as well as during academic and industrial surveys, such as fish stock estimations and bathymetric surveys. Especially, low- and mid- frequency naval sonars are of great concern given the mass stranding events of cetaceans linked in space and time with military exercises and need to be addressed with particular care.
- **Acoustic Deterrents**. High-powered devices designed to keep marine mammals away from fish farms by causing them pain. Frequencies range from 5-20KHz for repelling pinipeds and 30-160KHz for delphinids (Carretta et al, 2008, Lepper et al, 2004, Lurton, 2010, OSPAR, 2009).

What information to collect to enter into the register:

Data	**Units and/or comments**	**Priority**
Position	geographic position (lat/long) or pre-defined block/area which can be identified through a coding system (single identifier for each block used)	Required
Dates	Start and end day	Required
Source intensity	Source level or proxy, unique levels or in bins (see Annex 5.3 for corresponding tables of values in bins)	Required
Source spectra	Frequency range	Additional
Duty cycle		Additional
Duration of transmission	Actual time/time period	Additional
Directivity		Additional
Source depth		Additional
Platform speed	For moving sources like seismic surveys	Additional

Minimum thresholds (Source intensity) for including a noise event in the register:

- For low frequency sources: no thresholds, i.e. all sources to be registered
- For mid-frequency sources, table hereafter:
-

Noise source type	Thresholds for inclusion of noise events in the register
Explosive	mTNTeq> 8 g
Airgun	SLz-p > 209 dB re 1 µPa m
Low/mid freq sonar	176 dB re 1 µPa m

Low/mid freq acoustic deterrent	176 dB re 1 µPa m
Other pulse	186 dB re 1 µPa² m² s

Again, **there is no need to measure on the field** and data are to be sought in institutions centralising data (Ministries, national regulatory bodies, etc.).

Monitoring Protocol: Data on the use of impulsive noise sources (location, period, and intensity at least) are entered in the register on a regular basis (once, twice or more times per year). This is done by a selected contact person in each country.

Available data sources

ACCOBAMS Noise Register (currently developed but not yet operational, expected to be on-line in 2019).

National data repositories available for some countries for specific activities (e.g. licensing areas for seismic exploration). Some examples:
http://www.minetur.gob.es
http://www.ifremer.fr/sismer
http://bo.ismar.cnr.it
http://unmig.mise.gov.it/;
http://unmig.sviluppoeconomico.gov.it
http://energy.gov.il
http://www.sigetap.tn
http://www.ypeka.gr
http://www.beph.net

Further data repositories are open data platform developed by different organisations, where the most relevant appear to be the following: EmodNet (EU funded platform). From EmodNet it is possible to access data gates for marine activities, including marine renewable energy plants, platforms, cables and others.

For military activities, as a first approach, the *notice to mariners*[16] can be monitored to gather information on possible military activities. Notice to mariners are indeed freely available information for navigation.

Spatial scope guidance and selection of monitoring stations

No monitoring stations needed, only declarative data are required to fill up the noise register. Concerning the spatial scope at large: the monitoring methodology is based on the use of a regular spatial grid to compute pulse-block days. In this sense, a block is a unit of area of a spatial management system, for example a cell of the regular spatial grid. If a noise event lasts several days in the same block (ca. area), the pulse-block day is equal to the number of days of duration of that noise event.

Based on the calculation of PBDs, it is possible to derive other quantities such as:

[16] Notice to mariners are information issued by country's military authorities. Such notices inform on sailing in a given area about the occurrence of some military exercise or other activity that may be dangerous for boats sailing in the area. For example, notice to mariners may be used for collecting data about military activities to be included in the noise register

- the extent in km², or the proportion (%) of the assessed area, with impulsive sound sources. Here a country may decide to apply a minimum number of PBDs to account an area (e.g. a grid cell or blocks) in the calculation of the extent or proportion. Example: A conservative choice (ca. risk prevention) would be the proportion (% of grid cells) of the assessed area (total number of grid cell) with at least 1 PBDs.

Temporal Scope guidance

Data on noise events can be entered in the register by the responsible institution several times in a year, for example whenever data become available.
Based on the calculation of pulse-block days, it is possible to derive time-based quantities such as:

- the number of PBDs calculated monthly, quarterly, and/or yearly;
- the % of days over a time window with impulsive sound sources (noise events). Here again, a country may decide to apply a minimum # of PBDs to account an area (e.g. a grid cell) in the calculation of the extent or proportion. A conservative version of this indicator would be the following: the proportion (% of days) with at least 1 PBDs in the assessed time window (e.g. 1 month) and area (e.g. a subregion).

Data analysis and assessment outputs

Statistical analysis and basis for aggregation

Basic descriptive statistics are needed to compute the indicator:

- the number of pulse-block days over a time window;
- the % of an assessment area with impulsive sound sources.

Further statistics are the trend analysis that maybe applied on different aggregated periods, for example: year to year; summer to summer, month of year N to month of year N+1 (and N+3, …) or others.

From a regional and sub regional perspective, once the noise register is established by a all countries, such data may be transferred to the ACCOBAMS Nosie Register. This is proposed as the basis for regional and sub regional aggregation of data which can feed regional assessment (QSR) as well as supporting countries in reporting to EcAp EO11.

Expected assessments outputs

The assessment outputs are the following:

- GIS maps showing the spatial and temporal distribution of noise sources over a year, or calculated monthly or quarterly; the value associated to each grid cell (block) in such maps is the total number of *pulse-block days* for a month, a quarter, or a year;
- Noise source coverage values: number of grid cells and % of the total cell number, or extent in km²with number of *pulse-block days*> 0;
- Trend analysis is possible across aggregated time periods (year, seasons, months, etc.).

Known gaps and uncertainties in the Mediterranean

As a relatively new Common Indicator within the context of marine environmental protection policy, its applicability beyond usual management of marine activities needs to be determined. The main uncertainties lie in the availability of declarative data (location, period and intensity of noise sources), although experience from the implementation of the MSFD in the last 10 years are encouraging.

Another important issue is the perception that underwater acoustics is too complex and noise monitoring generally too expensive. However, if this might be true if we talk about the science of acoustics (the physics of sound, the engineering behind the hydrophones and recording systems, in-situ recordings, software for analysing measurements, etc.), this Common Indicator was conceived to cut out most of this complexity, and this not only simplifies extremely the way of monitoring, but also minimizes the costs of implementation. Therefore, an emphasis should be put on correctly disseminating the information on how this indicator is built.

Contacts and version Date

Key contacts within ACCOBAMS and UN Environment/MAP for further information

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3. THE GUIDANCE FACTSHEET FOR THE CANDIDATE INDICATOR 27

5. The Guidance Factsheet for **Common Indicator 27 (EO11): "**Levels of continuous low frequency sound with the use of models as appropriate" is presented in the following tabular form.

Indicator Title	Common Indicator 27. Levels of continuous low frequency sound with the use of models as appropriate	
Relevant GES definition	**Related Operational Objective**	**Proposed Target(s)**
Noise from human activities causes no significant impact on marine and coastal ecosystems.	Energy inputs into the marine environment, especially noise from human activities, are minimized	Noise levels at monitoring stations are below thresholds; The extent (% or km²) of the assessment area which is above levels causing disturbance to sensitive marine animal is below limits, or such limits are exceeded for a limited amount of time
Rational		
Justification for indicator selector Anthropogenic energy introduced by human activities into the marine environment includes sources of sound, light, heat and others among the electromagnetic field spectrum. The most widespread and pervasive is underwater sound (Dekeling et al., 2013a). Sound energy input can occur at varying spatial and temporal scales. Anthropogenic sounds may be of short duration (i.e. impulsive) or be long lasting (i.e. continuous). Lower frequency sounds can be transmitted far (tens to thousands of kilometres), whereas higher frequency sounds transmit less well in the marine environment (hundreds of meters to few kilometres (Urick, 1996). Most common sources of marine noise pollution include ship traffic, geophysical exploration and oil and gas exploitation, military sonar use and underwater detonations, telemetry devices and acoustic modems, scientific research involving the use of active acoustic sources, and offshore and inshore industrial construction works. Such activities are growing throughout the Mediterranean Sea (e.g. DeMicco; OWEMES, 2012; US Energy Information administration, 2013). Marine organisms can be adversely affected both on short and long timescales and include acute or chronic impact and temporary or permanent effects (Richardson et al, 1995). Adverse effects can be subtle (e.g. temporary reduction in hearing sensitivity, stress effects causing reduced immunity, reproduction success or survival), or more obvious (e.g. injury, death). The former may be difficult to observe and evaluate while the latter may in some circumstances be related to acute short-range noise exposures. This indicator addresses, particularly, the continuous (ca. chronic) low-frequency sound produced by marine activities. The major contributor to this type of ambient ocean noise is produced by maritime traffic. For this reason, it has been pointed as an important factor potentially reducing the acoustic space of marine animals, and particularly cetaceans which are known to communicate over very long ranges through acoustic signals. Many studies also shown negative effects on fish. The potential masking of biological signal due to ship noise is considered indeed as a big issue risk as it may be the cause of many other indirect impacts, such as reduced reproduction, reduced foraging success, and hence a long term degradation of the survival rate of populations(e.g. Blair et al. 2016; Tennessen & Parks 2015; Putland et al. 2017; Aguilar de Soto et al. 2006; Pirotta et al. 2012; Wysocki et al. 2006)		

Scientific References

Aguilar de Soto, N. et al., 2006. Does Intense Ship Noise Disrupt Foraging in Deep-Diving Cuvier'S Beaked Whales (Ziphius Cavirostris)? Marine Mammal Science, 22(3), pp.690–699. Available at: http://doi.wiley.com/10.1111/j.1748-7692.2006.00044.x [Accessed May 22, 2013].

Blair, H.B. et al., 2016. Evidence for ship noise impacts on humpback whale foraging behaviour. Biology Letters, 12(8). Available at: http://rsbl.royalsocietypublishing.org/content/12/8/20160005.abstract.

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De Micco P. The prospect of Eastern Mediterranean gas production: An alternative energy supplier for the EU?

OWEMES. 2012. Offshore wind and other marine renewable energies in the Mediterranean and European seas. In Proceedings of the European Seminar OWEMES 2012, Lazzari A, Molinas P (eds). National Agency for New Technologies, Eneregy and Sustainable Economic Development: Rome.

Urick, Robert J. (1996). Principles of underwater sound. pp 444 Peninsula Publishing. 3rd Edition.
Pirotta, E. et al., 2012. Vessel noise affects beaked whale behavior: results of a dedicated acoustic response study. PloS one, 7(8), p.e42535. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3411812&tool=pmcentrez&rendertype=abstract [Accessed October 6, 2012].

Putland, R.L. et al., 2017. Vessel noise cuts down communication space for vocalizing fish and marine mammals. Global Change Biology, (November). Available at: http://doi.wiley.com/10.1111/gcb.13996.
Tennessen, J.B. & Parks, S.E., 2015. Acoustic propagation modeling indicates vocal compensation in noise improves communication range for North Atlantic right whales. Endangered Species Research, 30(1), pp.225–237.

US Energy Information Administration. 2013. Overview of oil and natural gas in the Eastern Mediterranean region. Geology.

Wysocki, L.E., Dittami, J.P. &Ladich, F., 2006. Ship noise and cortisol secretion in European freshwater fishes. Biological Conservation, 128(4), pp.501–508. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0006320705004350 [Accessed January 13, 2014].

Policy Context and targets

Policy context description

Shipping activities are regulated by the IMO, the United Nations agency with responsibility for many aspects of shipping, including safety, maritime security, environmental concerns, legal and technical matters and efficiency. IMO is the source of several legal instruments, and among these the MARPOL

Convention was signed with the aim of minimising pollution in oceans and seas. MARPOL includes 6 Annexes, each one addressing a category of pollution produced by ships: oil emissions, noxious liquids, packaged harmful substances, sewage, garbage, air pollution. Unfortunately, MARPOL defines pollution as substance, not energy, contrary to many other regulation bodies including other UN-related bodies such as the UN Convention on the Law of the Sea (UNCLOS). Underwater noise is therefore not addressed by MARPOL. However, in recent years the Marine Environment Protection Committee (MEPC) of the IMO addressed underwater noise produced by shipping. As a result, guidelines were issues on the reduction of noise emission from ships. (IMO 2014; IMO 2013b; IMO 2013a). However, it is worth noting that such guidelines address noise radiated from single ships and the way to mitigate the emissions, while the general rising in ambient ocean noise due to increased shipping (i.e. an ecosystem approach) is not addressed.

Given the lack of global regulation of ship radiated noise, the MSFD and EcAp processes provide the first legal instrument for monitoring, assessing and setting targets, at least for their competence areas (the European Union and the Mediterranean region, respectively). All the policy document developed in the framework of such initiatives are therefore a novelty concerning the regulation of emissions of pollutant related to shipping. A closer cooperation with such global regulatory bodies as the IMO and MARPOL is certainly a major asset for the success of initiatives aimed at reducing ship radiated noise, the associated impacts, and therefore deliver good environmental status.

Beyond large scale regulation, many interesting initiatives are being proposed to strengthen the implementation of mitigation measures applied to shipping at a local scale. For example, some ports authorities are setting specific rules to foster ships complying with increasingly high environmental standards, including low noise emissions through reduced speed or displacement of ship lanes. One of the most known initiatives appears to be the port authority of Vancouver. Of course, the sum and synergy of increasing numbers of local initiatives has the potential to create a network big enough to produce positive effects at the ecosystem scale.

Targets

The early proposition contained in MSFD-related document was to adopt a decreasing trend in average noise levels. However, this appeared hard to implement as a trend could takes decades to be detected by robust statistical analysis, while actions may be taken already today to reduce noise radiated from ships, the contribution of shipping to marine noise, and finally the adverse effects on marine wildlife.

An interim list of targets was developed in the framework of the QUIETMED project, subject to further discussion and validation, or adjustments. This list includes operational and environmental targets. The difference between such two types of targets are that operational targets address actions that can be already implemented and for which we are confident that this will help moving towards (or maintaining) GES. On the other hand, environmental targets rather describe the sought characteristics of the environment with respect to the pressure factor (continuous noise from shipping in the case of Common Indicator 27). Therefore, environmental targets are more related to the units of measurements of the indicator (noise levels, spatial extents, etc.). Operational and environmental targets included in QUIETMED Deliverable 2.3 are the following: (operational) promoting the adoption of IMO guidelines on the reduction of ship radiated noise, and promoting other initiatives aimed fostering the emergence of low-noise ships (e.g. labelling, promoting the role of harbour authorities in regulating noise from ships, etc.); (environmental) threshold levels not exceeded > XX days/year; or (environmental) area with levels exceeding thresholds does not exceed XX% of the assessment area.

Policy documents

IMO, 2014. GUIDELINES FOR THE REDUCTION OF UNDERWATER NOISE FROM COMMERCIAL SHIPPING TO ADDRESS ADVERSE IMPACTS ON MARINE LIFE. 44(April).

IMO, 2013a. Noise from commercial shipping and its adverse impacts on marine life.66(March).

IMO, 2013b. PROVISIONS FOR REDUCTION OF NOISE FROM COMMERCIAL SHIPPING AND ITS ADVERSE IMPACTS ON MARINE LIFE.

International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978 (MARPOL 73/78).

Report of the following Meetings: COP17-18-19:

- http://www.unepmap.org/index.php?module=events&action=detail&id=65
- http://rac-spa.org/nfp12/documents/reference/13ig21_9_eng.pdf
- http://195.97.36.231/dbases/MEETING_DOCUMENTS/12IG20_8_Eng.pdf
- Reports of the 4th and 5thEcAp Coordination Unit meeting
- http://195.97.36.231/dbases/MEETING_DOCUMENTS/14WG401_8_ENG.pdf
- Report of the Meeting of the CORMONs, Athens 30 March – 01 April 2015
- Report of the Meeting of MED POL and joint-session MED POL/REMPEC, Malta 16-19, June 2015.
- http://195.97.36.231/dbases/MEETING_DOCUMENTS/15WG417_17_ENG.pdf

DIRECTIVE 2008/56/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive).

Commission Decision of 1 September 2010 on criteria and methodological standards on good environmental status of marine waters (2010/477/EU).

Commission Decision 2017/848/EU of 17 May 2017 laying down criteria and methodological standards on good environmental status of marine waters and specifications and standardised methods for monitoring and assessment, and repealing Decision (2010/477/EU)

Indicator analysis methods

Indicator Definition

Exceedance level was thought to detect such phenomenon, as an additional indicator for GES assessment.

Annual average of sound pressure level (SPL) and 33% Exceedance Level in selected frequency bands (third-octave bands centred at 20, 63, 125, 250, 500, 2000), where:

- SPL means Sound Pressure Level in dB (re 1µPa
- The term “Exceedance Level” is defined by the international standard ISO 1996-1:2003(E) as the level exceeded during 33% of the analysed time window

Average SPL gives an overview of average noise conditions in the assessed time window (1 year); while the 33% Exceedance Level provides a view of the highest noise levels for about one third of a year, corresponding to roughly 4 months. The use of 33% Exceedance Level is based on the assumption that in the Mediterranean Sea marine traffic noise increases substantially in the Summer season (June to September) mainly due to leisure craft, but also to increased numbers of navigating ships due to better weather conditions. The 33% Exceedance level was thought to detect such phenomenon, as an additional indicator for GES assessment.

Concerning frequencies, they were chosen as follows:

- 20Hz, based on fin whale biological significance. 20 Hz is indeed the peak frequency of the vocalizations of fin whales and monitoring the 1/3 octave band centred at this frequency may

help assessing the masking effect from anthropogenic noise sources

- 63 Hz, based on the frequency bands where noise from shipping is most likely to dominate over other sources (consistent with MSFD ambient noise criterion)
- 125 Hz, based on frequency bands where noise from shipping is most likely to dominate over other sources (consistent with MSFD ambient noise criterion)
- 250 Hz, based on frequency bands where noise from shipping is most likely to dominate over other sources according to Mediterranean data (e.g. Pulvirenti et al. 2014)
- 500 Hz, based on frequency bands where noise from shipping is most likely to dominate over other sources according to Mediterranean data (e.g. Pulvirenti et al. 2014)
- 2000 Hz, based sperm whale biological significance. Although sperm whale click peak frequency has been identified in 5000 Hz (Madsen et al., 2002; Watkins et al. 1980), its lower peak frequency limit has been defined in 2000 Hz. It seems more relevant to use the lower peak frequency limit because it is more likely to be affected by anthropogenic noise and it requires lower sampling rates to be recorded, reducing the cost of monitoring equipment and data archiving volume.

Methodology for indicator calculation

The calculation of the indicator requires to perform the following tasks:

- Analysing recordings from deployed acoustic equipment and computing graphs of sound levels against time, sound levels against frequency, or similar;
- Modelling the propagation of noise from continuous sources (ships) for estimating levels at large scales and for mapping the indicators in the assessment areas.

The metrics to employ are the following:

- Average Sound Pressure Level (arithmetic mean) over a year, calculated either from SPL samples obtained from the field or from a modelling process;
- 33% Exceedance level over a year, meaning the level corresponding to the 77^{th} percentile of the distribution of SPL values obtained either from the fields or from a modelling process.

In practice, two simple statistics should be calculated: the arithmetic mean, and the 77^{th} percentile. In the case of recordings, the samples to be used for statistical analysis are short cuts of sound recordings of fixed duration, where the number and duration of each sample is to be determined. Guidance for MSFD-Ambient Noise criterion says samples should not exceed 1 minute. For models, different approaches exist to obtain the required statistics: temporal approaches and probabilistic approaches. Regardless of the approach used for models, if any, it is recommended to consider available guidance on the use of models, such as: *Impacts of noise and use of propagation models to predict the recipient side of noise*(Borsani et al. 2015); *Review of underwater acoustic propagation models* (Wang et al. 2014); and the guidelines on noise modelling and mapping developed in the framework of the QUIETMED project (Deliverable 3.3), where practical implementation in a Mediterranean context is described.

Indicator units

Sound Pressure Levels expressed in **dB re 1µPa**

List of Guidance documents and protocols available

Dekeling, R.P.A., Tasker, M.L., Van der Graaf, A.J., Ainslie, M.A, Andersson, M.H., André, M., Borsani, J.F., Brensing, K., Castellote, M., Cronin, D., Dalen, J., Folegot, T., Leaper, R., Pajala, J., Redman, P., Robinson, S.P., Sigray, P., Sutton, G., Thomsen, F., Werner, S., Wittekind, D., Young, J.V., 2014. Monitoring Guidance for Underwater Noise in European Seas, Part I: Executive Summary, JRC Scientific and Policy Report EUR 26557 EN, Publications Office of the European Union, Luxembourg, 2014, doi: 10.2788/29293.

Best practice guidelines on acoustic modelling and mapping. 2017/848/EU and ACCOBAMS premises, and generalisation for the EcAp process. Deliverable 3.3, QUIETMED project. DG ENV/MSFD Second Cycle/2016.

Best practices guidelines on signal processing algorithms for the preprocessing of the data and for obtaining the noise indicator. Deliverable 3.2, QUIETMED project. DG ENV/MSFD Second Cycle/2016.

ACCOBAMS, 2015. A basin-wide strategy for underwater noise monitoring in the Mediterranean. Report prepared by Alessio Maglio, Manuel Castellote and Gianni Pavan.

Borsani, J.F., Faulkner, R.C. & Merchant, N.D., 2015. Impacts of noise and use of propagation models to predict the recipient side of noise. Report prepared under contract ENV.D.2/FRA/2012/0025 for the European Commission. Centre for Environment, Fisheries & Aquaculture Science, UK. , (July), p.27. Available at: http://mcc.jrc.ec.europa.eu/document.py?code=201601081529.

Verfuß, U.K., Andersson, M., Folegot, T., Laanearu, J., Matuschek, R., Pajala, J., Sigray, P., Tegowski, J., Tougaard, J. BIAS Standards for noise measurements. Background information, Guidelines and Quality Assurance. Amended version. 2015.

Wang, L.S. et al., 2014. Review of underwater acoustic propagation models (April 2016), p.35.

Data Confidence and uncertainties

Many sources of uncertainty exist concerning both measurements and models: the characteristics of the sound recorder used, the calibration, the mooring conditions and on the location of deployment (near or far from shipping lanes, in shadow areas, etc.), as well as many steps and settings of the data processing. Also, modelling methods contemplate a large number of variability factors often hindering meaningful comparisons among different monitoring programs. Such uncertainty results in well-known shortcomings in the understanding of how anthropogenic noise may affect the environment.

However, despite these sources of uncertainty, many steps forward have been done since the beginning of the implementation of the EcAp process, and considerable effort was done to develop guidance and best practices. Many of these efforts were focussed in northern European waters and the North Atlantic, but recent QUIETMED project produced valuable work in the direction of laying down common methods and shared understanding of the several technical aspects.

Methodology for monitoring, temporal and spatial scope

Available Methodologies for Monitoring and Monitoring Protocols

General monitoring methodology: the combined use of measurements and modelling is recommended. Continuous sound recording should be done at fixed sites through sound recording stations. Acoustic modelling and mapping through appropriate analytical procedures producing estimations to be validated from field measures.

The use of in-situ acoustic measurements is essential for:

- Gathering fundamental field data to establish information on the ambient noise in a given location
- Reducing uncertainty on source levels to be used as the input for modelling;
- Increasing evidence base to improve management decisions.

The use of models is essential for:

- Reducing the time required to establish a trend (the expected trend in shipping noise, based on observations in deep water, is of the order of 0.1 dB/year; and therefore, it takes many years, possibly decades, to reveal such small trends without the help of spatial averaging);
- Reducing the number of stations required to establish a trend over a fixed amount of time (similar reasoning to above), therefore reducing the cost of monitoring;
- Helping with the choice of monitoring positions and equipment (selecting locations where the shipping noise is dominant as opposed to explosions or seismic surveys being dominant);
- Producing noise maps, which are a valuable tool to quickly understand the ensonification levels over large areas, and a fundamental tool to calculate the extent of potentially impacted (non-GES) areas;
- Predicting future scenarios and therefore testing different noise reduction strategies, e.g. by answering simple questions such as what happens if we reduce by XX dB the noise of 1% (or 20% etc.) of the circulating ships? Will this be a significant reduction?

Monitoring Protocol: recordings are stored in a storage facility (server) during the year. These can be retrieved manually or automatically transmitted through appropriate networks (wi-fi, GPRS, Satellite) from the station to the server. Cabled sound recorders, directly connected to land, can also be used. Fieldwork is limited to deployment and maintenance of sound recorders. Data can be analysed once a year over the whole acoustic dataset obtained or periodically during the year. Models and mapping are computed through appropriate software once a year or with other suitable periodicity.

Contracting Parties within a subregion are recommended to work together to establish an ambient noise monitoring system. When defining such monitoring system, a number of aspects should be addressed (not exhaustive list): measuring equipment quality, calibration, deployment depth, mooring configuration.

Available data sources

It is expected that the European platform EmodNet shall include in the next future a section dedicated to under water noise data made available from monitoring stations placed in waters surrounding the EU (thus with some good coverage of the Mediterranean Sea).

Input environmental data for acoustic modelling (depth, seafloor, temperature and salinity profiles, etc.) are available at many freely available data repositories (EmodNet, Copernicus, NOAA, etc.).

Input ship data (AIS databases) for acoustic modelling (ship positions, speed, vessel type, etc.) can be accessed through AIS networks (marine traffic, AIShub, etc.).

Spatial scope guidance and selection of monitoring stations

Spatial scope: Contracting Parties should consider the whole maritime space under their jurisdiction for locating the acoustic devices, following the guidelines hereafter for selecting the location. Further, noise mapping based on sound propagation modelling provides an effective way of covering the whole maritime space of a country with limited costs.

Location of sampling sites:

- Monitoring in both high traffic and low traffic areas, also searching and including spots where the noise is supposed to be the lowest;
- Monitoring may be more cost effective if existing oceanographic stations included noise monitoring along with the other oceanographic variables already being monitored, such as European Multidisciplinary Seafloor Observation (EMSO) - European Seas Observatory Network of Excellence (ESONET-NoE);

- Consider local topography and bathymetry effects e.g. where there are pronounced coastal landscapes or islands/archipelagos it may be appropriate to place hydrophones on both sides of the feature;
- As far as possible avoid locations close to other sound producing sources that might interfere with measurements e.g. oil and gas exploration or offshore construction activities. Areas of particularly high tidal currents may also affect the quality of the measurement;
- Monitoring station should be primarily located in important cetacean habitat, as identified by ACCOBAMS (Resolution 4.15);
- Whenever possible use deep monitoring stations, either autonomous or cabled, to limit the influence of surface and sub-surface noise.

Temporal Scope guidance

Monitoring stations should be able to **continuously** record underwater sound. The temporal scheme for the monitoring may vary according to the type of equipment and the logistics for recovering and/or retrieving data. It is desirable that the deployments cover all the year, but there is no recommended retrieval periodicity with regards to moored equipment. Also, real-time equipment (either cabled stations or monitoring stations transmitting data through satellite or other wireless connection) may be used; The main advantages of these systems are the constant availability of data from land and the constant monitoring of the system status, thus resulting in reduced risk of losing data in case of damage of equipment at sea compared to bottom recorders, and optimised maintenance which is done only when required.

Data analysis and assessment outputs

Statistical analysis and basis for aggregation

Appropriate analysis software (usually algorithms developed in some programming language as Matlab) is used to derive simple statistics: the arithmetic means and 33% Exceedance level. Also, a trend analysis is possible. The arithmetic mean was originally proposed by TG-Noise with regards to the implementation of ambient noise monitoring for the MSFD. In TG-Noise guidance (Dekeling et al. 2014) different methods were tested and the result was that compared to the geometric mean, the median and the mode, the arithmetic mean has the following advantages:

- the arithmetic mean includes all sounds, so there is no risk of neglecting important ones;
- the arithmetic mean is independent of sample duration (the duration of the short cut of sound recording).

Even considering the robustness to sample duration, the TG-Noise recommended that the duration of single short cuts of sound recording (the samples for calculation of statistics) should not exceed 1 minute. Despite such detail was not addressed in the noise monitoring strategy developed by ACCOBAMS (2015), it seems consistent adopting this recommendation for the whole Mediterranean Sea.

In addition, ACCOBAMS considers that values in percentile appear very useful to convey information about how much time noise levels are maintained, welcoming the advice from different works on underwater noise monitoring (e.g. Merchant et al., 2013). In this regard, the adoption of the 33% Exceedance Level addresses the potential seasonal rising in ambient noise due to recreational craft, which is suspected to be heavy in many coastal areas of the Mediterranean region.
Finally, aggregation could be done through transboundary cooperation at the sub-regional level.

Expected assessments outputs

The assessment outputs are the following:

- Levels and maps of mean sound pressure level over a year or other suitable temporal windows;

- Levels and maps of 33% exceedance level over a year or other suitable temporal windows; Trend analysis across years or other periods (any robust statistical technique able to detect a trend can be used).

Known gaps and uncertainties in the Mediterranean

The Mediterranean presents a majority of deep-water environment whose soundscape has been poorly studied, although some fixed deep monitoring observatories (2 stations of the European Multidisciplinary Seafloor Observation/ European Seas Observatory Network of Excellence - EMSO/ESONET network, respectively 1 in the NW Mediterranean and 1 in the Ionian Sea) provide long term acoustic data since many years. Obviously, many other temporary deployments from the '90s to date were done and data are available for reviewing levels, results, and more with a view of establishing baselines. However, common shortcomings (lack of standards for calibration, and the many source of variability highlighted above in this factsheet), may prevent from extracting meaningful information from such review concerning the Common Indicator 27. Further, the poor AIS coverage in some parts of the Mediterranean, especially the southern part, may affect the quality of monitoring through modelling techniques. However, the work done in the last 10 years on underwater noise from an ecosystem perspective enabled a better understanding.

The Mediterranean present a majority of deep-water environment whose soundscape has been poorly studied, although some fixed deep monitoring observatories (2 stations of the EMSO/ESONET network, 1 in the NW Mediterranean, 1 in the Ionian Sea) provide long term acoustic data since many years. Obviously, many other temporary deployments from the '90s to date were done and data are available for reviewing levels, results, and more with a view of establishing baselines. However, common shortcomings (lack of standards for calibration, and the many source of variability highlighted above in this factsheet), may prevent from extracting meaningful information from such review concerning the Common Indicator 27. Further, the poor AIS coverage in some parts of the Mediterranean, especially the southern part, may affect the quality of monitoring through modelling techniques. However, the work done in the last 10 years on underwater noise from an ecosystem perspective enabled a better understanding, and thus a better management and mitigation, of the different sources of uncertainties.

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Appendix I
The amendments of the IMAP Guidance Factsheets for Common Indicators 13, 14, 17, 18, 20 and 21

1. The amendments of the IMAP Guidance Factsheets for Common Indicators 13, 14, 17, 18, 20 and 21

1.1 Common Indicator 13

1. The update for **Common Indicator 13 (EO5)**: Concentration of key nutrients in water column[17,18] is presented in bellow table.

Indicator Title	Common Indicator 13. Concentration of key nutrients in water column (EO5)	
Relevant GES definition	**Related Operational Objective**	**Proposed Target(s)**
Concentrations of nutrients in the euphotic layer are in line with prevailing physiographic, geographic and climate conditions	Human introduction of nutrients in the marine environment is not conducive to eutrophication	1. Reference nutrients concentrations according to the local hydrological, chemical and morphological characteristics of the un-impacted marine region. 2. Decreasing trend of nutrients concentrations in water column of human impacted areas, statistically defined. 3. Reduction of BOD emissions from land-based sources. 4. Reduction of nutrients emissions from land-based sources
Rational		
Justification for indicator selection Eutrophication is a process driven by enrichment of water by nutrients, especially compounds of nitrogen and/or phosphorus, leading to: increased growth, primary production and biomass of algae; changes in the balance of nutrients causing changes to the balance of organisms; and water quality degradation. The direct and indirect consequences of eutrophication are undesirable when they degrade ecosystem health and/or the sustainable provision of goods and services, such as algal blooms, dissolved oxygen deficiency, declines in sea-grasses, mortality of benthic organisms and/or fish. Although, these changes may also occur due to natural processes, the management concern begins when they are attributed to anthropogenic sources.		
Scientific References i. Brzezinski M.A., 1985. The Si:C:N ratio of marine diatoms: interspecific variability and the effect of some environmental variables. Journal of Phycology, Vo. 21, pp. 347–357.		

[17]Note that this builds upon a previous indicator factsheet developed under Horizon 2020. H2020 Indicators Fact Sheets. Regional meeting on PRTR and Pollution indicators, Ankara (Turkey), 16-17 June 2014. (UNEP(DEPI)/MED WG. 399/4)

[18]MSFD Descriptor 5: Human-induced eutrophication is minimized, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algae blooms and oxygen deficiency in bottom waters.

Indicator Title	Common Indicator 13. Concentration of key nutrients in water column (EO5)

ii. Conley D.J., Schelske C.L., Stoermer E. F., 1993. Modification of the biogeochemical cycle of silica with eutrophication. Mar. Ecol. Prog. Ser. 101, 179-192.

iii. Devlin, M., Painting, S., Best, M., 2007. Setting nutrient thresholds to support an ecological assessment based on nutrient enrichment, potential primary production and undesirable disturbance. Mar. Poll., 55., 65-73

iv. Carstensen J., 2007. Statistical principles for ecological status classification of Water Framework Directive monitoring data. Mar. Poll., 55, 3-15.

v. Phillips,G., Kelly M., Leujak W., Salas F., Teixeira H. 2017. Best Practice Guide on establishing nutrient concentrations to support good ecological status. Common Implementation Strategy for the Water Framework Directive and the Floods Directive. 138 pp.

Policy Context and targets

Policy context description

In the Mediterranean, the UNEP/MAP MED POL Monitoring programme included from its inception the study of eutrophication as part of its seven pilot projects approved by the Contracting Parties at the Barcelona meeting in 1975 (UNEP MAP, 1990a,b). The issue of a consistent monitoring strategy and assessment of eutrophication was first raised at the UNEP/MAP MED POL National Coordinators Meeting in 2001 (Venice, Italy) which recommended to the Secretariat to elaborate a draft programme for monitoring of eutrophication in the Mediterranean coastal waters (UNEP/MAP MED POL, 2003). In spite of a series of assessments reviewing the concept and state of eutrophication, there are important gaps in the capacity to assess the intensity of this phenomenon. Efforts have been devoted to defining the concepts to assess the intensity and to extend experience beyond the initial sites in the Adriatic Sea, admittedly, the most eutrophic area in the entire Mediterranean Sea. In the context of the Mediterranean Sea, the Integrated Monitoring and Assessment Programme (UNEP/MAP, 2016) and the European Marine Strategy Framework Directive (2000/56/EC) are the two main policy tools for the eutrophication phenomenon.

Targets

For each considered marine spatial scale (region, sub-region, local water mass, etc.) the nutrient levels should be compared based on base reference levels and trends monitoring until commonly agreed thresholds have been scientifically assessed and agreed upon in the Mediterranean Sea.

Policy documents

General Policy documents

i. 19th COP to the Barcelona Convention, Athens, Greece, 2016. Decision IG.22/7 - Integrated Monitoring and Assessment Programme (IMAP) of the Mediterranean Sea and Coast and Related Assessment Criteria (UNEP(DEPI)/MED IG.22/28)

ii. 19th COP to the Barcelona Convention, Athens, Greece, 2016.Draft Integrated Monitoring and Assessment Guidance (UNEP(DEPI)/MED IG.22/Inf.7)

Indicator Title	Common Indicator 13. Concentration of key nutrients in water column (EO5)

iii. 18th COP to the Barcelona Convention, Istanbul, Turkey, 2013.Decision IG.21/3 - Ecosystems Approach including adopting definitions of Good Environmental Status (GES) and Targets. UNEP(DEPI)/MED IG.21/9

iv. Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive).

Nutrient/Eutrophication related Policy documents

v. UNEP/MAP MED POL (2003). Eutrophication Monitoring Strategy of UNEP/MAP MED POL. UNEP(DEPI)/MED WG.231/14. UNEP, Athens.

vi. Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy.

vii. UNEP/FAO/WHO (1996). 'Assessment of the state of eutrophication in the Mediterranean Sea'. MAP Technical Reports Series No 106. UNEP, Athens, 211 pp.

viii. UNEP/MAP MED POL (1990a). Activity IV: Research on the effects of pollutants on Marine Organisms and their Populations (UNEP/MAP MED POL Phase I, 1975-1981).

ix. UNEP/MAP MED POL (1990b). Activity V: Research on the effects of pollutants on Marine Communities and Ecosystems (UNEP/MAP MED POL Phase I, 1975-1981).

Indicator analysis methods

Indicator Definition

Concentration of key (inorganic) nutrients in the water column:
Nítrate (NO_3-N)
Nitrite (NO_2-N)
Ammonium (NH_4-N)
Total Nitrogen (TN)
Orthophosphate (PO_4-P)
Total Phosphorus (TP)
Orthosilicate (SiO_4-Si)

Sub-Indicators: Nutrient ratios (molar) of silica, nitrogen and phosphorus where appropriate:
Si:N, N:P, Si:P

Methodology for indicator calculation

All: Spectrophotometry (manually or automated methods and instrumentation)

Indicator units

All: micromol per liter, that is micromolar concentration (μmol/L =μM)
Ratios: adimensional (simple mathematical derivation of ratios from nutrient concentrations)

List of Guidance documents and protocols available

i. OSPAR, 2012. OSPAR MSFD Advice Document on Eutrophication. Approaches to determining good environmental status, setting of environmental targets and selecting indicators for Marine Strategy Framework Directive descriptor 5.

ii. Piha, H., Zampoucas, N., 2011. Review of Methodological Standards Related to the Marine Strategy Framework Directive Criteria on Good Environmental Status. JRC Scientific and Technical Reports, EUR 24743 EN

iii. UNEP/MAP MED POL (2005). Sampling and Analysis Techniques for the Eutrophication Monitoring Strategy of UNEP/MAP MED POL. MAP Technical Reports Series No. 163. UNEP, Athens. 61pp.

iv. Durairaj, P., Sarangi, R.K., Ramalingam, S. *et al.* Seasonal nitrate algorithms for nitrate retrieval using OCEANSAT-2 and MODIS-AQUA satellite data. Environ Monitoring Assess (2015) 187: 176.

v. See also UNEP/MAP website (http://web.unep.org/unepmap)

Data Confidence and uncertainties

Despite the great variability born by the water layers subject to active hydrodynamic processes, monitoring the characteristics of the seawater is still the most direct way of assessing eutrophication. Inorganic nutrients may be determined either at the surface or at various depths.

Methodology for monitoring, temporal and spatial scope

Available Methodologies for Monitoring and Monitoring Protocols

Traditional methods for eutrophication monitoring in coastal waters involve *in situ*sampling/measurements of commonly measured parameters such as nutrients concentration. Concerning available methods for *in situ* measurements, ships provide flexible platforms for eutrophication monitoring, while remote sensing provides opportunities for a synoptic view over regions or sub-regions. Besides traditional ship measurements, ferry-boxes and other autonomous measuring devices have been developed that allow high frequency and continuous measurements.

Sampling for the determination of *in vitro* fluorescence and nutrient analysis may be carried out with relatively little effort if a proper pump and hose are mounted on the ship. The measurements may be done at the surface or just below it with a water intake on the hull of the vessel or at fixed or varying depths with a towed “fish” and pumping system.

Available data sources
MED POL Database.

EMODNET Chemistry:
http://www.emodnet-chemistry.eu/data_access.html

EEA Waterbase - Transitional, coastal and marine waters:
http://www.eea.europa.eu/data-and-maps/data/waterbase-transitional-coastal-and-marine-waters-11

Spatial scope guidance and selection of monitoring stations

The first factor promoting eutrophication is nutrient enrichment. This explains why the main eutrophic areas are to be found primarily not far from the coast, mainly in areas receiving high nutrient loads, despite some natural symptoms of eutrophication can also be found, such as in upwelling areas. Additionally, the risk of eutrophication is linked to the capacity of the marine environment to confine

growing algae in the well-lighted surface layer. The geographical extent of potentially eutrophic waters may vary widely, depending on:

(i) the extent of shallow areas, i.e. with depth ≤ 20 m;
(ii) the extent of stratified river plumes, which can create a shallow surface layer separated by a halocline from the bottom layer, whatever its depth;
(iii) extended water residence times in enclosed seas leading to blooms triggered to a large degree by internal and external nutrient pools; and
(iv) upwelling phenomena leading to autochthonous nutrient supply and high nutrient concentrations from deep water nutrient pools, which can be of natural or human origin.

Therefore, the geographical scale of monitoring for the assessment of GES for eutrophication will depend on the hydrological and morphological conditions of an area, particularly the freshwater inputs from rivers, the salinity, the general circulation, upwelling and stratification. The spatial distribution of the monitoring stations should, prior to the establishment of the eutrophication status of the marine sub-region/area, be risk-based and proportionate to the anticipated extent of eutrophication in the sub-region under consideration as well as its hydrographic characteristics aiming for the determination of spatially homogeneous areas. The eutrophication monitoring programmes should pursue to assess the eutrophication phenomena, based on the differentiation of the scale and time dependant signals from human induced versus natural eutrophication.

Temporal Scope guidance

Flexibility should be incorporated into the design of the monitoring programme to take account of differences in each marine sub-region/area. At the Mediterranean Sea latitudes, in general terms, the pre-summer and Winter primary production bloom intensity peaks of natural eutrophication will define the strategy for the sampling frequency, although year-round measurements of nutrients may be more appropriate. The optimum frequency (seasonal 2 to 4 times per year or monthly 12 times per year) for the monitoring of nutrients at the selected stations should be chosen taking into account the necessity of both to control the deviations of the known natural cycles of eutrophication in coastal areas and the control of (decreasing) trends monitoring impacted areas, therefore, from low frequency (minimum)to high frequency measurements.

Therefore, either for impacted or non-impacted coastal waters the optimal frequency per year and sampling locations needs to be selected at a local scale, whilst for open waters the sampling frequency to be determined on a sub-regional level following a risk-based approach.

Mainly, in order to build a robust sampling frequency scale in future a sounded statistical approach has to be developed that takes into account the discriminant limit between classes when the nutrient boundaries approach will be widely accepted. Let consider the approach developed for CI14 - Chlorophyll a concentration in water column as an example to be used, as for this CI accepted boundaries exists.

Sampling frequency is determined by the variability of the measured parameters and is usually determined by how many samples are needed to reliably assess the differences between two neighbouring mean values.

Discriminant limit (ie power of applied test), depends on sample size:

Discriminant limit dM = sd * t(α/2; N1+N2-2) * √ 2; N1+N2-2) 0

For Chl-a log10 units for different sample size N with the significance level: α/2 = 0,025; with an average sd = 0.30

N = 12 t = 2.074 √

N = 24 t = 2.013 √ = 24 = 0.289 dM > |0.17|

N = 52 t = 1,983 √ = 52 = 0.196 dM > |0.12|

Based on the above it follows that a particular area can be characterized best if we measure three relevant depths (typically 0, 5 and 10 m) at one station at least monthly or at three stations one depth (0 m). It is at annual base 36 samples which discriminates around 0.15 Chl-a log10 unit for mesotrophic

- eutrophic area that is slightly less than half difference between two classes (0.37 as log10 unit). Due to smaller standard deviation for an oligotrophic area we achieve the same with half the frequency. The next measurement frequency is proposed: Eutrophic – mesotrophic: monthly, Mesotrophic – oligotrophic: monthly near the coast, bimonthly in open waters, and Oligotrophic: bimonthly near the coast, seasonally in open waters.[19]
Data analysis and assessment outputs
Despite the individual nutrient concentrations and nutrient ratios will be evaluated based on statistical analysis against known reference levels and known marine eutrophication processes, following the evaluation of information provided by a number of countries and other available information, it has to be noted that the Mediterranean countries are using different eutrophication non-mandatory assessment methods such as TRIX, UNTRIX, Eutrophication scale, EI, HEAT, OSPAR, etc. Nutrients concentrations are part of these tools and is very important to continue to be used at sub-regional or national levels because there is a long-term experience within countries which can reveal / be used for assessing eutrophication trends. However, in order to increase coherency and comparability regarding eutrophication assessment methodologies is recommended that further efforts should be made to harmonize existing tools through workshops, dialogue and comparative exercises at regional/subregional/subdivision levels in Mediterranean with a view to further develop common assessment methods.
Expected assessments outputs As suggested by the on-line expert group on eutrophication established by the Contracting parties it is recommended that with regard to nutrient concentrations, until commonly agreed thresholds have been determined and agreed upon, GES may be determined on a levels and trend monitoring basis.
Known gaps and uncertainties in the Mediterranean For a complete assessment of eutrophication and GES achievement, GES thresholds and reference conditions (natural background concentrations) are needed not only for chlorophyll *a*, but such values must be set in the near future, through dedicated workshops and exercises also for nutrients, transparency and oxygen as minimum requirements (see also related Common Indicator 14). This should include quality assurance schemes, as well as data quality control protocols. Nutrient, transparency and oxygen thresholds and reference values may not be identical for all areas, since is recognized that area-specific environmental conditions must define threshold values. GES could be defined on a sub-regional level, or on a sub-division of the sub-region (such as the Northern Adriatic), due to local specificities in relation to the trophic level and the morphology of the area.
Contacts and version Date
http://www.unepmap.org

Version No	**Date**	**Author**
V.1	31.5.17	MEDPOL
V.2	10.1.19	MEDPOL
Final version	31/05/2019	Approved by the Meeting of MED POL FPs

1.2 Common Indicator 14

2. The update for **Common Indicator 14** (EO5): Chlorophyll a concentration in water column[20] is presented for in below table.

[19] Morocco expressed reservation on proposed example for sampling frequency determination
[20] MSFD Descriptor 5: Human-induced eutrophication is minimized, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algae blooms and oxygen deficiency in bottom waters.

Indicator Title	Common Indicator 14. Chlorophyll *a* concentration in water column (EO5)	
Relevant GES definition	**Related Operational Objective**	**Proposed Target(s)**
Natural levels of algal biomass, water transparency and oxygen concentrations in line with prevailing physiographic, geographic and weather conditions	Direct and indirect effects of nutrient over-enrichment are prevented	1. Chlorophyll *a* concentrations in high-risk areas below thresholds 2. Decreasing trend in chl-*a* concentrations in high risk areas affected by human activities

Rational

Justification for indicator selection

Eutrophication is a process driven by enrichment of water by nutrients, especially compounds of nitrogen and/or phosphorus, leading to: increased growth, primary production and biomass of algae; changes in the balance of nutrients causing changes to the balance of organisms; and water quality degradation. The consequences of eutrophication are undesirable if they appreciably degrade ecosystem health and/or the sustainable provision of goods and services, such as excessive algal blooms, dissolved oxygen deficiency, declines in sea-grasses, mortality of benthic organisms and/or fish. Altough, these changes may also occur due to natural processes, the management concern begins when they are attributed to anthropogenic sources.

Scientific References

i. Boyer J.N. Kelble C.R., Ortner P.B., Rudnick D.T., 2009. Phytoplankton bloom status: Chlorophyll *a* biomass as an indicator of water quality condition in the southern estuaries of Florida, USA. Ecological Indicators 9s:s56- s67.

ii. Primpas I., Karydis M., 2011. Scaling the trophic index (TRIX) in oligotrophic marine environments. Environmental Monitoring and Assessment July 2011, Volume 178, Issue 1-4, pp 257-269.

iii. Vollenweider, R.A., Giovanardi F., Montanari, G., Rinaldi A., 1998. Characterization of the trophic conditions of marine coastal waters, with special reference to the NW Adriatic Sea: proposal for a trophic scale, turbidity and generalized water quality index. Environmetrics, 9, 329-357.

Policy Context and targets

Policy context description

In the Mediterranean, the UNEP/MAP MED POL Monitoring programme included from its inception the study of eutrophication as part of its seven pilot projects approved by the Contracting Parties at the Barcelona meeting in 1975 (UNEP MAP, 1990a,b). The issue of a consistent monitoring strategy and assessment of eutrophication was first raised at the UNEP/MAP MED POL National Coordinators Meeting in 2001 (Venice, Italy) which recommended to the Secretariat to elaborate a draft programme for monitoring of eutrophication in the Mediterranean coastal waters (UNEP/MAP MED POL, 2003). In spite of a series of assessments reviewing the concept and state of eutrophication, there are important gaps in the capacity to assess the intensity of this phenomenon. Efforts have been devoted to defining the concepts to assess the intensity and to extend experience beyond the initial sites in the Adriatic Sea, admittedly, the most eutrophic area in the entire Mediterranean Sea. In the context of the Mediterranean Sea, the European **Marine** Strategy

Indicator Title	Common Indicator 14. Chlorophyll *a* concentration in water column (EO5)

Framework Directive (200/56/EC) and the Integrated Monitoring and Assessment Programme (UNEP/MAP, 2016), are the two main policy tools for the eutrophication phenomenon.

Targets

For each defined marine spatial scale (region, sub-region, etc.) the levels should be compared against agreed threshold levels defining High/Good and Good/Medium environmental status based on the indicative thresholds and reference values of Chlorophyll *a*- in Mediterranean coastal water types, according to the Commission Decision of 20 September 2013 (2013/480/EU) establishing, pursuant to Directive 2000/60/EC (WFD), the values of the Member State monitoring system classifications as a result of the intercalibration exercise and repealing Decision 2008/915/EC, recalling on reference conditions (High/Good) and boundaries of good/moderate status (G/M).

Policy documents

General Policy documents

i. 19th COP to the Barcelona Convention, Athens, Greece, 2016. Decision IG.22/7 - Integrated Monitoring and Assessment Programme (IMAP) of the Mediterranean Sea and Coast and Related Assessment Criteria (UNEP(DEPI)/MED IG.22/28)

ii. 19th COP to the Barcelona Convention, Athens, Greece, 2016.Draft Integrated Monitoring and Assessment Guidance (UNEP(DEPI)/MED IG.22/Inf.7)

iii. 18th COP to the Barcelona Convention, Istanbul, Turkey, 2013.Decision IG.21/3 - Ecosystems Approach including adopting definitions of Good Environmental Status (GES) and Targets. UNEP(DEPI)/MED IG.21/9

iv. Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive).

Nutrient/Eutrophication related Policy documents

v. UNEP/MAP MED POL (2003). Eutrophication Monitoring Strategy of UNEP/MAP MED POL. UNEP(DEPI)MED WG.231/14. UNEP, Athens.

vi. Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy.

vii. UNEP/FAO/WHO (1996). 'Assessment of the state of eutrophication in the Mediterranean Sea'. MAP Technical Reports Series No 106. UNEP, Athens, 211 pp.

viii. UNEP/MAP MED POL (1990a). Activity IV: Research on the effects of pollutants on Marine Organisms and their Populations (UNEP/MAP MED POL Phase I, 1975-1981).

ix. UNEP/MAP MED POL (1990b). Activity V: Research on the effects of pollutants on Marine Communities and Ecosystems (UNEP/MAP MED POL Phase I, 1975-1981).

Indicator analysis methods

Indicator Definition

Chlorophyll *a* concentration in the water column (State, Impact Indicator);

Indicator Title	Common Indicator 14. Chlorophyll *a* concentration in water column (EO5)

Sub-Indicators: Water Transparency (State, Impact Indicator) and Dissolved oxygen (State, Impact Indicator)

Methodology for indicator calculation

Chlorophyll *a*: Spectrophotometry.
ISO 10260 (1992) on spectrometric determination of the chlorophyll *a* concentration provides a standard method for quantification of chlorophyll *a*.
Water transparency: measured as Secchi disk depth or according to ISO 7027:1999 Water Quality-Determination of Turbidity
Dissolved Oxygen: Chemical methods, Oxygen sensors, etc. measured near the bottom (under the euphotic layer/oxycline)

Indicator units

microgram per liter (μg/L) - Chlorophyll *a*
meters – Secchi disk depth; NTU Turbidity Scale (Nephelometric Turbidity Units) – Water transparency
milligram per liter (mg/L) and % Saturation (if temperature and salinity is known) – Dissolved Oxygen

List of Guidance documents and protocols available

i. OSPAR, 2012. OSPAR MSFD Advice Document on Eutrophication. Approaches to determining good environmental status, setting of environmental targets and selecting indicators for Marine Strategy Framework Directive descriptor 5

ii. Piha, H., Zampoucas, N., 2011. Review of Methodological Standards Related to the Marine Strategy Framework Directive Criteria on Good Environmental Status. JRC Scientific and Technical Reports, EUR 24743 EN

iii. UNEP/MAP MED POL, 2005. Sampling and Analysis Techniques for the Eutrophication Monitoring Strategy of UNEP/MAP MED POL. MAP Technical Reports Series No. 163. UNEP, Athens. 61pp.

Data Confidence and uncertainties

Despite the great variability born by the water layers subject to active hydrodynamic processes, monitoring the characteristics of the seawater is still the most direct way of assessing eutrophication. A number of parameters have been identified as providing most information relative to eutrophication e.g. chlorophyll *a*, dissolved oxygen, inorganic nutrients, organic matter, suspended solids, light penetration, aquatic macro-phytes, zoo benthos, etc. They all may be determined either at the surface or at various depths.
If only limited means are available, determination of those parameters that synthesize the most information should be retained. Chlorophyll *a* determination for example, although not very precise representations of the system, are data which provide a great deal of information. Turbidity may also be a good measure of eutrophication, except near the mouths of rivers where inert suspended solids may be extremely abundant. Dissolved oxygen is one parameter that integrates much information on the processes involved in eutrophication, provided it is measured near the bottom or, at least, below the euphotic zone where an oxycline usually appears.

Methodology for monitoring, temporal and spatial scope

Available Methodologies for Monitoring and Monitoring Protocols

Traditional methods for eutrophication monitoring in coastal waters involve *in situ* sampling/measurements of commonly measured parameters such as nutrients concentration,

Indicator Title	Common Indicator 14. Chlorophyll *a* concentration in water column (EO5)

chlorophyll *a* concentration, phytoplankton abundance and composition, transparency and dissolved oxygen concentration. Concerning available methods for *in situ* measurements, ships provide flexible platforms for eutrophication monitoring, while remote sensing provides opportunities for a synoptic view over regions or sub-regions. Besides traditional ship measurements, ferry-boxes and other autonomous measuring devices have been developed that allow high frequency and continuous measurements.

Modelling and remote sensing should also be considered as area integrating in addition to *in situ* measurements, depending on the requirements with respect to data. In general, *in situ* measurements always remain necessary to validate and calibrate the models and data calculated from satellite measurements.

However, satellite data need to be supported by ground truth data. A good strategy appears to be a combination of remote sensing and scanning of the area known or suspected to be affected with automatic measuring instruments such as thermo-salinometer, dissolved oxygen sensors and *in vivo*fluorometer and/or nephelometer. Sampling for the determination of *in vitro* fluorescence and nutrient analysis may be carried out with relatively little effort if a proper pump and hose are mounted on the ship. The measurements may be done at the surface or just below it with a water intake on the hull of the vessel or at fixed or varying depths with a towed "fish" and pumping system.

Available data sources
MED POL Database.

EMODNET Chemistry:
http://www.emodnet-chemistry.eu/data_access.html

EEA Waterbase - Transitional, coastal and marine waters:
http://www.eea.europa.eu/data-and-maps/data/waterbase-transitional-coastal-and-marine-waters-11

Satellite databases such as in EMIS http://mcc.jrc.ec.europa.eu/emis/

Spatial scope guidance and selection of monitoring stations

The extent of eutrophication shows spatial variation, for instance coastal regions versus the open sea. The frequency and spatial resolution of the monitoring programme should reflect this spatial variation in eutrophication status and pressures following a risk-based approach and the precautionary principle.

The geographical extent of potentially eutrophic waters may vary widely, depending on:

(i) the extent of shallow areas, i.e. with depth ≤ 20 m;
(ii) the extent of stratified river plumes, which can create a shallow surface layer separated by a halocline from the bottom layer, whatever its depth
(iii) extended water residence times in enclosed seas leading to blooms triggered to a large degree by internal and external nutrient pools; and
(iv) upwelling phenomena leading to autochthonous nutrient supply and high nutrient concentrations from deep water nutrient pools, which can be of natural or human origin.

Therefore, the geographical scale of monitoring for the assessment of GES for eutrophication will depend on the hydrological and morphological conditions of an area, particularly the freshwater inputs from rivers, the salinity, the general circulation, upwelling and stratification. The spatial distribution of the monitoring stations should, prior to the establishment of the eutrophication status of the marine sub-region/area, be risk-based and proportionate to the anticipated extent of eutrophication in the sub-region under consideration as well as its hydrographic characteristics aiming for the determination of spatially homogeneous areas. The eutrophication monitoring programmes should pursue to assess the eutrophication phenomena, based on the differentiation of the scale and time dependant signals from human induced versus natural eutrophication.

Indicator Title	Common Indicator 14. Chlorophyll *a* concentration in water column (EO5)

Temporal Scope guidance

The current national eutrophication monitoring programme implemented so far by the Contracting Parties in the framework of the UNEP/MAP MED POL programme should be used as a sound basis for monitoring under the EcAp.
Sampling frequency has to be determined by the variability of the measured parameters and is usually determined by how many samples are needed to reliably assess the differences between two neighbouring mean values.
Discriminant limit (i.e. power of applied test), depends on sample size:

Discriminant limit $dM = sd * t(\alpha/2; N1+N2-2) * \sqrt{(1/N1+1/N2)} \neq 0$

For Chl-a log10 units for different sample size N with the significance level: $\alpha/2 = 0{,}025$; with an average sd = 0.30

N = 12 t = 2.074 $\sqrt{(2/12)}$ = 0.408 dM > |0.25|

N = 24 t = 2.013 $\sqrt{(2/24)}$ = 0.289 dM > |0.17|

N = 52 t = 1,983 $\sqrt{(2/52)}$ = 0.196 dM > |0.12|

Based on the above it follows that a particular area can be characterized best if we measure three relevant depths (typically 0, 5 and 10 m) at one station at least monthly or at three stations one depth (0 m). It is at annual base 36 samples which discriminates around 0.15 chla log10 unit for mesotrophic - eutrophic area that is slightly less than half difference between two classes (0.37 as log10 unit). Due to smaller standard deviation for an oligotrophic area we achieve the same with half the frequency.
The next measurement frequency is proposed:
Eutrophic – mesotrophic: monthly,
mesotrophic – oligotrophic: monthly near the coast, bimonthly in open waters, and
oligotrophic: bimonthly near the coast, seasonally in open waters[21].
For open waters sampling frequency to be determined on a sub-regional level following a risk-based approach
Water transparency: *id.* Chlorophyll *a*
Dissolved Oxygen: *id.* Chlorophyll *a*

Data analysis and assessment outputs

Statistical analysis and basis for aggregation

The classification scheme on chlorophyll *a* concentration developed by MEDGIG as an assessment method easily applicable by all Mediterranean countries based on the indicative thresholds and reference values adopted.
The main statistical analysis is based on the typology criteria and settings derived from the analysis of influence of freshwater inputs as the main nutrient drivers. More information on is presented in document the UNEP(DEPI)/MED WG 417/Inf.15. Tree main types were identified:

Type I	coastal sites highly influenced by freshwater inputs,
Type IIA	coastal sites moderately influenced not directly affected by freshwater inputs (Continent influence),
Type IIIW	continental coast, coastal sites not influenced/affected by freshwater inputs (western Basin),
Type IIIE	not influenced by freshwater input (Eastern Basin),
Type Island	coast (western Basin).

[21] Morocco expressed reservation on proposed example for sampling frequency determination

Indicator Title	Common Indicator 14. Chlorophyll *a* concentration in water column (EO5)

Coastal water type III was split in two different sub basins, the western and the Eastern Mediterranean s, according to the different trophic conditions and is well documented in literature. It is recommended to define the major coastal water types in the Mediterranean for eutrophication assessment (Table 1).

Table 1. Major coastal water types in the Mediterranean

	Type I	Type IIA, IIA Adriatic	Type IIIW	Type IIIE	Type Island-W
σt (density)	<25	25<d<27	>27	>27	All range
salinity	<34.5	34.5<S<37.5	>37.5	>37.5	All range

With the view to assess eutrophication, it is recommended to rely on the classification scheme on Chlorophyll a concentration (μg L-1) in coastal waters as a parameter easily applicable by all Mediterranean countries based on the indicative thresholds and reference values presented in Table 2.

Table 2. Coastal Water types reference conditions and boundaries in the Mediterranean

Coastal Water Typology	Reference conditions of Chla (μg L-1)		Boundaries of Chla (μg L-1) for G/M status	
	G_mean	90% percentile	G_mean	90% percentile
Type I	1,4	3,33* - 3,93**	6,3	10* - 17,7**
Type II-FR-SP		1,9		3,58
Type II-A Adriatic	0,33	0,8	1,5	4,0
Type II-B Tyrrhenian	0,32	0,77	1,2	2,9
Type III-W Adriatic			0,64	1,7
Type III-W Tyrrhenian			0,48	1,17
Type III-W FR-SP		0,9		1,80
Type III-E		0,1		0,4
Type Island-w		0,6		1,2 – 1,22

* aapplicable to Gulf of Lion
** applicable to Adriatic

Further, developments within the European MSFD with regard to eutrophication should also be taken into account.
Further, it has to be noted that the Mediterranean countries are using different eutrophication non-mandatory assessment methods such as TRIX, UNTRIX, Eutrophication scale, EI, HEAT, OSPAR, etc. These tools are very important to continue to be used at sub-regional or national levels because there is a long-term experience within countries which can reveal / be used for assessing eutrophication trends.
However, in order to increase coherency and comparability regarding eutrophication assessment methodologies is recommended that further efforts should be made to harmonize existing tools through workshops, dialogue and comparative exercises at regional/sub-regional/subdivision levels in Mediterranean with a view to further implement the IMAP assessment methods, in a.

Expected assessments outputs

GES thresholds and trends are recommended to be used in a combined way, according to data availability and agreement on GES threshold levels. In the framework of UNEP/MAP MED POL there is experience with regard to using quantitative thresholds. It is proposed that for the Mediterranean region, quantitative thresholds between “good” (GES) and “moderate” (non-GES) conditions for coastal waters could be based as appropriate on the work carried out in the framework of the MEDGIG intercalibration process of the EU Water Framework Directive (WFD). The

Indicator Title	Common Indicator 14. Chlorophyll *a* concentration in water column (EO5)

Contracting Parties are recommended to rely on the classification scheme on chlorophyll a concentration (μg/L) in coastal waters as a parameter easily applicable by all Mediterranean countries based on the indicative thresholds and reference values of chlorophyll a in Mediterranean coastal water types (according to 2013/480/EU, see reference below), recalling on reference conditions and boundaries of good/moderate status (G/M).

In this context regarding the definition of sub-regional thresholds for chlorophyll a water typology is very important for further development of classification schemes of a certain area. Within the MEDGIG exercise the recommended water types for applying eutrophication assessment is based on hydrological parameters characterizing a certain area dynamics and circulation.
COMMISSION DECISION (EU) 2018/229 of 12 February 2018 establishing, pursuant to Directive 2000/60/EC of the European Parliament and of the Council, the values of the Member State monitoring system classifications as a result of the intercalibration exercise and repealing Commission Decision 2013/480/EU.

Known gaps and uncertainties in the Mediterranean

For a complete assessment of eutrophication and GES achievement, GES thresholds and reference conditions (natural background concentrations) are needed not only for chlorophyll *a*, but such values must be set, in the near future, through dedicated workshops and exercises also, water transparency and oxygen as minimum requirements, where appropriate. This should include quality assurance schemes, as well as data quality control protocols.
Further, in order to increase coherency and comparability regarding eutrophication assessment methodologies is recommended that further efforts should be made to harmonize existing tools through workshops, dialogue and comparative exercises at regional/subregional/subdivision levels in Mediterranean with a view to further improve and develop common assessment methods.

Contacts and version Date

http://www.unepmap.org

Version No	**Date**	**Author**
V.1	31.5.17	MEDPOL
V.2	10.1.19	MEDPOL
Final version	31/05/2019	Approved by the Meeting of MED POL FPs

1.3 Common Indicator 17

3. **The update for Common Indicator 17 (EO9)**: Concentration of key harmful contaminants measured in the relevant matrix[22] is presented in below table.

Indicator Title	Common Indicator 17. Concentration of key harmful contaminants measured in the relevant matrix (EO9)	
Relevant GES definition	**Related Operational Objective**	**Proposed Target(s)**
Level of pollutionisbelow a determined threshold defined for the area and species	Concentration of priority contaminants is kept within acceptable limits and does not increase	1. Concentrations of specific contaminants below Environmental Assessment Criteria (EACs) or below reference concentrations 2. No deterioration trend in contaminants concentrations in sediment and biota from human impacted areas, statistically defined 3. Reduction of contaminants emissions from land-based sources
Rational		
Justification for indicator selection Environmental chemical pollution is directly linked with humankind activities in all the earth's ecosystems. Marine environmental investigations have detected thousands of man-made chemicals (both inorganic and organic compounds) all over the world oceans, which have been shown to impair the health of the marine ecosystems and their ecosystem services. The study of the occurrence, transport, transformation and fate, through the different ecosystem compartments (seawater column, marine biota, sediment, etc.), as well as the study of their sources and entry routes (land-based, sea-based (marine) and atmospheric wet and dry deposition) are the first steps to assess the pressures, state and impact to the environment understand and to decide further management actions fora growing environmental problem. Currently, new man-made chemicals and emerging pollutants continue to enter the marine environment and interact with the different marine species, habitats and ecosystems (coastal, open ocean, deep-sea areas), increasing the complexity of the chemical pollution threats for the marine environment and their future sustainability to deliver its benefits. The monitoring and assessment of the harmful and noxious substances occurrence, at selected spatial and temporal scales, will determine either a chronic or acute contamination/pollution scenarios.		
Scientific References i. Clark, R.B., 1986. Marine Pollution, Oxford University Press. ii. Neff, J.M., 1979. Polycyclic aromatic hydrocarbons in the aquatic environment. Sources, fates and biological effects. Applied Science Publishers, Ltd., London. iii. Goldberg, E. D., 1975. The Musssel Watch - a first step in global marine monitoring. *Mar.Poll.Bull.*, 6, 111.		

[22]MSFD Descriptor 8: Concentrations of contaminants are at levels not giving rise to pollution effects

Indicator Title	Common Indicator 17. Concentration of key harmful contaminants measured in the relevant matrix (EO9)

iv. Bricker, S., Lauenstein, G., Maruya, K., 2014. NOAA's Mussel Watch Program: Incorporating contaminants of emerging concern (CECs) into a long-term monitoring program. *Mar.Poll.Bull.*, 81, 289–290.

v. Furdek, M., Vahcic, M., Ščancar, J., Milacic, R., Kniewald, G., Mikac, N., 2012. Organotin compounds in seawater and Mytilusgalloprovincialis mussels along the Croatian Adriatic Coast. *Mar.Poll.Bull.*, 64, 189–199

vi. Nakata, H., Shinohara, R.I., Nakazawa, Y., Isobe, T., Sudaryanto, A., Subramanian, A., Tanabe, S., Zakaria, M.P., Zheng, G.J., Lam, P.K.S., Young Kim, E., Yoon Min, B., Wef, S.U., Hung Viet, P., Tana, T.S., Prudente, M., Donnell, F., Lauenstein, G., Kannan, K., 2012. Asia–Pacific mussel watch for emerging pollutants: Distribution of synthetic musks and benzotriazole UV stabilizers in Asian and US coastal waters. Mar. Pollut. Bull., 64, 2211–2218

vii. Richardson, S., 2004. Environmental Mass Espectrometry: Emerging contaminants and current issues. Anal. Chem., 76, 3337-3364.

viii. Schulz-Bull, D.E., Petrick, G., Bruhn, R., Duinker, J.C., 1998. Chlorobiphenyls (PCB) and PAHs in water masses of the northern North Atlantic. Mar. Chem., 61, 101-114.

Policy Context and targets

Policy context description

In most Mediterranean countries, the monitoring of a range of hazardous chemical substances in different marine compartments are undertaken in response to the UNEP/MAP Barcelona Convention (1976) and its Land-Based Protocol, through the coordination of the UNEP/MAP MED POL Monitoring Program. For Mediterranean EU Countries, the European legislation on the Marine Environment also applies (e.g. EU WFD and EU MSFD), as well as other international and national policy drivers. A considerable amount of founding knowledge and actions are available through the pollution monitoring and assessment component of the UNEP/MAP MED POL Programme during the past decades until today. The environmental assessments have been used for the identification and confirmation of significant marine contaminants occurrence, distributions, levels and trends; as well as, for the continuous development of monitoring strategies and guidance. With respect to the Ecosystem Approach and IMAP, their implementation will continue under the benefits gained from this past knowledge and the policy and practical framework built in the Mediterranean Sea.

Targets

Initial GES targets under Common Indicator 17 will be focused on the control of environmental levels, temporal trend improvements and the reduction of emissions at sources. The monitoring of these targets will be based upon data of a relatively small number of primarily legacy pollutants, reflecting the scope of current programmes and the availability of suitable agreed assessment criteria for them, despite the measurement of other chemicals remains open and is necessary. The inclusion of contemporary and emerging chemicals of new environmental concern and their targets for GES, within IMAP Common Indicator 17, will be implemented as the scientific knowledge advances.

Policy documents

General Policy documents

Indicator Title	Common Indicator 17. Concentration of key harmful contaminants measured in the relevant matrix (EO9)

i. 19th COP to the Barcelona Convention, Athens, Greece, 2016. Decision IG.22/7 - Integrated Monitoring and Assessment Programme (IMAP) of the Mediterranean Sea and Coast and Related Assessment Criteria (UNEP(DEPI)/MED IG.22/28)

ii. 19th COP to the Barcelona Convention, Athens, Greece, 2016.Draft Integrated Monitoring and Assessment Guidance (UNEP(DEPI)/MED IG.22/Inf.7)

iii. 18th COP to the Barcelona Convention, Istanbul, Turkey, 2013.Decision IG.21/3 - Ecosystems Approach including adopting definitions of Good Environmental Status (GES) and Targets. UNEP(DEPI)/MED IG.21/9

iv. Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (EU Marine Strategy Framework Directive and updates in 2010).

v. COMMISSION DIRECTIVE (EU) 2017/845 amending Directive 2008/56/EC of the European Parliament and of the Council as regards the indicative lists of elements to be taken into account for the preparation of marine strategies

vi. COMMISSION DECISION (EU) 2017/848 laying down criteria and methodological standards on good environmental status of marine waters and specifications and standardised methods for monitoring and assessment, and repealing Decision 2010/477/EU.

vii. Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (and updated revisions).

Contaminants related Policy documents

viii. UNEP/MAP, 1987. Report of the Fifth Meeting of the Contracting Parties to the Convention for the Protection of the Mediterranean Sea against pollution and its Related Protocols. UNEP/IG. 74/5. UNEP/MAP, Athens.

ix. UNEP/MAP, 2005. Fact sheets on Marine Pollution Indicators. Meeting of the UNEP/MAP MED POL National Coordinators. Barcelona, Spain, 24-27 May 2005. UNEP (DEC)/MED/ WG.264/ Inf.14. UNEP, Athens.

x. UNEP/MAP MED POL – Phase III, Programme for the Assessment and Control of Pollution in the Mediterranean Region. MAP Technical Report Series No. 120, UNEP, Athens, 1999.

xi. OSPAR Commission, 2013. Levels and trends in marine contaminants and their biological effects - CEMP Assessment Report 2012. Monitoring and Assessment Series, 2013.

xii. EEA, 2003. Hazardous substances in the European marine environment: Trends in metals and persistent organic pollutants. Topic Report 2/2003. EEA, European Environmental Agency, Copenhagen, 2003. http://www.eea.eu.int

Indicator Title	Common Indicator 17. Concentration of key harmful contaminants measured in the relevant matrix (EO9)

xiii. EEA, 1999 State and pressures of the marine and coastal Mediterranean environment. Environmental issues series nº5. European Environmental Agency, Copenhagen, 1999. http://www.eea.eu.int

xiv. EEA, 2018. European Waters – Assessment of status and pressures 2018. EEA Report /No 7, 2018.

Indicator analysis methods

Indicator Definition

Concentrations of key contaminants in the following matrices (note this is a multiparameter pressure indicator):

MARINE BIOTA: In collected marine organisms, where whole soft tissues or dissected parts are processed according sampling and sample preparation protocols, and primarily, in bivalve species and/or fish the following hazardous substances should be measured:
Trace/Heavy Metals (TM): Total mercury (HgT), Cadmium (Cd) and Lead (Pb)
Organochlorinated compounds (PCBs, Hexachlorobenzene, Lindane and ΣDDTs)
Polycyclic Aromatic Hydrocarbons (PAHs)

The lipid content and flesh fresh/dry weight ratio should be measured in biota for normalisation and reporting purposes

MARINE SEDIMENTS: In coastal and marine areas, continental platform and offshore, sediments should be collected by mechanical means and processed at the laboratory (< 2 mm particle size fraction). Further the following hazardous substances should be measured:
Trace/Heavy Metals: Total mercury (HgT), Cadmium (Cd) and Lead (Pb)
Organochlorinated compounds (PCBs (at least, congeners 28, 52, 101, 118, 138, 153, 180, 105 and 156) , aldrin, dieldrin, Hexachlorobenzene, Lindane and ΣDDTs)
Polycyclic Aromatic Hydrocarbons (PAHs)

The aluminium (Al), Total Organic Carbon (TOC) in the < 2mm particle size fraction should be performed for normalization and reporting purposes for TM and OCs, respectively. The < 63µm sediment fraction is also recommended to be complementary for metals.
The liophilization ratio (dry/wet sediment ratio) should be considered for datasets reporting.

SEAWATER: the monitoring and assessment of contaminants in seawater samples collected in coastal, marine and open-sea areas presents specific challenges and higher costs. For the mid/long-term monitoring programmes, such as IMAP, these are recommended to be carried out on a country decision basis.

Sub-indicators: other relevant chemicals (such as tributyltin, TBT; low molecular weight PAHs; etc.) and emerging pollutants are recommended to be carried out on a country decision basis until a firm COP Meeting Decision will be taken.

The chemical compounds above are being used to develop the IMAP Info System and those are included in the list of contaminants of concern which accompanies the Data Dictionaries (DDs) and Data Standards (DSs) for CI17.

Methodology for indicator calculation

Trace/Heavy Metals (TM) and Aluminium: Spectrometry, Mass Spectrometry

Indicator Title	Common Indicator 17. Concentration of key harmful contaminants measured in the relevant matrix (EO9)

Organic compounds: Gas or Liquid Chromatography (GC/LC) coupled to a variety of detectors, such as Electron Capture Detectors or Mass Spectrometry, atomic adsorption.

TOC: Elemental Analyser

Particle fractions: in-house mesh validated methods (for < 2 mm) and/or geological sieving methods.

Additional parameters to be recorded: biometrics (size/length, age), biological parameters such as condition index (mussels), condition factor according established protocols and scientific knowledge.

Indicator units

Trace/Heavy Metals (TM) and Aluminium: mass/dry or wet weight mass of sample according MEDPOL Database Format Protocols. The dry/wet mass ratios should be calculated and reported.

Organic compounds (OCs): mass/dry or wet weight mass of sample according MEDPOL Database Format Protocols. The dry/wet mass ratios should be calculated and reported.

TOC: Elemental Analyser (as %)

Particle fractions (as %)

List of Guidance documents and protocols available

Refer to UNEP Methods and Protocols for Marine Pollution, as well as from other recent documents from regional conventions (e.g. OSPAR) and European Guidelines, such as the Guidance Document No. 33 ON ANALYTICAL METHODS FOR BIOTA MONITORING UNDER THE WATER FRAMEWORK DIRECTIVE, Technical Report - 2014 – 084, ISBN 978-92-79-44679-5.

Data Confidence and uncertainties

Selected analytical methods and measurements are subject to internal Quality Assurance through National Laboratories QA/QC Protocols and Laboratory accreditations, as well as external Quality Assurance by performing regional interlaboratory QA/QC exercises organized by the UNEP/MAP MED POL/IAEA MESL.
Uncertainties in marine data measurements are identified at different levels (cumulative): analytical level (by use of Certified Reference Materials), reporting level (by providing averaged values and the associated uncertainties), database flagging level (primarily according the analytical and reporting compliance, number of non-detected values and levels, fulfilment of the QA/QC Protocols and Interlaboratory Exercises).

Methodology for monitoring, temporal and spatial scope

Available Methodologies for Monitoring and Monitoring Protocols

In line with the Ecosystem Approach and the IMAP implementation, there are considerable benefits to be gained from taking advantage of previous knowledge and information developed through the UNEP/MAP MED POL. These actions include (1) the use of existing experience in the design of monitoring programmes, (2) the use of existing guidance on sampling and analytical methods to inform technical aspects of ecosystem approach monitoring, (3) the use of existing sampling station networks as a framework for the ecosystem approach monitoring networks, (4) the use of existing statistical assessment tools and work on assessment criteria as the basis for the assessments of ecosystem approach data, (5) the use of existing data to describe the distributions and levels of

Indicator Title	Common Indicator 17. Concentration of key harmful contaminants measured in the relevant matrix (EO9)

contaminants against EACs and reference concentrations, and (6) the use of existing time series as the basis of monitoring against a "no deterioration" target. The availability of quality assured data is of importance for the assessment of trends and levels and their comparability overtime and across spatial scales.

Available data sources

i. UNEP(DEPI)/MED WG.365/Inf.5. Analysis of the trend monitoring activities and data for the MED POL Phase III and IV (1999-2010). Consultation Meeting to Review MED POL Monitoring Activities. Athens, 22-23 November 2011.

ii. UNEP(DEPI)/MED WG. 365/Inf.8. Development of assessment criteria for hazardous substances in the Mediterranean. Consultation Meeting to Review MED POL Monitoring Activities. Athens, 22-23 November 2011.

iii. UNEP(DEPI)/MED WG. 427/Inf.3. Background to the Assessment Criteria for Hazardous Substances and Biological Markers in the Mediterranean Sea Basin and its Regional Scales.

iv. Meeting of the Ecosystem Approach Correspondence Group on Pollution Monitoring Marseille, France, 19-21 October 2016.

Spatial scope guidance and selection of monitoring stations

The spatial scope for monitoring should include reference and coastal long-term master stations, including offshore, distributed spatially as relevant and include local spatial refinements, such as transect sampling (for sediment and/or active biomonitoring); and therefore, is a direct function of the risk-based assessments and the long-term monitoring purposes. The selection of the sampling sites for the monitoring of contaminants in the marine environment should consider:

• Risk areas of concern identified on the basis of the review of the existing information.
• Vulnerable areas of known past and/or present release of chemical contaminants.
• Offshore areas where risk warrants coverage (aquaculture, offshore oil and gas activity, dredging, mining, dumping at sea and others).
• Monitoring sites representative of other sources, such as shipping and atmospheric inputs.
•Reference monitoring sites: to establish scale-based reference values and background concentrations.
• Monitoring sites representing sensitive pollution sites/areas at national and sub regional scale.
• Monitoring sites in deep-sea sites, offshore stations (sediments) and areas of potential particular concern.

The selected sites should allow the collection of a realistic number of samples over the years (e.g. to be suitable for sediment sampling, to allow sampling a sufficient number of biota for the selected species during the duration of the programme). It is essential that the monitoring strategies are being coordinated at regional and/or sub regional level. The coordination with the monitoring networks for other Ecological Objectives is crucial for cost-effective and future IMAP integrated assessment.

Temporal Scope guidance

Sampling frequencies will be determined according the current status of the national marine monitoring.

INITIAL PHASE MONITORING: to identify key sampling sites/stations within a coastal network which should include: BIOTA samples (bivalves, e.g. *Mytilus galloprovincialis, Donax trunculus*,

Indicator Title	Common Indicator 17. Concentration of key harmful contaminants measured in the relevant matrix (EO9)

etc. (yearly collection) and fish (i.e. *Mullus barbatus* every 4 years. In this phase monitoring SEDIMENTS (coastal, platform should be collected every two years

ADVANCED PHASE MONITORING (when there is a fully completed MED POL Phase IV implementation with the ongoing reporting of datasets) should include: BIOTA (from 1 to 3 years according the trends and levels of chemicals assessed at the different stations/sites) and SEDIMENTS (from 3 to 6 years depending on the characteristics of sedimentation areas and the chemical concerned known through previous MED POL assessments).

The temporal scope may range from seasonally variable parameters up to large time scales, e.g. sediment core monitoring (years to decades). For temporal trend determinations the sampling frequencies will depend on the ability to detect trends considering the environmental and the analytical variability (ca. total uncertainty). It can be possible to decrease the sampling frequencies and target chemicals in cases where established time trends and levels show concentrations well below levels of concern, and without any upward trend over a number of years (including the stations/sites where recurrently exhibit non-detected contaminants value; that is below detection and quantification limits).

Data analysis and assessment outputs

Statistical analysis and basis for aggregation

Monitoring should allow the necessary statistical data treatments and long-term time-trend data analysis.

Expected assessments outputs

For chemical contaminants, trends analysis and distribution levels for the assessment could be carried out on sub-regional and/or regional level, provided appropriate quality control assured datasets are available. For the assessment of GES, it would be carried out using Mediterranean data from the MEDPOL database and applying a two-level threshold classification (Background Assessment Criteria-BACs and Environmental Assessment Criteria-EACs), such as the OSPAR methodology. However, the revised Mediterranean BACs and EACs for chemical contaminants, such as trace metals (mercury, cadmium and lead) and organic contaminants (chlorinated compounds and PAHs) in sediments and biota in the Mediterranean Sea should be applied.

Known gaps and uncertainties in the Mediterranean

Important development areas in the Mediterranean Sea over the next few years will include harmonization of monitoring targets (determinants and matrices) within assessment at sub-regions scales, development of suites of assessment criteria, integrated chemical and biological assessment method developments, and review of the scope of the national monitoring programmes to ensure that those contaminants which are considered to be important within each assessment area are included. Through these and other actions, it will be possible to develop targeted and effective monitoring programmes tailored to meet the needs and conditions within each GES assessment sub-region.It has been recognized that the open and deep sea is much less covered by monitoring efforts than coastal areas. There is a need to include within monitoring programmes also areas beyond the coastal areas in a representative and efficient way (where risks warrant coverage).

Contacts and version Date

http://www.unepmap.org

Version No	**Date**	**Author**
V.2	31.05.17	MEDPOL
V.3	11.09.17	MEDPOL
V.4	12.12.18	MEDPOL
Final version	31/05/2019	Approved by the Meeting of MED POL FPs

1.4 Common Indicator 18

4. The update for **Common Indicator 18 (EO9)**: Level of pollution effects of key contaminants where a cause and effect relationship has been established[23] is presented in below table.

Indicator Title	Common Indicator 18. Level of pollution effects of key contaminants where a cause and effect relationship has been established (EO9)	
Relevant GES definition	**Related Operational Objective**	**Proposed Target(s)**
Concentrations of contaminants are not giving rise to acute pollution events	Effects of released contaminants are minimized	Contaminants effects below threshold Decreasing trend in the operational releases of oil and other contaminants from coastal, maritime and off-shore activities.
Rational		
Justification for indicator selection Upon exposure to certain dose of harmful contaminants, marine organisms start manifesting a number of symptoms that are indicative of biological damage, the first ones appearing after a short while at the sub-cellular level. These 'sub lethal' effects, when integrated, often converge to visible harm for the organisms and possibly to the whole population at a later stage, when it will be too late to limit the extent of biological damage resulting from environmental chemical exposure and ecosystems deterioration. Most of these symptoms have been reproducibly obtained in the laboratory (at high dose) and the various biological mechanisms of response to major xenobiotics are now sufficiently well documented. In the latest decades, scientific research has been intensified towards these alternative cellular and sub-cellular methods for integrated pollution monitoring, despite it revealed a more complex panorama with samples exposed to environmental concentrations, which includes a number of confounding factors hindering the cost-effective and reliable determination of biological effects at cellular and sub-cellular levels. As a consequence, most of these methods (biomarkers), based on the chemical exposure to biological effects cause relationships, are envisaged to monitor hotpots stations, dredging materials assessments and local damage evaluations rather than for continuous long-term environmental monitoring (surveillance). Ongoing research (biomarkers, bioassays) and future research trends, such as 'omics' developments, will further define the indicators and the methodologies for these common indicators for toxicological effects.		
Scientific References i. European Commission, 2014. Technical report on aquatic effect-based monitoring tools. Technical Report - 2014 – 077. ii. Davies, I. M. And Vethaak, A.D., 2012. Integrated marine environmental monitoring of chemicals and their effects. ICES Cooperative Research Report N). iii. Moore, M.N. (1985), Cellular responses to pollutants. *Mar.Pollut.Bull.*, 16:134-139 iv. Moore, M.N. (1990), Lysosomal cytochemistry in marine environmental monitoring. *Histochem J.*, 22:187-191		

[23]MSFD Descriptor 8: Concentrations of contaminants are at levels not giving rise to pollution effects

Indicator Title	Common Indicator 18. Level of pollution effects of key contaminants where a cause and effect relationship has been established (EO9)

v. Scarpato, R., L. Migliore, G. Alfinito-Cognetti and R. Barale (1990), Induction of micronuclei in gill tissue of *Mytilusgalloprovincialis*exposed to polluted marine waters *Mar.Pollut.Bull.*, 21:74-80

vi. Lowe, D., M.N. Moore and B.M. Evans (1992), Contaminant impact on interactions of molecular probes with lysosomes in living hepatocytes from dab *Limandalimanda. Mar.Ecol.Progr.Ser.*, 91:135-140

vii. Lowe, D.M., C. Soverchia and M.M. Moore (1995), Lysosomal membrane responses in the blood and digestive cells of mussels experimentally exposed to fluoranthene. *Aquatic Toxicol.,* 33:105-112

viii. George, S.G. and Per-Erik Olsson (1994), Metallothioneins as indicators of trace metal pollution in Biomonitoring of Coastal Waters and Estuaries, edited by J.M. Kees. Boca Raton, FL 33431, Kramer CRC Press Inc., pp.151-171

Policy Context and targets

Policy context description

In most Mediterranean countries, the monitoring of a range of hazardous chemical substances in different marine compartments are undertaken in response to the UNEP/MAP Barcelona Convention (1976) and its Land-Based Protocol, through the coordination of the UNEP/MAP MED POL Monitoring Program. For Mediterranean EU countries, the European legislation on the Marine Environment also applies (e.g. EU WFD and EU MSFD), as well as other international and national policy drivers. A considerable amount of founding knowledge and actions are available through the pollution monitoring and assessment component of the UNEP/MAP MED POL Programme during the past decades until today, including monitoring pilot programmes (Eco-toxicological effects of contaminants). The environmental assessments have been used for the identification and confirmation of significant marine contaminants effects on biota and therefore, impacts on biodiversity; as well as, for the continuous development of monitoring strategies and guidance. With respect to the Ecosystem Approach and IMAP, their implementation will continue under the benefits gained from this past knowledge and the policy and practical framework built in the Mediterranean Sea.

Targets

Initial targets of GES under Common Indicator 18 will be based upon data of a selected biological effects parameters and biomarkers (reflecting the scope of current programmes and research, see Indicator Justification above) and the availability of suitable agreed assessment criteria.

Policy documents

General Policy documents

i. 19th COP to the Barcelona Convention, Athens, Greece, 2016. Decision IG.22/7 - Integrated Monitoring and Assessment Programme (IMAP) of the Mediterranean Sea and Coast and Related Assessment Criteria (UNEP(DEPI)/MED IG.22/28)

ii. 19th COP to the Barcelona Convention, Athens, Greece, 2016.Draft Integrated Monitoring and Assessment Guidance (UNEP(DEPI)/MED IG.22/Inf.7)

Indicator Title	Common Indicator 18. Level of pollution effects of key contaminants where a cause and effect relationship has been established (EO9)

iii. 18th COP to the Barcelona Convention, Istanbul, Turkey, 2013.Decision IG.21/3 - Ecosystems Approach including adopting definitions of Good Environmental Status (GES) and Targets. UNEP(DEPI)/MED IG.21/9

iv. Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive).

v. Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy.

Contaminants related Policy documents

vi. UNEP (1997), The MED POL Biomonitoring Programme Concerning the Effects of Pollutants on Marine Organisms Along the Mediterranean Coasts. UNEP(OCA)/MED WG.132/3, Athens, 15 p.

vii. UNEP (1997), Report of the Meeting of Experts to Review the MED POL Biomonitoring Programme. UNEP(OCA)/MED WG.132/7, Athens, 19 p.

viii. Targets: UNEP(DEPI)/MED WG.421/Inf.9. Integrated Monitoring and Assessment Guidance. Agenda item 5.7: Draft Decision on Integrated Monitoring and Assessment Programme (IMAP) of the Mediterranean Sea and Coast and Related Assessment Criteria. Meeting of the MAP Focal Points. Athens, Greece, 13-16 October 2015.

Indicator analysis methods

Indicator Definition

In marine bivalves (such as *Mytilusgalloprovincialis*) and/or fish (such as *Mullus barbatus*)

Lysosomal Membrane Stability (LMS) as a method for general status screening.
Acetylcholinesterase (AChE) assay as a method for assessing neurotoxic effects in aquatic organisms.

Micronucleus assay as a tool for assessing cytogenetic/DNA damage in marine organisms.
Sub-indicators: complementary biomarkers, bioassays and histology techniques and methods are also recommended to be carried out on a country basis (such as, hepatic pathologies assessment, reduction of survival in air by Stress on Stress (SoS), larval embryotoxicity assay, Comet assay, etc.). Metallothionnein in mussels and Ethoxyresorufin-O-deethylase (EROD) activity in fish as a biomarker of chemical exposures.

The biochemical parameters and toxicological measurements above will be used to develop the IMAP Info System which will include Data Dictionaries (DDs) and Data Standards (DSs) for CI18 accordingly.

Methodology for indicator calculation

Lysosomal Membrane Stability (LMS): Biological techniques (neutral red retention), including microscopy

Acetylcholinesterase (AChE) assay: Biochemical techniques, including spectrophotometry

Indicator Title	Common Indicator 18. Level of pollution effects of key contaminants where a cause and effect relationship has been established (EO9)

Micronucleus assay: Biochemical techniques, including microscopy

Additional parameters to be recorded: biometrics (size/length, age), biological parameters such as condition index (mussels), condition factor, gonadosomatic index, hepatosomatic index (fish) and data on temperature, salinity and oxygen dissolved.

Indicator units

(retention) minutes - Lysosomal Membrane Stability (LMS)
nmol/min mg protein in gills (bivalves) - Acetylcholinesterase (AChE) assay
Number of cases, ‰ in haemocytes - Micronucleus assay

List of Guidance documents and protocols available

i. European Commission, 2014. Technical report on effect-based monitoring tools. Technical Report 2014 – 077. European Commission, 2014.

ii. UNEP/RAMOGE: Manual on the Biomarkers Recommended for the UNEP/MAP MED POL Biomonitoring Programme. UNEP, Athens, 1999.

iii. UNEP/MAP, 2005. Fact sheets on Marine Pollution Indicators. Meeting of the UNEP/MAP MED POL National Coordinators. Barcelona, Spain, 24-27 May 2005. UNEP(DEC)/MED/ WG.264/ Inf.14. UNEP, Athens.

iv. ICES Cooperative Research Report. No.315. Integrated marine environmental monitoring of chemicals and their effects. I.M. Davies and D. Vethaak Eds., November 2012.

Data Confidence and uncertainties

Selected analytical validated methods should be subject to Quality Assurance Protocols and interlaboratory exercises: QA/QC through UNEP/MAP MED POL intercalibration supported exercises in agreement with University of Piemonte Orientale (Italy).

Methodology for monitoring, temporal and spatial scope

Available Methodologies for Monitoring and Monitoring Protocols

With regard the Ecosystem Approach and IMAP implementation, there are considerable benefits to be gained from taking advantage of previous knowledge and information developed through the UNEP/MAP MED POL. These actions include (1) the use of existing experience in the design of monitoring programmes, (2) the use of existing guidance on sampling and analytical methods to inform technical aspects of ecosystem approach monitoring, (3) the use of existing sampling station networks as a framework for the ecosystem approach monitoring networks, (4) the use of existing statistical assessment tools and work on assessment criteria as the basis for the assessments of ecosystem approach data, (5) the use of existing data to describe the distributions and levels of contaminants and effects against EACs and reference concentrations , and (6) the use of existing time series as the basis of monitoring against a “no deterioration” target. The availability of quality assured data is of importance for the assessment of levels and trends, and thus, their comparability overtime and across spatial scales. Therefore, based on the work already carried out, the results of the intercalibration exercises and the scientific and technical publications within the UNEP/MAP MED POL programme on biological effects monitoring, there is a network of laboratories in the Mediterranean region with the capacity to carry out

Indicator Title	Common Indicator 18. Level of pollution effects of key contaminants where a cause and effect relationship has been established (EO9)

biological effects monitoring activities, in line with the monitoring requirements. Available guidelines and monitoring protocols can be found in the framework of other Regional Seas Conventions (e.g. OSPAR) as well.

Available data sources

i. MED POL Database.

ii. UNEP/RAMOGE: Manual on the Biomarkers Recommended for the UNEP/MAP MED POL Biomonitoring Programme. UNEP, Athens, 1999.

iii. ICES Cooperative Research Report, No 315, November 2012. Integrated marine environmental monitoring of chemicals and their effects. Ed. Ian M. Davis and Dick Vethaack.

Spatial scope guidance and selection of monitoring stations

The spatial scope for monitoring should include reference and coastal long-term master stations, including offshore, distributed spatially as relevant and include local spatial refinements, such as transect sampling, and therefore, is a direct function of the risk-based assessments and the long-term monitoring purpose. The selection of the sampling sites for the monitoring of biological effects in the marine environment should consider:

• Risk areas of concern identified on the basis of the review of the existing information.
• Vulnerable areas of known past and/or present release of chemical contaminants.
• Offshore areas where risk warrants coverage (aquaculture, offshore oil and gas activity, dredging, mining, dumping at sea and others).
• Monitoring sites representative of other sources, such as shipping and atmospheric inputs.
• Reference monitoring sites: to establish scale-based reference values and background concentrations.
• Monitoring sites representing sensitive pollution sites/areas at national and sub regional scale.
• Monitoring sites in deep-sea sites, offshore stations (sediments)and areas of potential particular concern

The selected sites should allow the collection of a realistic number of samples over the years (e.g. allow to sample sufficient number of biota for the selected species during the duration of the programme). It is essential that the monitoring strategies are being coordinated at regional and/or sub regional level, in particular with chemical monitoring. The coordination with monitoring for other Ecological Objectives is crucial for cost-effective and future integrated assessment.

Temporal Scope guidance

Sampling frequencies will be determined according the current status of the pilots and national marine monitoring programmes:

INITIAL PHASE MONITORING (PILOT): to identify monitoring stations to collect BIOTA (bivalves, such as *Mytilus galloprovincialis*,) on a yearly basis (or higher frequencies if the environmental variability study needs to be carried out), and in the same manner as for chemical monitoring, focusing on few locations such as hotspots and reference stations.
ADVANCED PHASE MONITORING: when fully completed and reported MED POL Phase IV datasets, including biological effects is achieved, then, at this stage the objective should be the integration of the chemical and biological monitoring on a efficient manner. Therefore, a refinement of the successful strategies for biological effects long-term monitoring should be

Indicator Title	Common Indicator 18. Level of pollution effects of key contaminants where a cause and effect relationship has been established (EO9)

implemented and maintained based on the experiences from developing pilot monitoring activities (Initial Phase).

For trend determinations the sampling frequencies will depend on the ability to detect trends considering the environmental and the analytical variability (ca. total uncertainty). It can be possible to decrease the sampling frequencies in cases where established time trends and levels show concentrations well below levels of concern, and without any upward trend over a number of years.

Data analysis and assessment outputs

Statistical analysis and basis for aggregation

Monitoring should allow the necessary statistical data treatments and long-term time-trend analysis.

Expected assessments outputs

For biological effects, trends analysis and distribution levels could be carried out on sub-regional level, provided appropriate quality assured datasets are available. For the integrated assessment of GES, it would be carried out using Mediterranean data from the MEDPOL database and applying a two-level threshold classification (such as the OSPAR methodology). Assessing biomarker responses against Background Assessment Criteria (BACs) and Environmental Assessment Criteria (EACs) allows establishing if the responses measured are at levels that are not causing deleterious biological effects, at levels where deleterious biological effects are possible or at levels where deleterious biological effects are likely in the long-term. In the case of biomarkers of exposure, only BAC can be estimated, whereas for biomarkers of effects both BAC and EAC can be established.

Known gaps and uncertainties in the Mediterranean

Important development areas in the Mediterranean Sea over the next few years will include harmonization of monitoring targets (determinants and matrices) within assessment sub-regions, development of suites of assessment criteria integrated chemical and biological assessment methods, and review of the scope of the monitoring programmes to ensure that those contaminants which are considered to be important within each assessment area are included in monitoring programmes. Through these and other actions, it will be possible to develop targeted and effective monitoring programmes tailored to meet the needs and conditions within each GES assessment sub-region.
It has been recognized that the open and deep sea is much less covered by monitoring efforts than coastal areas. There is a need to include within monitoring programmes also areas beyond the coastal areas in a representative and efficient way, where risks warrant coverage.

Contacts and version Date

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V.2	31.05.17	MEDPOL
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1.5 Common Indicator 20

5. The update for **Common Indicator 20 (EO9):** Actual levels of contaminants that have been detected and number of contaminants which have exceeded maximum regulatory levels in commonly consumed seafood[24] [i]s presented in below table.

Indicator Title	Common Indicator 20. Actual levels of contaminants that have been detected and number of contaminants which have exceeded maximum regulatory levels in commonly consumed seafood (EO9)	
Relevant GES definition	**Related Operational Objective**	**Proposed Target(s)**
Concentrations of contaminants are within the regulatory limits for consumption by humans.	Levels of known harmful contaminants in major types of seafood do not exceed established standards	1. Concentrations of contaminants are within the regulatory limits set by legislation.
Rational		
Justification for indicator selection One of the potential risks associated with the occurrence of harmful substances (chemicals, nanoparticles, microplastics, toxins) in the marine environment is the human exposure through commercial fish and shellfish species (primarily, from wild fisheries and aquaculture). These organisms are exposed to environmental contaminants which enter their organism through different mechanisms and pathways according their thropic level, which include from filter feeding to predatory strategies (crustaceans, bivalves, fish). Consequently, there exist both bioaccumulation and biomagnification processes of these chemicals released in the marine environment. Common examples are the well-known bioaccumulation of metals and organic compounds in commercial bivalve species (such as the *Mytillusgalloprovincialis* in the Mediterranean Sea) or alkyl mercury compounds (methylmercury) in tuna fish, which should be increased by new and emerging contaminants in the near future.		
Scientific References i. Vandermeersch, G. *et al.* 2015. Environmental contaminants of emerging concern in seafood – European database on contaminant levels. Environmental Research, 143B, 29-45. ii. Maulvault, A.M. *et al.* 2015. Toxic elements and speciation in seafood samples from different contaminated sites in Europe. Environmental Research, 143B, 72-81. iii. Molin, M. *et al.*, 2015. Arsenic in the human food chain, biotransformation and toxicology – Review focusing on seafood arsenic. Journal of Trace Elements in Medicine and Biology, 31, 249-259. iv. Bacchiocchi, S. *et al.* 2015. Two-year study of lipophilic marine toxin profile in mussels of the North-central Adriatic Sea: First report of azaspiracids in Mediterranean seafood. Toxicon, 108, 115-125. v. Perello, G. *et al.*, 2015. Human exposure to PCDD/Fs and PCBs through consumption of fish and seafood in Catalonia (Spain): Temporal trend. Food and Chemical Toxicology, 81, 28-33.		

[24]MSFD Descriptor 9:Contaminants in fish and other seafood for human consumption do not exceed levels established by Union legislation or other relevant standards

Indicator Title	Common Indicator 20. Actual levels of contaminants that have been detected and number of contaminants which have exceeded maximum regulatory levels in commonly consumed seafood (EO9)

vi. Zaza, S. *et al.* 2015. Human exposure in Italy to lead, cadmium and mercury through fish and seafood product consumption from Eastern Central Atlantic Fishing Area. Journal of Food Composition and Analysis, 40, 148-153.

vii. Cruz, R. Brominated flame retardants and seafood safety: A review. Environment International, 77, 116-131.

viii. Dellate, E. *et al.* 2014. Individual methylmercury intake estimates from local seafood of the Mediterranean Sea, in Italy. Regulatory Toxicology and Pharmacology, 69, 105-112.

ix. Spada, L. *et al.* 2014. Mercury and methylmercury concentrations in Mediterranean seafood and surface sediments, intake evaluation and risk for consumers. International Journal of Hygiene and Environmental Health, 215, 418-42.

Policy Context and targets

Policy context description

The understanding of the health risks to humans (maximum levels, intake, toxic equivalent factors, etc.) and the food safety prevention, including emerging contaminants, through the consumption of potentially poisoned seafood is a challenge and a priority policy issue for governments, as well as a major societal concern. There are different initiatives and regulations at national and international levels mainly for the fishery economic sector, which have established public health recommendations and maximum regulatory levels for different contaminants in numerous marine commercial target species. Methylmercury poisoning continues as a global priority policy issue and in 2013 the Global Legally Binding Treaty (Minamata Convention on Mercury) was launched by UNEP. Further, the US Food and Drugs Administration, the European Food Safety Authority, as well as Food and Agriculture Organization (FAO), are also national and international authorities with regard seafood safety, respectively.

Targets

Initial targets of GES under Common Indicator 20 will be to maintain the chemical contaminants of human health concern under regulatory levels in seafood set/recommended/agreed by national and/or international authorities and their trends with regard their occurrence should decrease pointing towards zero events.

Policy documents

General Policy documents

i. 19th COP to the Barcelona Convention, Athens, Greece, 2016. Decision IG.22/7 - Integrated Monitoring and Assessment Programme (IMAP) of the Mediterranean Sea and Coast and Related Assessment Criteria (UNEP(DEPI)/MED IG.22/28)

ii. 19th COP to the Barcelona Convention, Athens, Greece, 2016.Draft Integrated Monitoring and Assessment Guidance (UNEP(DEPI)/MED IG.22/Inf.7)

iii. 18th COP to the Barcelona Convention, Istanbul, Turkey, 2013.Decision IG.21/3 - Ecosystems Approach including adopting definitions of Good Environmental Status (GES) and Targets. UNEP(DEPI)/MED IG.21/9

Indicator Title	Common Indicator 20. Actual levels of contaminants that have been detected and number of contaminants which have exceeded maximum regulatory levels in commonly consumed seafood (EO9)

iv. Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive).

v. Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy.

Contaminants related Policy documents

vi. EU 1881/2006. Commission Regulation (EC) No 1881/2006 of 19 December 2006 setting maximum levels for certain contaminants in foodstuffs. European Commission.

vii. US FDA http://www.fda.gov/Food/FoodborneIllnessContaminants/Metals/ucm115644.htm

viii. Joint FAO/WHO Expert consultation on the risk and benefits of fish consumption. FAO Fisheries and Aquaculture Report No. 978. ISSN 2070-6987. Rome, January, 2010.

ix. List of maximum levels for contaminants in foods set by the FAO/WHO Codex Alimentarius Commission can be found at ftp://ftp.fao.org/codex/Meetings/cccf/cccf7/cf07_INFe.pdf

x. Global Legally Binding Treaty (Minamata Convention on Mercury) http://www.mercuryconvention.org/

Indicator analysis methods

Indicator Definition

Number of detected regulated contaminants* in commercial species.

Number of detected regulated contaminants* exceeding regulatory limits.

(*lists of regulated contaminants can be found in the links from the previous section, including the European Regulation EU 1881/2006)

Additional parameters required: sample identification, location, date and biometrics

Sub-indicators: other relevant chemicals and emerging pollutants are recommended to be carried out on a country decision basis.

The chemical compounds list, as in the case of CI17, accompanies the development of the IMAP Info System along Data Dictionaries (DDs) and Data Standards (DSs) for CI20.

Methodology for indicator calculation

Number of detected contaminants: monitoring by national regulatory and inspection bodies through statistics and databases

Number of detected contaminants exceeding regulatory limits: monitoring by national regulatory and inspection bodies through statistics and databases

Indicator units

(frequencies, %) - Number of detected contaminants in individual commercial species

Indicator Title	Common Indicator 20. Actual levels of contaminants that have been detected and number of contaminants which have exceeded maximum regulatory levels in commonly consumed seafood (EO9)

(Frequencies, %) - Number of detected contaminants exceeding regulatory limits in appropriate units, for example, mg/kg fresh weight (parts per million, ppm, and fresh weight) or µg/g fresh weight (part per billion, ppb, fresh weight).

Methodology for monitoring, temporal and spatial scope

Available Methodologies for Monitoring and Monitoring Protocols

There are no directly-applicable monitoring protocols in order to fulfil the requirement of this Common Indicator. Risk-based public health methodologies to define the monitoring are recommended.

Available data sources

At present national databases (if available), research papers and environmental databases (the MED POL Database)

Spatial scope guidance and selection of monitoring stations

Risk-based methodologies to define monitoring are recommended.
Guidance for monitoring stations: environmental monitoring, fish markets, aboard fishing fleets, sampling at regular inspections by national authorities

Temporal Scope guidance

Risk-based methodologies to define monitoring are recommended. The temporal scope is highly linked to the data confidence and uncertainty of the indicator. Yearly statistics would be the basic time period.

Data analysis and assessment outputs

Statistical analysis and basis for aggregation

Monitoring should allow the necessary statistical data treatments and long-term time-trend evaluations. Geographic reporting scales (within IMAP implementation) should be also considered in terms of indictor aggregation:

(1) Whole region (i.e. Mediterranean Sea);
(2) Mediterranean sub-regions, as presented in the Initial Assessment of the Mediterranean Sea, UNEP(DEPI)/MED IG.20/Inf.8;
(3) Coastal waters and other marine waters;
(4) Subdivisions of coastal waters provided by Contracting Parties

Expected assessments outputs

Assessment outputs would be based on trend analysis and annual statistics

Known gaps and uncertainties in the Mediterranean

As this is a new Common Indicator within the context of marine environmental protection policy (*ca*. Ecosystem Approach and IMAP implementation) its applicability beyond food consumer protection and public health would need to be determined, although intuitively reflects the health status of the marine environment in terms of their delivery of benefits (e.g. fisheries industry). Thus, monitoring protocols, risk-based approaches, analytical testing and assessment methodologies would need to be further examined between Contracting Parties national food safety authorities, research organisations and/or environmental agencies.

Indicator Title	Common Indicator 20. Actual levels of contaminants that have been detected and number of contaminants which have exceeded maximum regulatory levels in commonly consumed seafood (EO9)	
Contacts and version Date		
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1.6 Common Indicator 21

6. The update for **Common Indicator 21 (EO9)**: Percentage of intestinal enterococci concentration measurements within established standards is presented in below table.

Indicator Title	Common Indicator 21. Percentage of intestinal enterococci concentration measurements within established standards (EO9)	
Relevant GES definition	**Related Operational Objective**	**Proposed Target(s)**
Concentrations of intestinal enterococci are within established standards	Water quality in bathing waters and other recreational areas does not undermine human health	Increasing trend in the percentage of intestinal enterococci concentration measurements within established standards
Rational		
Justification for indicator selection The Mediterranean Sea continues to attract every year an ever-increasing number of international and local tourists that among their activities use the sea for recreational purposes. The establishment of sewage treatment plants and the construction of submarine outfall structures have decreased the potential for microbiological pollution, despite major hotpots still exist. High levels of intestinal enterococci bacteria in recreational marine waters (coasts, beaches, tourism spots, etc) are known to be indicative of human pathogens, which is a serious public health concern, as well as economical. Therefore, intestinal enterococci concentrations are frequently used as a faecal indicator bacteria proxy or general indicators of faecal contamination in the marine environment. It has been suggested and later on demonstrated that *enterococci sp*. might be more appropriate than traditional *Escherichia coli* in marine waters as an index of faecal pollution. Currently, is the only faecal indicator bacteria recommended by the US Environmental Protection Agency (US EPA, 2012) for brackish and marine waters, since they correlate better than faecal coliforms or *E.coli*. The World Health Organization (WHO) is also in line with this approach (Ashbolt et al., 2001; Kay et al., 2004). Within the framework of Integrated Monitoring and Assessment Programme (UN/MAP IMAP) this indicator has been selected.		
Scientific References i. Ashbolt, N.J., Grabow, W.O.K, and Snozzi, M., 2001. Indicators of microbial water quality, Chapter 13. In: Water Quality: Guidelines, Standards and Health. 2001 World Health Organization (WHO). Edited by Lorna Fewtrell and Jamie Bartram. Published by IWA Publishing, London, UK. ii. Cabelli VJ, Dufour AP, Levin MA, McCabe LJ, Haberman PW. 1979. Relationship of microbial indicators to health effects at marine bathing beaches. Am. J. Public Health, 69, 690–696 iii. Byappanahalli, MN. *et al.*, 2012. Enterococci in the environment. Microbiol. Mol. Biol.Rev., 76, 685-706 iv. Kay, D. et al, 2004. Derivation of numerical values for the World Health Organization guidelines for recreational waters. Water Research 38 (2004) 1296–1304 v. Kay D, *et al.* 1994. Predicting likelihood of gastroenteritis from sea bathing: results from randomised exposure. Lancet, 344, 905–909		

Indicator Title	Common Indicator 21. Percentage of intestinal enterococci concentration measurements within established standards (EO9)

vi. Prüss A. 1998. Review of epidemiological studies on health effects from exposure to recreational water. Int. J. Epidemiol., 27, 1–9

vii. US EPA RWQC 2012. Recreational Water Quality Criteria. OFFICE OF WATER 820-F-12-058. Scientific document.

Policy Context and targets

Policy context description

The World Health Organisation (WHO) has been concerned with health aspects of the management of water resources for many years and published various documents concerning the safety of the water environment, including marine waters, and its importance for health. Revised Mediterranean guidelines for bathing water quality were formulated in 2007 based on the WHO guidelines for "Safe Recreational Water Environments" and on the EC Directive for "Bathing Waters" (EU/2006/7), and through Decision IG.20/9 (Criteria and Standards for bathing waters quality in the framework of the implementation of Article 7 of the LBS Protocol. COP17, Paris, 2012). The proposal was made in an effort to provide updated criteria and standards that can be used in the Mediterranean countries and to harmonize their legislation in order to provide homogenous data. Therefore, the standards for bathing waters quality in the framework of the implementation of Article 7 of the LBS Protocol, could be further used to define GES for the indicator on pathogens in bathing waters.

Targets

Initial target of GES under Common Indicator 21 will be an increasing trend in measurements to test that levels of intestinal enterococci comply with established national or international standards and the methodological approach itself. Particularly, under Decision IG.20/9 and the EU 2006/7 Directive, excellent (95^{th} percentile < 100 CFU/100 mL) or good (95^{th} percentile < 200 CFU/100 mL) qualitycategories for the "last assessment"; which means the last four years (see documents below)

Policy documents

General Policy documents

i. 19th COP to the Barcelona Convention, Athens, Greece, 2016. Decision IG.22/7 - Integrated Monitoring and Assessment Programme (IMAP) of the Mediterranean Sea and Coast and Related Assessment Criteria (UNEP(DEPI)/MED IG.22/28)

ii. 19th COP to the Barcelona Convention, Athens, Greece, 2016.Draft Integrated Monitoring and Assessment Guidance (UNEP(DEPI)/MED IG.22/Inf.7)

iii. 18th COP to the Barcelona Convention, Istanbul, Turkey, 2013.Decision IG.21/3 - Ecosystems Approach including adopting definitions of Good Environmental Status (GES) and Targets. UNEP(DEPI)/MED IG.21/9

iv. Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive).

v. Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy.

Indicator Title	Common Indicator 21. Percentage of intestinal enterococci concentration measurements within established standards (EO9)

Contaminants related Policy documents

vi. UNEP(DEPI)/MED IG 20/8. Decision IG.20/9. Criteria and Standards for bathing waters quality in the framework of the implementation of Article 7 of the LBS Protocol. COP17, Paris, 2012.

vii. UNE/MAP MED POL, 2010. Assessment of the state of microbial pollution in the Mediterranean Sea. MAP Technical Reports Series No. 170 (Amended).

viii. WHO, 2003. Guidelines for safe recreational water environments. VOLUME 1: Coastal and fresh waters. WHO Library. ISBN 92 4 154580. World Health Organisation, 2003.

ix. Directive 2006/7/EC of the European Parliament and of the council of 15 February 2006 concerning the management of bathing water quality and repealing Directive 76/160/EEC

http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32006L0007&from=EN

Indicator analysis methods

Indicator Definition

The concentration (Colony-forming unit, CFU) of intestinal enterococci in the water sample (normalised to 100 mL) collected at one beach location.

Methodology for indicator calculation

A methodology has been proposed by Directive 2006/7/EC with the following specification:
Based upon percentile evaluation of the log10 normal probability density function of microbiological data acquired from the particular bathing water, the 90^{th} and 95^{th}percentile values are derived as follows:
1) Take the log10 value of all bacterial enumerations in the data sequence to be evaluated. (If a zero value is obtained, take the log10 value of the minimum detection limit of the analytical method used instead)
2) Calculate the arithmetic mean of the log10 values (μ).
3) Calculate the standard deviation of the log10 values (σ).
The upper 90-percentile point of the data probability density function is derived from the following equation: upper 90-percentile = antilog (μ + 1,282 σ). The upper 95-percentile point of the data probability density function is derived from the following equation: upper 95-percentile = antilog (μ + 1,65 σ).

Indicator units

The 90th and 95th percentiles of the log10 normal probability density function of the CFU datasets measured at one single location according established monitoring and assessment protocols and standards.

List of Guidance documents and protocols available

i. ISO 7899-1[Water quality – Detection and enumeration of intestinal enterococci: Part 1: Miniaturized method (Most Probable Number) for surface and wastewater]

ii. ISO 7899-2 [Water quality – Detection and enumeration of intestinal enterococci: Part 2: Membrane filtration method].

Indicator Title	Common Indicator 21. Percentage of intestinal enterococci concentration measurements within established standards (EO9)

iii. UNEP(DEPI)/MED IG 20/8. Decision IG.20/9. Criteria and Standards for bathing waters quality in the framework of the implementation of Article 7 of the LBS Protocol. COP17, Paris, 2012.

Data Confidence and uncertainties

As in the case of analytical chemistry, the data confidence originates in the maintenance of internal QA/QC programmes by national laboratories, as well as regular interlaboratory or proficiency testing exercises. It should be mentioned that the level of uncertainty in measurements could be considered low, provided the above is fulfilled. On the other hand, the ISO 7899-2 methodology describes the isolation of intestinal enterococci (*Enterococcus faecalis, E. faecium, E. durans*and *E. hirae*), pointing out that, other Enterococcus species and some species of the genus Streptococcus (namely *S. bovis*and *S. equinus*) may occasionally be detected. These Streptococcus species do not survive long in water and are probably not enumerated quantitatively. Further, for purposes of water examination, *enterococci sp.* can be regarded as indicators of faecal pollution, despite it should be mentioned that some enterococci found in water can occasionally also originate from other habitats.

Methodology for monitoring, temporal and spatial scope

Available Methodologies for Monitoring and Monitoring Protocols

Revised Mediterranean guidelines for bathing waters were formulated in 2007 based on the WHO guidelines for "Safe Recreational Water Environments" and on the EC Directive for "Bathing Waters" (EU/2006/7), and through Decision IG.20/9 (Criteria and Standards for bathing waters quality in the framework of the implementation of Article 7 of the LBS Protocol. COP17, Paris, 2012). The proposal was made in an effort to provide updated criteria and standards that can be used in the Mediterranean countries and to harmonize their legislation in order to provide homogenous data.

Available data sources

For some Mediterranean countries European and non-European, the European Environmental Agency (EEA) has published a number of reports and the datasets are available through their website services. https://www.eea.europa.eu/data-and-maps/indicators/bathing-water-quality

Spatial scope guidance and selection of monitoring stations

Sampling should be performed in recreational waters where microbiological pollution could threat the recreational uses. The measurements are made in selected monitoring stations during the summer season focusing in the touristic beaches and other sites of concern. The full description of indications to prepare a monitoring strategy can be found in Directive 2006/7/EC of the European Parliament and of the council of 15 February 2006 concerning the management of bathing water quality and repealing Directive 76/160/EEC.

Temporal Scope guidance

According Annex IV (EU Directive 2006/7EC), the temporal scope guidance is as follows:

1. One sample is to be taken shortly before the start of each bathing season. Taking account of this extra sample and subject to paragraph 2 (below), no fewer than four samples are to be taken and analysed per bathing season.
2. However, only three samples need be taken and analysed per bathing season in the case of a bathing water that either:
(a) has a bathing season not exceeding eight weeks; or
(b) is situated in a region subject to special geographical constraints.
3. Sampling dates are to be distributed throughout the bathing season, with the interval between sampling dates never exceeding one month.
4. In the event of short-term pollution, one additional sample is to be taken to confirm that the incident has ended. This sample is not to be part of the set of bathing water quality data. If necessary to replace

Indicator Title	Common Indicator 21. Percentage of intestinal enterococci concentration measurements within established standards (EO9)

a disregarded sample, an additional sample is to be taken seven days after the end of the short-term pollution.

Data analysis and assessment outputs

Statistical analysis and basis for aggregation

Monitoring should allow the necessary statistical data treatments, as well as time-trend evaluations. In order to comply with the stated Common Indicator within IMAP, the geographic reporting scales (nested approach) should be taken into account. However, the balance between data, locations and spatial resolution should be carefully considered for coherence in areas (1) and (2), as this Common Indicator is largely (if not entirely) evaluated in coastal waters (3) and (4):

(1) Whole region (i.e. Mediterranean Sea);
(2) Mediterranean sub-regions, as presented in the Initial Assessment of the Mediterranean Sea, UNEP(DEPI)/MED IG.20/Inf.8;
(3) Coastal waters and other marine waters;
(4) Subdivisions of coastal waters provided by Contracting Parties

Expected assessments outputs

For pathogenic microorganisms in bathing water, monitoring for the assessment of GES could be carried out on a sub-regional and/or local level due to the nature of microbiological contamination (the impact is restricted to a relatively short distance from the pollution source due to the short survival time of microorganisms in seawater and dilution effects).

Distribution maps and temporal trend assessment (short periods) are also envisaged.

Known gaps and uncertainties in the Mediterranean

Within the context of Ecosystem Approach and IMAP implementation its applicability beyond bathing waters (recreational waters) protection and management would need to be determined, although intuitively reflects the health status of the coastal environment in terms of their delivery of benefits (e.g. tourism).

Contacts and version Date

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Appendix IV
Defining the Most Representative Species for IMAP Candidate Indicator 24 and Related Monitoring Protocol

List of Abbreviations

CITES	The Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	The Convention for the Conservation of Migratory Species
EC	The European Commission
EO	Ecological Objective
GES	Good Environmental Status
GESAMP	The Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection
GI	Gastrointestinal
INDICIT	Implementation of Indicators of Marine Litter on Sea Turtles and Biota In Regional Sea Conventions And Marine Strategy Framework Directive Areas
IMAP	The Integrated Monitoring and Assessment Programme and related Assessment Criteria
MAP	Mediterranean Action Plan
MEDPOL	Mediterranean Pollution Assessment and Control Programme
MSFD	Marine Strategy Framework Directive
OSPAR	Convention for The Protection of The Marine Environment of The North-East Atlantic
RPML	Regional Plan on Marine Litter Management in the Mediterranean Plan for Marine Litter
SPA/RAC	Specially Protected Areas Regional Activity Centre
TG ML	Technical Group on Marine Litter

Table of Contents

1. Introduction

1. In the Mediterranean, marine litter pose a critical problem because of its great quantity and effects on marine fauna. To deal with this problem, UN Environment/Mediterranean Action Plan - Barcelona Convention adopted the first ever legally binding Regional Plan on Marine Litter Management in the Mediterranean (Decision iG.21/71).

2. One of the steps identified in the Regional Plan on Marine Litter is linked to the implementation of the integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coasts and Related Assessment Criteria (IMAP) and its 10th Ecological Objective (EO10) i.e. Marine Litter, partly based on the Candidate indicator 24 "*Trends in the amount of litter ingested by or entangling marine organisms focusing on selected mammals, marine birds, and marine turtles*".

3. During this process it is essential to improve knowledge of the impact of marine litter on marine fauna and also to assess the IMAP Candidate indicator 24. This particularly involves continuing the work of selecting the most representative species to be used for the development and assessment of the IMAP Candidate indicator 24. MED POL and SPA/RAC have worked in developing and preparing the report "*Defining the Most Representative Species for IMAP Candidate Indicator 24*", which comes up with the following findings:

a. Marine litter affects various compartments of the marine environment and monitoring its impacts on marine organisms is of growing importance.
b. Whatever temporal and spatial scale are considered, marine litter (mainly plastics) interact with a vast range of marine species. The different types of impact of marine litter on these organisms can be classified according to the modes of action such as entanglement, ingestion and transportation of species that may be colonized on them.
c. Until now, no monitoring has been implemented to assess the impact of marine litter on marine organisms in the Mediterranean; but we have good scientific and technical basis to start doing so.
d. On the basis of the available information, the approach that uses monitoring of the ingestion of marine litter by marine turtles is consistent and compatible with the whole set of the identified biological, methodological, environmental, logistic and ethical constraints. The target species for the IMAP Candidate indicator 24 and also for monitoring at basin scale are the marine turtles species, which are most commonly found in the Mediterranean, i.e. *Caretta caretta*. *Caretta caretta* has a wide distribution throughout the Mediterranean Sea and a great deal of information is already available. The potential for developing a monitoring network corresponds to the needs expressed by the Contracting Parties to the Barcelona Convention.
e. The use of cetaceans as indicator species can only be considered on an opportunistic basis, and at the initiative of each Contracting Party that has pre-existing stranding monitoring networks.
f. Although protocols for monitoring the ingestion of marine litter by seabirds have been used for a long time in other marine regions, work is still required to identify the most representative species for developing a monitoring programme on the impact of marine litter on seabirds in the Mediterranean. A pilot monitoring programme of marine litter in cormorants' nests is recommended, at the initiative of the Contracting Parties to the Barcelona Convention.
g. Monitoring the ingestion of micro-plastics by fishes or invertebrates presents a strong potential for developing a monitoring programme on the ingestion of marine litter by marine

organisms in the Mediterranean. Supplementary work is however necessary to complete a rigorous protocol which eliminates any risk of contamination of the samples examined and thus of false positives due, for example, to the presence of natural fibres. For these pilot studies or for more in-depth research work, priority should be given to common fish species with a wide distribution and easily fished fish species, which are sensitive to micro particles. The selection of nekto-benthic fishes, already identified as being the most affected (i.e. *Boops boops*), of important commercial interest (i.e. *Mullus sp.*), or of farmed molluscs such as the mussel Mytilus edulis, could facilitate the monitoring approach.

h. Concerning the entrapment/entanglement of marine species, observations have so far been poorly described, which restricts the development of corresponding monitoring networks. Carrying out coordinated pilot experiments based on a strategy of improved data collection, seems to be the most suitable preliminary step before envisaging developing regional monitoring. Work should focus on the prevalence of entrapment/entanglement of Mediterranean species, the identification and mapping of risk areas (presence of active or ghost fishing gear, distribution of susceptible species, probability of encounters between susceptible species and marine litter, etc.), and the rationalization of observation procedures on the basis of existing arrangements (stranding networks, Marine Protected Areas, Observation networks, opportunistic analyses of diving using submersibles or ROVs/Remotely Operated Vehicles).

4. All the recommended approaches should permit:

i. acquiring of better information to support the implementation of reduction measures; and
ii. defining of a Regional Plan-friendly monitoring strategy.

Part I

2. Proposal for the Selection of Species for the Development of the Candidate Indicator 24

5. Monitoring the impacts of marine litter on marine fauna depends strongly on the availability of indicator species to measure the prevalence and effects of ingestion of marine litter and entanglement/strangling. Monitoring these effects can be designed within a multi-species approach in order to cover the range of impacts linked to both the diverse types of marine litter, of varied size (micro-particles and macro-litter) and nature (plastics, metal, glass, etc.), and also with the varied ways of life (sedentary, benthic, nekto-benthic, pelagic, aerial) and feeding (detritus-eaters, suspension eaters, omnivores, carnivores) of the species that interact with it. The multiplicity of approaches needed to take this variability into account thus requires the use of many target species, and this is only possible if infrastructures crafted using diverse skills are in place. In the present state of our knowledge, monitoring can only be done gradually, stage by stage, depending on the degree of maturity of the indicators. initially it is recommended that a pilot monitoring network be developed based on the use of the *Caretta caretta* marine turtle species, the indicator of ingestion of marine litter by this species being at the most advanced stage of development.

6. It seems reasonable to also envisage starting experimental work to test the potential of new indicator species, mainly to measure the impact of micro-plastics, in particular certain species of fish that have a high rate of ingestion and wide distribution (*Boops boops*, *Mullus sp.*) and invertebrates, particularly the mussel *Mytilus galloprovincialis*, present throughout a vast area of the Mediterranean

Basin. Table 1 lists the species/taxa already used, or that could be used, as bio-indicators, and their potential for use in the context of monitoring.

Table 1: Selection of indicator species for monitoring ingestion of marine litter by marine organisms in the Mediterranean

Taxon	Type of litter	Method	Infrastructure	Indicative Species	Priority	Remarks
Birds	macro-litter	Autopsy	Stranding networks, by-catch	To be researched	+	Work needed in the Mediterranean
Cetaceans	macro-litter	Autopsy	Stranding networks, by-catch	All species	+	Small number of species, low rate of ingestion, opportunistic approach only
Cetaceans	micro-plastics	Autopsy / chemical	Stranding networks, by-catch	All species	+	Sampling and measuring difficult
Marine turtles	macro-litter	Autopsy / excreta monitoring	Stranding networks, by-catch, rescue centers	*Caretta caretta*	+++	Necessity of mastering biological parameters
Nektobenthic fishes	micro-plastics	Stomach contents	Coastal fishing and trawling	*Mullus sp., Boops sp.*	++	Wide distribution of species, easily caught
Demersal fishes	macro-litter	Stomach contents	Scientific and commercial trawling	*Scyliorhinus sp.*	+	Opportunistic collection possible
Pelagic fishes	micro-plastics	Stomach contents	Commercial fishing		+	Opportunistic collection possible
Molluscs	micro-plastics	Stomach contents / chemical	Collection, farming, chemical monitoring networks	*Mytilus sp.*	++	Existing collection networks, concerning public health
Crustacean	micro-plastics	Stomach contents / chemical	Collection		+	Work needed in the Mediterranean
Other invertebrates	micro-plastics	Stomach contents / chemical	Collection	Sea cucumbers	+	Work needed in the Mediterranean

7. Concerning the entanglement / strangling, it is still necessary, under the present conditions, to organize the collection of information and to define the monitoring modes (Table 2). The mobilization of stranding networks must be considered as a priority by the Contracting Parties to the Barcelona Convention on a voluntary basis at first for experimental monitoring of entanglement/strangling of the main most sensitive species (mammals, birds, turtles).

8. The potential of monitoring marine litter in nests must be re-examined by experts in order to propose guidelines; to this effect, an experimental monitoring should be set up, particularly in the Mediterranean protected areas and on the basis of voluntary action by the Contracting Parties.

9. As part of future development, we recommend that the potential of surface and underwater observation campaigns (Table 1) be assessed. The interest of shallow diving, especially in Marine Protected Areas, and using submersibles or ROVs (Remotely Operated Vehicles) for greater depths as tools for collecting observations on entanglement/strangling of the most affected species (invertebrates and fishes) must be assessed. This last approach (submersibles/ROVs) should not be dissociated from operations of inventorying or reducing abandoned fishing gear/nets in areas defined as priority areas within the context of the Un Environment/MAP Regional Plan on Marine Litter Management in the Mediterranean.

Table 2: Monitoring arrangements and indicator species to be tested for monitoring entanglement/strangling in the Mediterranean

SPECIES	TYPES OF LITTER	METHOD	EXISTING NETWORKS	SPECIES	PRIORITY	REMARKS
Birds	Fishing gear, macro-litter	Observations , diagnosis	Stranding networks	All species	+	The monitoring must be organized per system with the following priorities: 1) Pilot study concerning opportunistic monitoring by stranding networks 2) Evaluation and tests of video/diving monitoring systems in protected areas 3) Surface observation test
Cetaceans	Lost nets, ghost nets	Observations , diagnosis	Stranding & observation networks at sea	All species	+	
Turtles	Lost nets, ghost nets	Video monitoring (diving and ROVs)	Stranding & observation networks at sea	All species	+	
Nektobenthic fishes	Fishing gear	Video monitoring (diving and ROVs)	Video monitoring (diving and ROVs)	All species	+++	
Pelagic fishes	Lost nets, surface ghost nets	Observations, fishing	networks of sea observation	Big pelagic sharks	++	
Invertebrates	Lost nets, macro-litter	Video monitoring (diving and ROVs)	Protected area monitoring, scientific campaign	All species	+	
Birds	Meso-/ macro-litter	Observation, litter in nests	Nesting monitoring networks	European Shag	+	Indicator of effect partially concerning strangling. To be tested on a pilot scale

Part II

3. Protocols for monitoring interactions between marine litter and marine turtles[25]

10. The protocol presented under the present document intends to provide technical support and guidance with regards to monitoring the impact of marine litter, especially through ingestion and entanglement, on marine biota. The hereunder presented monitoring protocol provides a response to the requirements under the European Commission (EC) Marine Strategy Framework Directive (MSFD) (i.e. Indicator 10.2.1 "*Trends in the amount and composition of litter ingested by marine animals*" (Criteria D10C3), and the Regional Sea Conventions i.e. OSPAR (Indicator EcoQO3) and Barcelona Convention (10th Ecological Objective (EO10) on Marine Litter of the Integrated Monitoring and Assessment Programme and related Assessment Criteria (IMAP)).

11. EO10 of IMAP consists of two Common Indicators and a single Candidate Indicator. EO10 Candidate Indicator 24 is referring to the "Trends in the amount of litter ingested by or entangling marine organisms focusing on selected mammals, marine birds, and marine turtles). Marine turtles have been proposed as indicator species to study marine litter ingestion on biota through the development and the implementation of one major indicator "Litter ingested by sea turtles".[26] On the basis of the information available, the approach that uses the monitoring of marine turtles' ingestion of litter seemed consistent and compatible with the whole set of biological, methodological,

[25] The elaboration of the protocols has been prepared by SPA/RAC in the framework of the EU-funded Marine Litter MED Project, with support of regional experts, in full synergy with the Protocols developed under EU-Funded INDICIT Project.

[26] As part of the Regional Plan on Marine Litter (PRDM) Decision G. 21/7 , one of the measures is linked to implementing the (IMAP), partly based on Ecological Objective 10's pilot indicator on amounts of litter ingested by marine organisms or these organisms' rates of entanglement. the PRDM selected the most representative species for the common indicator IMAP CI 18.)

environmental, logistical and ethical constraints identified (RAC/SPA, 2017). Some elements have already been suggested in this perspective (Table 3).

12. Standardized methodologies for extracting marine litter ingested from dead and live individuals are presented to the present document. This document originates from the merge and integration between, the INDICIT protocol (INDICIT[27], 2018) established from original methodologies tested first ever in Italy (Matiddi et al., 2011), later transposed into the MSFD guideline (MSFD TG ML, 2013), regularly improved in cooperation with various stakeholders (rescue centres, stranding networks, etc.); and the Marine Litter MED[28] Project protocol (UN Environment/MAP Specially Protected Areas Regional Activity Centre[29], 2017).

13. Species and habitat conservation policies recognise the pressure that waste of human-origin exerts on marine turtle populations as a potential threat. In the context of the Convention for the Conservation of Migratory Species (Bonn Convention or CMS), Resolution 10.4 on Marine Litter and Resolution 11.30 on Managing Marine Litter, have recently been repealed and put together in a new Resolution that will reflect how the context has changed since they were published in accordance with developments made in other surroundings. In this Resolution, the CMS invites the Parties (paragraph 24 b) to draft reports on measures implemented and their relative success in marine litter management. It also invites the Secretariat of the CMS family Accords (paragraph 28 b) to submit data on the impacts of marine litter, including micro-plastics, on the migratory species covered by these Accords with a view to their being examined by the Scientific Council.

Table 3: Types of data and categories of litter, the use of which has been advised in the context of the programmes for monitoring the impact of litter on marine turtles/biota, by UNEP/MAP/MEDPOL and MSFD.

a. Data capture sheet, according to UNEP/MAP, suggested by MEDPOL (2016)

Place No. of sample Observer	Date of sampling	Date of analysis	Species	
	Observer		Organ*	
	Storage conditions (fresh/frozen, duration)			
Item	Category (code)	Size (**)	Weight	Colour
Comments				

* Oesophagus, and/or stomach, and/or intestine (if parts have not been distinguished)
** (1 = <2.5 cm, 2 = 2.5-5 cm, 3 = 5-10 cm, 4 = 10-20 cm, 5 = > 20 cm)

b. List of recognised litter codes and categories (from UNEP/MAP, 2016). For the purposes of harmonization, the codes are taken from the main list of litter categories as defined by MSFD

Plastic polymers	Codes	Items
	G2	Plastic bags
	G48	Synthetic rope
	G51	Fishing net
	G119	Sheet-like plastic
	G122	Plastic fragments

[27] https://www.indicit-europa.eu
[28] https://web.unep.org/unepmap/what-we-do/projects
[29] https://www.rac-spa.org

	G81-G82	Polystyrene
	G78-79	Plastic fragments (>5 mm)
	G112	Industrial pellets
	G107 to G111, G113 to G116	Other micro-plastics (<5 mm)
Rubber	G125	Balloons
Supra-category 'Natural cloth/textile'	G145	
Supra-category 'Paper/cardboard'	G146	
Supra-category 'Wood' (processed)	G170	
Metal	G183	Fish hooks
	G198	Other metal
Supra-category 'Other'		

14. In the proposed protocol, both "basic" and "*optional*" parameters are proposed to be collected. The **basic parameters** (thereafter noted in bold) correspond to the minimum parameters which are fundamental to determine the indicator criteria. The ***optional parameters*** (thereafter noted in bold italic grey) aim at acquiring further knowledge on loggerheads' feeding behaviour and the probability to ingest marine litter and micro-litter, as well as to better specify the indicator criteria which are under development. The ***optional parameters*** can also help to better assess the impacts of litter related to entanglement.

15. An **observation sheet** is provided in Annex II. In order to facilitate data banking and statistical analysis, data must be filled in the corresponding **standardized table**, by respecting the units and proposed menu choices, and specifying remarks or other proposals in the last column "Note". **All boxes must be filled,** either by the information (quantitative or qualitative data), by 0 or by "NA" (information not available or not evaluated). A printable summary of the main manipulations is provided in Annex IV to the present document.

3.1. Preliminary Information

3.1.1 Regulatory aspects

16. The following protocols describe the technical operations that should be implemented during the recording of information and while taking samples from live or dead marine turtles. The surveyor will have to ensure beforehand the conditions of intervention on the sea turtles in the country where he/she intervenes and to comply with the regulations in force. These operations may require making requests for permission which may lie under different regulations. The requests that may be required are described as follows: i) action on protected species, if the species enjoy national protected status, ii) action on a live wild animal in the context of an animal experiment, even if the activities described here are not intrusive, and iii) the arrangements advocating health precautions to be taken regarding infectious diseases and zoonosis.

17. If specimens have to be moved for analysis to and/or from a state that is a signatory to the Washington Convention (CITES), it will also be necessary to make a request for a 'CITES permit' since all species of marine turtle appear in Annex 1 to this Convention.

3.1.2 Rules of hygiene

18. Action on specimens of marine turtles, whether these are dead or alive, must respect a certain number of rules of basic hygiene. We recommend applying a certain number of basic rules mentioned below.

19. Marine turtles may carry agents that are pathogenic to human beings (see Baron, 2014 for references) such as salmonella, mycobacteria, Leptospira, *Pseudomonas sp.*, *Aeromonas sp.*, amoeba etc. On the carcass, different anaerobic bacteria are developed and can infect people, especially if they are accidentally hurt while examining and handling.

20. The intervention zone must be marked-off from the bystanders and handling necessitates to wear a protective suit with glasses, gloves and rubber boots. Note that although gloves represent a protection, they can also, once soiled, represent a source of contamination. Thus, the surveyor must be very careful while separating those items that must remain away from the soiled items. For the soiled items a different process should be followed including washing and disinfection, or to be thrown in separate bins.

21. If the people providing the information (e.g. fishermen, firemen, etc.) have touched the turtle with their bare hands, they must be given advice and instruction on hygiene and should be particularly told to wash their hands carefully after the action. A disinfectant soap (e.g. chlorhexidine) could be also provided to them when they arrive at the place (e.g. rescue center) where the marine turtle will be delivered. The same precautions will be taken by surveyors who have not worn gloves.

22. For the same reasons, live turtles and carcasses must be moved in special tubs (e.g. plastic bowls with a waterproof mat for live animals) so that they can be cleaned and disinfected. Samples (e.g. digestive tracts) will be packed into watertight bags and if possible, put in a cool-box for transport to avoid any contamination of the vehicle and also to restrict the process of autolysis*[30] of the tissues (decomposition). After external examination of a dead turtle, or an autopsy, there are several options for eliminating the carcass or remains according to national rules where the operations are being carried out. If the turtle is examined at the site of the stranding and must be got rid of by municipal workers, for example, or by slaughterhouse workers, it is always preferable to wrap the carcass in a closed, hermetically sealed double bag and inform the agents who are taking over of the precautions to be taken.

23. All soiled elements, gloves, protective clothing, absorbent paper and disposable instruments must be thrown into the bag before it is closed if an incineration is anticipated, or special bins that will be treated in a way that suits this type of organic waste. Finally, it is understood that the ideal conditions for the external and internal examination of a turtle, and for the taking of samples, are those found in a laboratory. For dead turtles, it is recommended that there be a case-by-case study of the possibilities of carrying out the dissections*/necropsies in premises that are well-equipped and with competent technical staff. This means, particularly, veterinary analysis laboratories or scientific research laboratories. As regards live turtles, the examination is usually done in a care center or a veterinary surgery, where these precautions are already respected.

3.1.3 Preparing the premises, equipment and instruments

24. Before carrying out the operations of dealing with specimens, and storing or taking samples, and analyzing them, it is necessary to prepare the premises, equipment and instruments that are to be used. The elements that are useful for this preparation are summarized in Annex III to the present document.

[30] The glossary (Annex I) contains the definition of terms used in the protocols, marked in the text with an asterisk

25. If the examination and dissection cannot be done in laboratory conditions, it is recommended that an action zone be marked off and material prepared somewhere near the carcass, with a toolbox in which soiled instruments will be placed at the end of the operation to be cleaned later, and two big bin bags to receive the carcass to be got rid as well as disposable sharp things. If the examining and opening up of the carcass is done after moving it to the premises, these must at least have a water tap, an examination table and material that can be washed down (metal), if possible, fitted with a drainage canal, under which a bin will be placed to receive the tissues and non-sharp things to be thrown away at the end of the operation.

3.1.4 Preparing the team, distributing roles

26. For reasons of hygiene (see above), it is recommended that at least two people are involved in the operations: one to operate, protect himself and handle the soiled objects; the other to take photos, note information etc. The second person can assist the surveyor by wearing two pairs of gloves, one of them being changed for writing. For surveyors, cut-resistant pair of gloves must be worn below the two pairs of gloves, one of them being changed for touching materials to keep clean or in case of cutting the first pair.

3.1.5 Size of marine litter considered

27. The new Commission Decision (Decision 2017/848 of the 17th May 2017) provides the different sizes of marine litter for D10C3 “primary” criteria as litter (>5mm) and micro-litter (<5mm). For the D10C3 “secondary” criteria, both marine litter and micro-litter are quantified. The MSFD Technical sub-group on Marine litter (MSFD TG-ML, 2013) recommends, for practical reasons, to consider micro-plastics between 1 and 5 mm when it is impossible to characterize chemically or physically the type of smaller microplastics. Consequently, the micro-litter size range for this criterion is considered at 1-5mm, for practical reasons when visual observations is the only possible method of characterization.

28. GESAMP (2016) provides the definition of micro-plastic as any plastic particle < 5mm. Moreover, the categories meso-plastic (5-25mm) and macro-plastic (> 25mm) can be used.) For more precise definitions, a glossary is provided under Annex I to the present document.

3.1.6 Useful definitions

29. In order to ensure optimum harmonization during the collection of information, certain definitions must be clearly provided. Acceptance of certain terms may differ from one person to the other and thus may represent a source of bias. The glossary (Annex I) contains the definition of terms used in the protocols, marked in the text with an asterisk *. These concerns, inter alia, the anatomy of marine turtles, assessment of carcasses, impacts of litter on these species, types of litter and fishing gear* encountered, etc.

3.2. General Information on Live and Dead Specimens

3.2.1. First Notes on the Discovery Site

30. **Contact:** Note the name, contact (phone, mail) and institution of the observer(s) (data collector).

31. **On the individual:** Identify the species of the observed marine turtle:

- Cc (loggerhead *Caretta caretta*): 2 pairs of pre-frontals scutes, nuchal scale in contact with the 1st costal;
- Cm (green *Chelonia mydas*): 1 pair of pre-frontals scutes, nuchal scale not in contact with the 1st costal;
- Dc (leatherback *Dermochelys coriacea*): Absence of keratinized scutes, presence of 'leather' and ridges.

32. In case of doubt about the species identification, refer to identification guide (e.g www.cites.org). If the species cannot be identified, note NI (Non-identified) on the observation sheet.

33. **Tags:** If the examined marine turtle has been identified during egg-laying or a prior release, it may have one or two rings attached to one (two) flippers or an electronic chip that has been slid under the skin or into a muscle. To read the chip you need to have a transponder reader. In some relatively rare cases the turtle carries a telemetric monitoring device (tag) that can also help identify it, by contacting the provider or structure whose names appear on the tag. If pre-existing tag on the flipper, specify the tag number. Indicate the presence and code number of electronic chip. Otherwise, note NO.

34. **Animal Identification Code:** It is recommended to use a standard identification code. We propose noting: 2 letters for the country, 2 letters for the location (e.g. region or institution), the species, the year, the month, the day and the number of turtle per order of collection during the year, separated with "_". Example: "FR_GR_CC_2017_03_12_9" corresponds to the 9th loggerhead individual, found in by the center of Grau du Roi in France, the 12nd March 2017. Thereafter, it will be asked to specific the type of sample.

35. **On the site:** Note the **date of discovery** (dd/mm/yyyy), **the location of discovery** and ***the coordinates*** if available ***(X, Y**: in decimal degrees, or specify the coordinate system).*

NOTE: Taking pictures of the animal before handling is very important to verify the circumstances of the finding and to *a posteriori* confirm or clarify information noted, in case there is doubt or difficulty in identifying the species, the lesions*, the state of the individuals and the elements responsible for the interaction*. Using a tape measure can show the order of magnitude in the pictures and it is important to refer to the identification code of the animal examined when storing the pictures. Please specify if pictures are taken in the column "Photo at finding" of the Excel file.

3.2.2. Description of the animal's body condition

- *3.2.2.1 Conservation status or decomposition level*

36. Two cases are present: the turtle is alive, or it is dead. But it can also seem dead (very slow breathing) and just be in a coma, so it is useful to check by looking for reflexes (oculo-palpebral*, withdrawal reflex when the tail is pinched) before reanimation, if need be. Note the **status** according to these 5 levels presented under Figure 1, hereunder:

- Level 1: litter can be extracted from the analysis of faeces in rescue center.
- Levels 2 and 3: are adequate for litter ingestion analysis from necropsies.
- Level 4: allows to measure biometric data and assess the presence/absence of ingested plastic (for the evaluation of the frequency of occurrence of litter ingestion (or prevalence, FO%)) and entanglement*.
- Level 5: for which individuals have usually lost the gastro-intestinal material, the analysis of litter ingestion is not possible[31].

[31] Some tissues (muscle, etc.) can be collected and frozen at -20°C for further genetic analysis.

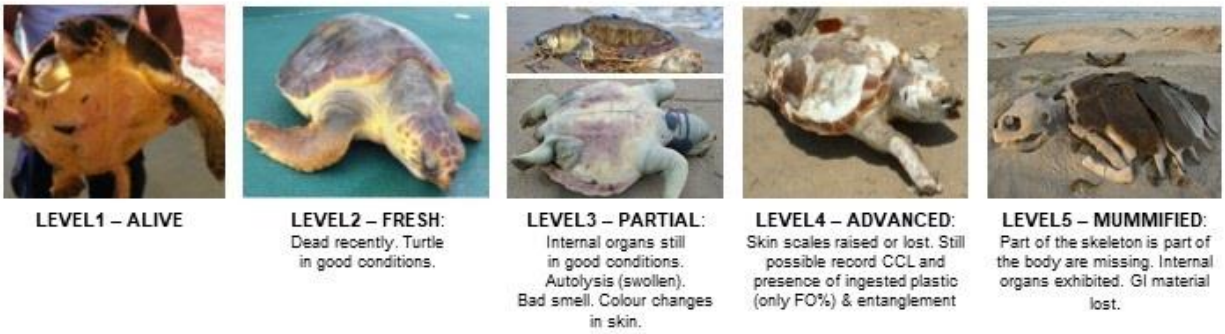

Figure 1: Conservation level or decomposition status

- *3.2.2.2 Discovery circumstances*

37. Note the circumstances among the 4 categories:

- Stranding*: Animal found stranded on the beach or in the shoreline,
- By-catch*/Fisheries: Animal accidentally captured by fishermen (e.g. ingestion of a hook, trapped in a net, brought back by fishermen, etc.) during fishing operations,
- Found at sea: Animal discovered on sea surface,
- Dead at the recovery center: The animal arrived alive but died during its hospitalization.

- *3.2.2.3 Possible cause of morbidity and mortality, type of impact*

38. If possible, the ***type of interaction with human activities and impact observed or suspected on dead or live stranded individuals*** should be deduced from external observations or organs observation during the necropsy* of dead individuals and complement with veterinarian examinations. Also, an inspection of the oral cavity should be conducted for the presence of foreign material. Then a choice among the 10 different categories should be made and the notes and remarks box should be completed with the help of the pathologist (if this is requested):

- Bycatch/Fisheries related: ingested hook, decompression sickness (diagnosable through X rays), individual trapped in a fishing gear, individual drowned in a fishing gear…;
- Entanglement in litter: entanglement in litter other than related to fishing activity. Please fill the column "Entanglement type" and "Litter causing entanglement";
- Ingestion of litter: digestive obstruction or occlusion, perforation or other impacts;
- Anthropogenic trauma: Collision with a boat or a propeller, individual beaten with knife, stick or harpoon, poaching…;
- Natural trauma: e.g., shark attack;
- “Natural disease” (=other symptoms): buoyancy trouble, cachexia, dermatitis, conjunctivitis, rhinitis…;
- Oils: Ingestion or external impregnation with oils;
- Unidentified: Impossible to know the cause of death/stranding, no remarkable damages, injury or disease;
- Other: Please specify in the column "Notes".

- *3.2.2.4 By-catch gear*

39. If the animal has been found bycaught, specify among the 6 proposed categories, the ***by-catch gear***:

- Longline;
- Trawler;
- Nets;
- Fishing rod;
- Non-identified;
- Other: Please specify in the column "Notes".

40. Please also specify if possible, in the column "Notes" the distance from the coast and the duration of the deployment before the gear was brought aboard.

- *3.2.2.5 Health status*

41. Note the ***health status*** according to the level of body condition (Fig. 2).

Figure 2: Health status from visual observation of plastron shape (from Thomson et al., 2009)

- *3.2.2.6 Main injuries*

42. In case of injuries, the ***main type of injury*** (fracture, amputation*, sectioning, abrasion or other) should be reported according to Fig. 3 hereunder presented. For other type, please specify it in the column “Notes”.

Figure 3: Typology* of the most frequent injuries observed in sea turtles

- *3.2.2.7 Affected body part*

43. If the animal presents an injury, the ***affected body part*** should be reported:

- RFF for the right front flipper;
- LFF for the left front flipper;
- RRF for the right rear flipper;
- LRF for the left rear flipper;
- Neck;
- Carapace;
- Plastron;
- Head;
- Several (if several parts of the body are impacted) or other (please specify in the column "Notes").

- *3.2.2.8 Litter causing entanglement*

44. If the individual has been found entangled in litter, the ***type of material in which the sea turtle has been found entangled in*** should be specified, according to the following categories:

- Pieces of net (N),
- Monofilament line (nylon) (L),
- Rope or pile of ropes (R),
- Plastic bag (Pb),
- Raffia (Rf),
- Other plastics (Ot),
- Multiple materials (Mu),
- Unknown (Unk).

- *3.2.2.9 Other descriptive parameters*

45. Visual inspection of the animal's ***fat reserves*** at the neck is recommended. For dead individual, this can be verified when opening the plastron* according to the quantity of fat recovering the abdominal muscles (see below, Fig. 6c). Choose among the 3 categories:

- Thin (sunken neck);
- Fat;
- Normal.

46. If possible, the ***sex*** (Male or Female) should be noted, which can be determined by gonads analysis or, in adult individuals from the observation of secondary sexual characters (Fig. 4), according to the length of the tail and of the claw in the front flipper. This may be confirmed through a visual observation of the genital apparatus during the necropsy for dead individuals. Otherwise, specify by NI (for Not identified).

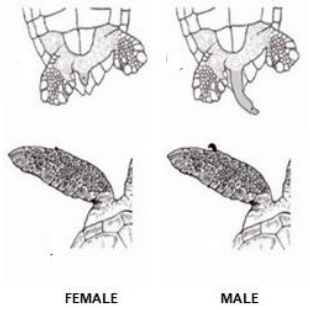

Figure 4: Example of determination of the sex of loggerhead turtle (from Wyneken, 2001)

- *3.2.2.10Biometric Measurements*

47. Following Fig. 5, several basic and *optional* body lengths can be measured (in centimeters, precision 0.01 cm), as well as the ***Weight*** (in kilograms, precision 0.01g). A measuring tape should be used to measure curved lengths and a sliding caliper for straight lengths:

- **Standard curved carapace length (CCLn-t or CCL)**
- ***Maximum Curved Carapace Length (CCLmax)***
- ***Minimum curved carapace length (CCLmin)***
- ***Curved carapace width (CCW)***
- ***Standard Straight carapace length (SCLnt)***
- ***Maximum Straight carapace length (SCLmax)***
- ***Minimum Straight carapace length (SCLmin)***
- ***Straight carapace width (SCW)***
- ***Curved plastron length (CPL)***
- ***Straight plastron length (SPL)***
- ***Curved plastron width (CPW)***
- ***Straight plastron width (SPW)***

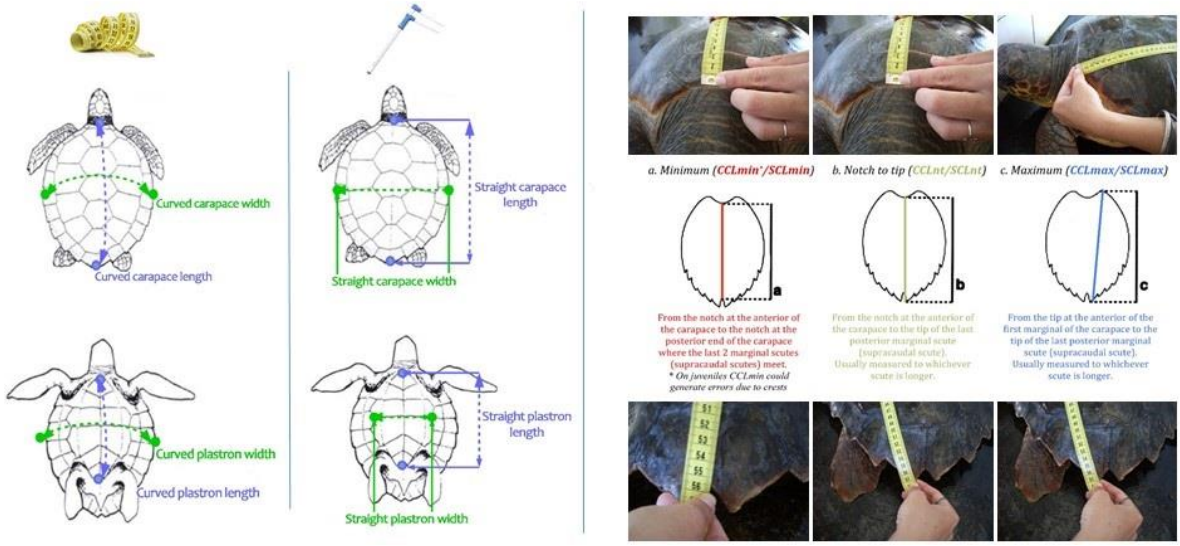

Figure 5: Biometric parameters (carapace and plastron lengths).

3.3. Sampling Marine Litter from Carcasses – Protocol for Dead Animals

48. In case of decomposed animal (status of Levels 3 and 4), the integrity of the digestive tract should be checked before carrying the turtle in laboratory. In any case (except status of Level 5), if the necropsy cannot be done immediately after the recovery, freeze the carcass at -20°C.

3.3.1 Turtle Necropsy

- *3.3.1.1 Opening of the carcass*

49. The carcass should be placed on its back, trying to wedge it with an object so that it doesn't wobble from side to side. The plastron should be removed and separated from the carapace through an incision on the outside edge (yellow line) (Fig. 6a). The incision should be made with special attention, with the use of a short blade or by cutting with a horizontal tilt in order not to affect the integrity of the interior organs (Fig. 6b).

50. Once the inside of the plastron is accessed, cut the ligament attachment to the pectoral and pelvic girdle to pull back the plastron and reach the muscles and then the internal organs.
Report the ***Fat reserves*** of the animal (Fig.6c) according to:

- Atrophy of pectoral muscles (none, moderate, severe);
- Fat thickness in joint cavities and in coelomic membrane (abundant, normal, low or none);
- Then complete the fat reserves informing the trophic status* of the animal (thin, normal of fat).

- *3.3.1.2 Extracting and preparing sections of the digestive tract*

51. **Extraction of the Gastrointestinal System:** Expose the gastrointestinal system (GI) by removing the pectoral muscles and the heart of the animal (Fig.7a and 7b). The blood can be emptied from the abdominal cavity by carefully rolling the turtle onto a side. Clamp the oesophagus proximal to the mouth and clamp the cloaca*, the closest to the anal orifice. Remove the entire GI and place it on the examination surface. This operation is easier if done by at least 2 operators: one person keeps the animal lying on one side, while the other separates the ligaments of the different organs and membranes of the carapace, extracting the GI from the carcasse. Isolate the different portions of GI (oesophagus, stomach, intestines) by strangling and cutting between 2 clamps (see the blue solid lines in Fig. 7c) the gastro-oesophageal sphincter and the pyloric sphincter.

52. **NOTE:** If possible, record the **sex** of the animal through the observation of gonads.

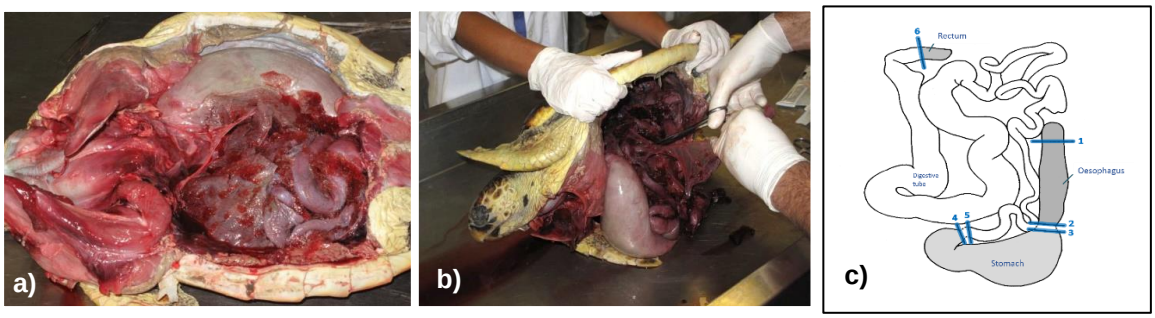

Figure 7: Sequence of extraction and preparation of sections of the digestive a) Remove the pectoral muscle and the heart; b) Extraction of the GI; c) Sketch of the entire GI. Blue lines indicate where clamps must be attached in order to separate the 3 different GI sections. (Drawing by V. Hergueta).

53. **Noting external lesions of the GI that can be attributed to litter:** Before opening up the digestive tube, examine the outer wall to observe possible perforations by foreign bodies or areas of necrosis. Also note secondary lesions, particularly a peritonitis following on a perforation of the digestive tube, an invagination of the digestive tube, an occlusion*, etc. Photograph every lesion observed, taking care to get an overall view and a close-up (macro-lens). Pictures must be stored referring to the code corresponding to the animal examined, describing the lesion in the description of the subject.

3.3.2 Extraction of Gut Content

54. The three parts of the gastrointestinal system (i.e. oesophagus, stomach, intestines) should be removed by adding a second strangling at the cut edge to prevent spillage of the contents (Fig. 8a)[32]. Each GI section should be opened lenghtway using a scissor and slide the material directly out of the section onto a 1mm mesh sieve. The content should be cleaned with current and abundant tap water (Fig. 8b) to remove the liquid portion, the mucus and the digested unidentifiable matter[33].

55. The content for the presence of any tar, oil, or particularly fragile material, should be inspected and should be subsequently removed and treated separately. It should be then reported in the column “Notes” of the INDICIT-UN-MAP Excel file.

56. All the material should be rinsed collected in the 1mm sieve (Fig. 8b, c), and should be placesd in tubes or in zipped bags, reporting the sample code (individual code, respective GI section) and stored at -20°C, pending the laboratory analyses.

NOTE: At this stage, for the optional differentiation of litter and micro-litter, the material should be slid out of the section directly onto a 5mm mesh sieve superposed on a 1mm mesh sieve. Then, proceed with the rinsing and the storing of the material collected as described above, for both 1- and 5- mm sieves, reporting the samples code (individual code, respective GI section and size class (>5mm or 1-5mm)).

[32] The 3 parts of the GI (oesophagus, stomach, intestines) are analysed separatelly in order to assess possible differences in litter content per section and better assess the digestive transit of marine litter.

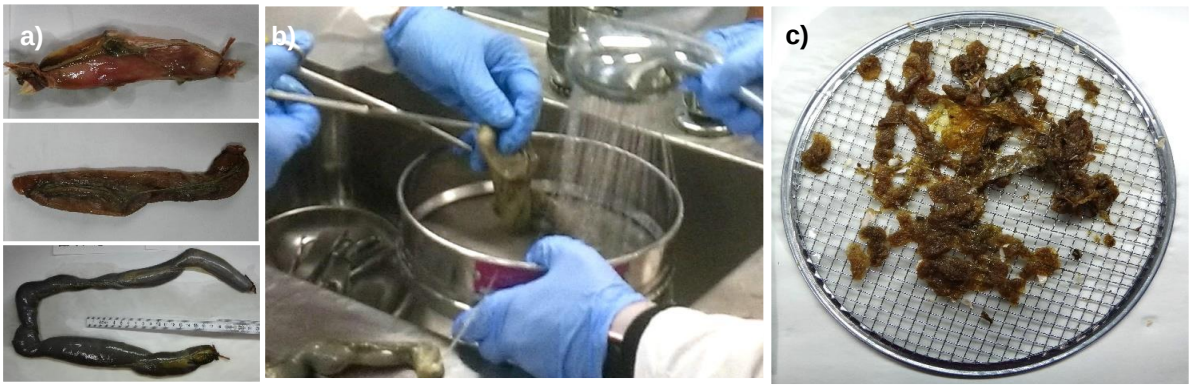

Figure 8: Digestive tract analysis: a) Separated GI sections: Oesophagus (up), stomach (middle) and intestines (down); b) Section opening and gut content lavage; c) Gut content extracted.

3.3.2. Extraction of Ingested Marine Litter and Other Elements from the Stored Gut Content

57. The gut contents should be defreezed the stored and both marine litter and other items should be removed manually by visual observation.

3.4. Sampling Marine Litter from Faeces – Protocol for Live Animals

58. **Collection of faeces:** For the homogeneity of approaches allowing the comparability of turtles and regions over time, the collected faeces will be analyzed only for the individuals remaining at least 1-month minimum in the rescue center. The faeces should be collected only after 2 months from the arrival of the individual. The turtle should be carefully rinsed with water to avoid contamination and the animal should be placed in an individual tank (Fig. 9a). A filter of 1mm should be disposed in all the discharge tubes of the tank (Fig. 9b). The water tank should be controlled daily by filtering through the 1mm mesh sieve according to the following methods:

- Collect the faeces manually with a 1mm mesh dip net (Fig. 9c);
- Put a 1mm mesh flexible collector in the drain tube (Fig. 9d);
- Place a 1mm mesh rigid sieve under the drain (Fig. 9e).

Figure 9: Sequence of faeces sampling. a) The turtle is disposed in an individual tank; b) A 1mm mesh sieve is disposed in discharge tubes; c) A 1mm dip net for handling faeces; d) Collector with 1mm mesh disposed in discharge tube for filtering water tank; e) An 1mm mesh rigid sieve down discharge tube for filtering water tank; f) Sample collected in a rigid sieve.

NOTE: Each sample which could not be analyzed directly can be conditioned in a tube or a zipped bag and identified with a permanent marker, e.g. with 2 letters for the country _ 2 letters for the region/Institution _ Species_Year _ Month _ Day _ N° turtle _ Type of sample.
Ex: FR_GR_CC_2017_03_12_9_Faeces corresponds to the faeces, excreted by the 9th loggerhead individual found by the rescue center of le Grau du Roi in France, the 12nd March 2017.
The sample is then stored at -20°C, pending the laboratory analyses.

59. **Collection of litter and other elements from faeces:** The sieves and collectors should be washed with abundant water above a 1mm mesh sieve (Fig. 9f). The collection of litter and other elements is conducted manually by visual observation directly from the 5mm and 1mm sieve.

NOTE: At this stage, for the optional differentiation of litter and micro-litter, the sieves and collectors should be rinsed above a 5mm mesh sieve superposed on a 1mm mesh sieve. Then, proceed with the collection of litter as described above, for both 1- and 5- mm sieves.

3.5. Marine Litter Analysis and Classification

60. **Litter and other elements classification:** The **protocol** that was used should be specified, between "Necropsy" or "Faeces". For each GI section of the necropsied individual (Section 1 of this document) or for faeces (Section 2 of this document), classify the litter and other elements according to the following categories (Tab 4., Fig. 10)[34].

Table 4: Classification of ingested litter and other elements for sea turtles content analysis.

CATEGORIES			CODE	DESCRIPTION
LITTER	PLASTIC LITTER	Industrial plastic	IND PLA	Industrial plastic granules, usually cylindrical but also sometimes oval spherical or cubical shapes, or suspected industrial item, used for the tiny spheres (glassy, milky...)
		Use sheet	USE SHE	Remains of sheet, e.g. from bag, cling-foil, agricultural sheets, rubbish bags…
		Use thread	USE THR	Threadlike materials, e.g. pieces of nylon wire, net-fragments, woven clothing…
		Use foam	USE FOA	All foamed plastics e.g. polystyrene foam, foamed soft rubber (as in mattress filling)…
		Use fragment	USE FRAG	Fragments, broken pieces of thicker type plastics, can be a bit flexible, but not like sheet like materials.
		Other Use plastics	USE POTH	Any other plastic type of plastics, including elastics, dense rubber, balloon pieces, soft air gun bullets… Specify in the column "Notes".
	Litter other than plastic		OTHER	All non-plastic rubbish and pollutant e.g. cigarette filters…
OTHER ELEMENTS		Natural food	FOO	Natural food for sea turtles (e.g., pieces of crabs, jellyfish, algae…)
		Natural no food	NFO	Anything natural, but which cannot be considered as normal nutritious food for sea turtle (stone, wood, pumice, etc.)

[34] The classification of the litter and other elements was adjusted by the INDICIT consortium, based on the MSFD guideline (MSFD TG-ML, 2013) and the INDICIT partners and collaborators (e.g. rescue centers and stranding networks) feedbacks. The different plastic categories can be identified visually and possibly confirmed by stereomicroscopy.

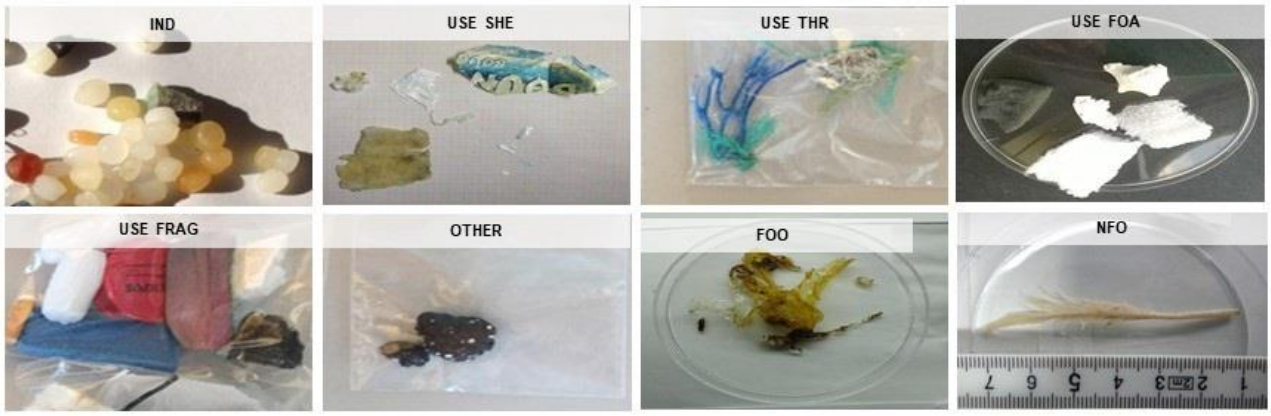

Figure 10: Examples of ingested litter and other elements categories established for marine turtle ingestion.

61. **Collection of data:** For each GI section of necropsied individuals or for the whole faeces' samples of live individuals, marine litter items and other items should be shorted into the different categories presented under Table 2. In additional the following parameters should be recorded:

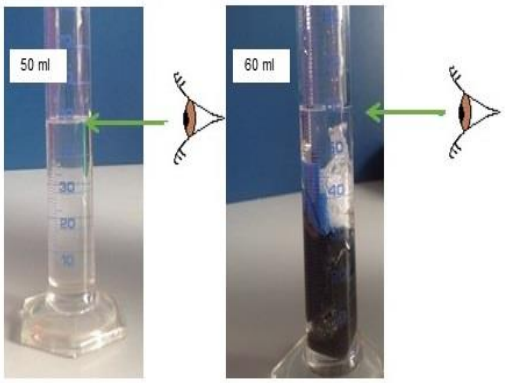

Figure 11: The volume of the plastic litter corresponds to the difference between the volume with (right) and the volume without (left) the plastic litter. The volume is read by considering the bottom of the meniscus formed by the surface water.

- Record for all categories (litter and other elements): The dry mass (grams, precision 0.01 g) of each category: dry the sample at room temperature during 24h minimum or in a stove at 35ºC during 12h.
- Record for litter categories only: The number of fragments in each category**:** a fragment is a piece of litter that can be identified. The ***number of items*** in each category: an item is a set of fragments that seem to originate from the same piece of litter
- Record for the plastic litter categories only: The ***total volume of plastic litter*** (milliliter, precision 0.01 ml): measure the volume of all plastic litter in a graduated beaker and record the water variation (Fig. 11). Push the floating plastic in the water thanks to a rod or a decimeter. The ***total number of plastic fragments per colour category:***
    - *Total number of white-transparent plastic fragments*;
    - *Total number of dark coloured plastic fragments (black, blue, dark green…)*;
    - *Total number of light coloured plastic fragments* (cream, yellow, pink, light green…).

NOTE 1: In the case where litter and micro-litter were differentiated, proceed with the data collection as described above, but distinguishing both size classes (>5mm and 1-5mm).

NOTE 2: The optional parameters recorded for plastic litter categories can be collected per GI section and per category, for practical and organizational reasons, but it is the total of all the GI – all plastic categories included – that will be noted in the Observation sheet.

4. References

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APPENDIX I
GLOSSARY

GLOSSARY

Amputation (of a member). For a marine turtle, the loss of a flipper by being cut off, which may result from constriction* or strangling.

Autolysis. Destruction of tissues by their enzymes.

Necropsy. Examination of a carcass to study the causes of death.

By-catch. The accidental catch of a non-target species (of marine turtle, for example).

Cloaca. (Common) orifice of the urinary and genital passages in birds and reptiles.

Constriction. Action of squeezing, pressing around; when this happens at the level of the neck it can suffocate the turtle; when around a member, the blood supply is slowed or even cut off, causing, after a certain time, necrosis and loss of the member.

Dissection (of a carcass). Opening up a carcass according to a defined protocol to study its structure and take samples. When looking for the causes of death, the term used is 'necropsy'.

Entanglement. Accidentally caught by fishing gear during the fishing operation, or abandoned or lost.

Fishing gear. Material intended for catching marketable aquatic species, e.g. trawls, seine nets, nets, lines and longlines. According to circumstance, the entangling is due to:

- **Abandoned gear** (derelict). The gear is left where the fisherman has intentionally abandoned it;
- **Ghost gear** (e.g. ghost net). Gear left on the seabed and which continues to fish; referred to as 'ghost fishing';
- **Lost gear.** Gear unintentionally lost during fishing operations;
- **Wreck**. Object abandoned at sea, drifting or on the seabed;
- **Discarded gear or fishing material**. Old gear or material put aside and often thrown back into the sea; this gear must be collected in containers on land for recycling.

Impact. Effect of something.

Interaction. Reciprocal action that two or more systems exercise on each other.

Occlusion. Complete halt of the passing of matter and gases in one portion of the GI. The occlusion can have a mechanical cause (total obstruction by litter) and constitute a veterinary emergency.

Lesion. Modification of the structure of a living tissue under the influence of a disease, of a reason inducing a pathology.

Macro-litter or litter: artificial polymers (plastic) and "other litter" with a maximum size (or diameter) > 5 mm.

Meso-litter: artificial polymers (plastic) and 'other litter" with size between 5 and 25mm.

Micro-litter: artificial polymers (plastic) and "other litter" with size < 5 mm.

Oculo-palpebral reflex. Reflex in which the eyelids spontaneously shut or blink if the lashes or the internal edge of the orbit are touched with a finger.

Plastron. The ventral part of a turtle's carapace.

Stranding (of a marine turtle). Said of an animal, dead or alive, that has been washed up on the coast.

Trophic status. Nutritional state in which may be reflected by variable degrees of stoutness, presence of fats in the tissues.

Typology. Approach consisting of defining or studying a set of types; by extension, here it means the listing and describing of types of litter, lesion, etc. that allow the surveyor to classify observations in the correct category of data.

APPENDIX II
OBSERVATION SHEET

UNEP

OBSERVATION SHEET - Entangling and litter ingestion

INDICIT

COLLECTOR | LOCAL CODE

INSTITUTION | Contact.

Discovery circumstances:

SPECIES ☐ Caretta caretta ☐ Dermochelys coriacea ☐ Chelonia mydas ☐ Other

INDIVIDUAL TAG: Tag number: | Electronic chip nº:

DATE OF DISCOVERY dd / mm / yyyy

INDIVIDUAL CODE CC - INFI (Region) - YY - MM - DD - a

LOCATION | X CORD | Y CORD

CIRCUMSTANCES	BY-CATH ENGINE CAUSE	CAUSE OF DEATH / STRANDING	ENTANGLEMENT TYPE
☐ Bycatch/Fishery	☐ Longline	☐ By-catch/Fisheries	☐ Active ☐ Passive ☐ NR
☐ Stranding	☐ Trawl	☐ Entanglement in debris	
☐ Dead at rescue centr	☐ Drift net	☐ Ingestion of litter	
☐ Found at sea	☐ Fishing rod	☐ Antrophogenic trauma	
☐ Other	☐ Other	☐ Natural trauma	
☐ NR	☐ NR	☐ Natural disease	
		☐ Oils	
		☐ Healthy	
		☐ Other	
		☐ NR	

LITTER CAUSING ENTANGLEMENT
☐ Net pieces
☐ Monofilament lines
☐ Rope/s
☐ Raffia
☐ Plastic bags
☐ Other
☐ NR

PICTURES ☐ Yes ☐ No

Picture names:

Animal body condition:

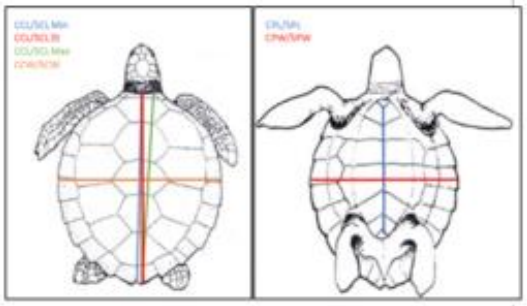
CONSERVATION STATUS	HEALTH STATUS (Plastron shape)	MAIN INJURIES	AFFECTED PARTS	FAT RESERVES
☐ 1- Alive	☐ Poor (concave	☐ No injuries	☐ Flipper (	☐ Thin
☐ 2- Fresh	☐ Fair (plane)	☐ Fracture	☐ Carapace	☐ Normal
☐ 3- Partial	☐ Good (convex	☐ Amputation	☐ Neck	☐ Fat
☐ 4- Advanced	☐ NR	☐ Sectioning	☐ Head	☐ NR
☐ 5- Momified		☐ Abrasion	☐ Plastron	
☐ NR		☐ Other	☐ Other	

Biometric measurements:

Curved measurements (0,01cm) Straight measurements (0,01cm)

CCLst	cm	SCLst	cm
CCLmax	cm	SCLmax	cm
CCLmin	cm	SCLmin	cm
CCW	cm	SCW	cm
CPL	cm	SPL	cm
CPW	cm	SPW	cm

WEIGHT (0,01kg):



Extraction of ingested debris: **INDIVIDUAL CODE:**

PROTOCOL: ☐ **NECROPSY** ☐ **OBSERVATION OF FAECES**

Please describe:

VISCERAS STATUS (note the presence of any infection, suspect colour, fluid effusion, perforantion, presence of oil, etc.):

DIGESTIVE TRACT (note the presence of any infection, suspect colour, fluid effusion, perforantion, presence of oil, etc.):

ARRIVAL DATE	/ /
DEPARTURE	/ /
DEAD DATE	/ /

TURTLE BEHAVIOUR AND TREATMENTS:

Marine litter and other elements measurements:

	OESOPHAGUS			*STOMACH*			*INTESTINES*			*FAECES*		
	Dry mass (0.01g)	Number of fragments	*Number of items*	Dry mass (0.01g)	Number of fragments	*Number of items*	Dry mass (0.01g)	Number of fragments	*Number of items*	Dry mass (0.01g)	Number of fragments	*Number of items*
IND PLA												
USE SHE												
USE THR												
USE FOA												
USE FRAG												
USE POTH												
OTHER												
FOO												
NFO												

NUMBER of plastic fragments per colour		*NUMBER of plastic items per colour*		*VOLUME of plastic litter*
white-transparent		*white-transparent*		
dark coloured		*dark coloured*		ml
light coloured		*light coloured*		

NOTES AND REMARKS (Necropsy, faeces collection and debris measurements):

APPENDIX III
LIST OF MATERIAL

ANNEX III: LIST OF MATERIAL

For the take-over of the animal and the collection of samples at the discovery site:

Rope (to mark-off the zone)

Integral protective suit

Glasses and protective mask or shield

Cut-resistant gloves

Gloves

Boots

Camera

Measuring tape

Pen

Observation sheet

Bottle/zipped bags

Cooler

Permanent marker

Transport bins or containers for the turtle

Garbage bag

For the collection of samples on dead individuals in laboratory and the extraction of the ingested litter from the digestive tract:

In the laboratory room

Cold chamber or chest freezers (-20°C) with large storage capacity

Proofer (not mandatory)

Garbage bags

For surveyors

Integral protective suit

Glasses and mobcaps

Protective mask or shield

Cut-resistant gloves

Gloves

Boots

For notes and report

Camera (+ scale decimeter)

Pen

Observation sheet

Permanent marker

For the necropsy and the collection of the GI content

Clamps (at least 6) or roast wire

Scalpel

Scissors

Clips with claws

Metal containers

Metal spoon

Containers for samples (Bottle/zipped bags)

For the collection of samples

Sieve with 1 mm mesh

Sieve with 5 mm mesh

Measuring cylinders (2 L, 1L, 50cL; precision 0.1L)

Measuring decimeter

Precision balance (capacity 4kg, precision 0.01 g)

For the collection of samples on live individuals in rescue centers and the extraction of ingested litter in the faeces:

In the laboratory room

Freezers (-20°C)

Proofer (not mandatory)

Garbage bags

For surveyors

Glasses

Protective mask

Gloves

For notes and report

Camera (+ scale decimeter)

Pen

Observation sheet

Permanent marker

For the collection of samples

Containers for samples (tubes/zipped bags)

Metal spoon

Sieve with 1mm mesh

Sieve with 5mm mesh

1mm mesh rigid sieve

1mm mesh flexible collector (drain tube)

For the analysis of the ingested litter:

For surveyors

Glasses

Protective mask

Gloves

For notes and report

Camera (+ scale decimeter)

Pen

Observation sheet

Permanent marker

For the analysis of the ingested litter

Measuring tape

Decimeter

Precision balance (capacity 1kg; precision 0.01)

Measuring cylinders

Metal spoon / clamps

Binocular (*optional*)

APPENDIX IV
REFLEX SHEETS

A. FIRST NOTES ON THE DISCOVERY SITE

***Note**: The loggerhead sea turtle (Caretta caretta) is a protected species in some countries, therefore only authorized people can handle live and dead animals or parts of them. Upon finding the animal, its management and recovery should be reported and coordinated with the responsible Authorities. A CITES permit is asked if a specimen or sample has to be sent/received.*
Sanitary precautions must be paid for the handling of dead or live wild animal to minimize risks of infectious diseases such as zoonosis. The intervention zone must be marked-off from the bystanders and handling necessitates to wear a protective suit with glasses, gloves and rubber boots, then carefully separated and disinfected or thrown. Ideally, a cut-resistant pair of gloves can be worn below two pairs of gloves, one of them being changed for writing or in case of cutting.

On the discovery site, note the following information on the observation sheet:

1. **General information:**
   - Contact information of the observer/collector of the animal;
   - Species;
   - Presence of pre-existing tags/electronic chips/telemetric monitoring devise;
   - New numbers of tag and electronic ship, when it applies;
   - Animal's identification code;
   - Date and location of discovery;
   - Coordinates (*optional*);
   - Pictures/Videos.

2. **Animal's body condition:**
   - Conservation status or decomposition level;
   - Discovery circumstances;
   - Probable cause of death/stranding (optional);
   - By-catch gear (optional);
   - Health status (optional);
   - Main injuries (optional);
   - Affected body parts (optional);
   - Entanglement type (optional);
   - Litter causing entanglement (optional);
   - Other descriptive parameters (optional);
     - Fat reserves
     - Sex
   - Biometric measurements.

B. EXTRACTION OF MARINE LITTER FOR DEAD ANIMALS: Necropsy protocol

1. Turtle's necropsy:

- Open the carcass by removing the plastron;
- Note fat reserves;
  Thin / Normal / Fat;
- Expose the gastrointestinal system (GI);
- Clamp the esophagus and the cloaca;
- Remove the GI from the carcass;
- Note external lesions on the GI and specify when attributed to litter.

2. Extraction of gut content and collection of ingested litter:

- Separate the 3 sections of the GI (oesophagus, stomach, intestines), and for each section:
- Rinse all the material collected over a 1mm mesh sieve (or superposed 5 and 1 mm mesh sieves – *optional*)
- Inspect the content and separate marine litter from other elements
- Collect marine litter and other content in separated zipped bags or bottles, noting the animal's identification code, the GI section (and optionally the litter class size (1-5, >5))
  Example: FR_GR_2017_03_12_9_Oeso
- Freeze at -20°C if analyses cannot be performed successively.

C. EXTRACTION OF MARINE LITTER IN LIVE ANIMALS: Faeces protocol

***Note**: Collect faeces from individual remaining at least 1 month in the rescue center only and up to 2 months after the individual's arrival*

1. Collection of the daily faeces:

- With a 1 mm mesh dip net;
- From a 1 mm mesh flexible collector disposed around the drain tube;
- From a 1 mm mesh rigid sieve disposed under the drain.

2. Collection of marine litter:

- Rinse the sieves and collector with abundant water above a 1mm mesh sieve (or superposed 5 and 1 mm mesh rigid sieves – optional);
- Inspect the content and separate marine litter from other elements;
- Collect marine litter and other content in separated zipped bags or tubes, noting the animal's identification code, the protocol (and optionally the litter size class (1-5, >5));
  Example: FR_GR_2017_03_12_9_Faeces
- Freeze at -20°C if analyses cannot be performed successively.

D. MARINE LITTER ANALYSIS

1. Litter and other element classification:

CATEGORIES			CODE	DESCRIPTION
LITTER	PLASTIC LITTER	**Industrial plastic**	**IND PLA**	Industrial plastic granules, usually cylindrical but also sometimes oval spherical or cubical shapes, or suspected industrial item, used for the tiny spheres (glassy, milky...)
		Use sheet	**USE SHE**	Remains of sheet, e.g. from bag, cling-foil, agricultural sheets, rubbish bags…
		Use thread	**USE THR**	Threadlike materials, e.g. pieces of nylon wire, net-fragments, woven clothing…
		Use foam	**USE FOA**	All foamed plastics e.g. polystyrene foam, foamed soft rubber (as in mattress filling)…
		Use fragment	**USE FRAG**	Fragments, broken pieces of thicker type plastics, can be a bit flexible, but not like sheet like materials.
		Other Use plastics	**USE POTH**	Any other plastic type of plastics, including elastics, dense rubber, balloon pieces, soft air gun bullets… Specify in the column "Notes".
	Litter other than plastic		**OTHER**	All non-plastic rubbish and pollutant, e.g. cigarette filters
OTHER ELEMENT		**Natural food**	**FOO**	Natural food for sea turtles (e.g., pieces of crabs, jellyfish, algae…)
		Natural no food	**NFO**	Anything natural, but which cannot be considered as normal nutritious food for sea turtle (stone, wood, pumice, etc.)

2. Collection of data for >5mm and 1-5mm

For each GI section of necropsied individuals or for the whole faeces samples of live individuals, sort litter and other elements into the different categories exposed above (Tab. 1) and record the following parameters:

- **For all categories (litter and other elements):**
  - Dry mass (grams, precision 0.01g) of each category.
- **For marine litter only:**
  - Number of fragments (i.e a piece of litter that can be identified in each category);
  - Number of items (i.e. a set of fragments that seem to originate from the same piece of litter) (*optional*).
- **For plastic litter only (*optional*):**
  - Total volume of plastic litter fragments;
  - Total number of plastic fragments and/or items per colour category:
    White-transparent / Dark coloured / Light coloured

***Note**: In the case where litter and micro-litter were differentiated, proceed with the data collection as described above, but distinguishing both size classes (>5mm and 1-5mm).*

Appendix V
Cross-Cutting Issues and Common Challenges: The Methodological Approach for Mapping the Interrelations between Sectors, Activities, Pressures, Impacts and State of Marine Environment for EO5 and EO9

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Annexes

4. OVERVIEW OF CROSS-CUTTING ISSUES AND COMMON CHALLENGES OF IMAP IMPLEMENTATION

1. 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.

2. Based on common region-wide agreed Common Indicators (CIs) per Ecological Objectives (EOs), 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 of GES and the assessment on its achievement includes the main elements of the ecosystem and is closely linked to the effects of pressures from human activities (e.g. pressure-based ecological objectives). The evaluation of all IMAP EOs and its consideration as functional units of the marine ecosystem as a whole should allow the definition and assessment of achievement of GES.

3. 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 (CIs). However, there is a need to address these issues in more detail for the period (2019-2021), and to this respect, criteria for assessments, reference and limit levels (baselines, thresholds, etc.), aggregation rules for the CIs and EOs, assessment scales (spatial/temporal), as well as continuous review of work progresses are considered critical to ensure an effective implementation of IMAP.

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

4. 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 a priority to improve GES assessment:

- Assessment of pressures/impacts/state interactions identifying, where possible, cause-effect relationships;
- Definition of clear and common aggregation (geographical) and integration rules, including in time and space;
- Definition of adequate assessment scales using a nested approach;
- Application of both trends and new/updated IMAP thresholds as appropriate tools for GES assessment.

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

6. Here, the terms pressure is defined as the forces that generate changes in the state of the ecosystem as a result of drivers and thereby the provision of its services (e.g. nutrient load, changes in the salinity regime, fishing effort, oil spills, introduction of invasive species). Impacts are defined as the consequences for the marine environment caused by the pressures affecting state.

7. 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.
- Second, an assessment of the environmental status of marine ecosystems (including species and habitats), informed by the pressure and impact assessments under the first step (e.g. Scorecards).

2. METHODOLOGICAL APPROACHES FOR INTEGRATED MARINE ASSESSMENTS

8. There are some approaches to support the integrated assessment under IMAP of the predominant pressures and their impacts on the marine and coastal environment to assess the state of the marine environment (i.e. DPSIR-based assessments); and as a consequence, build policy responses (e.g. measures and priority actions) to address the drivers (e.g. economic sectors and activities) causing the degradation of the marine ecosystem and its ecosystem services.

9. The following subsections explain some of the most commonly used GES-integrated assessments based on DPSIR approach that have been acknowledged and approved in principle by the Meeting of the CorMon on Pollution Monitoring.

2.1. GRID/Table approach

10. Pressures can be considered in the two following ways: (i) at source, i.e. focusing on the primary and main activities 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.

11. With its EOs and CIs, IMAP is the multidimensional measurement and assessment system of the Barcelona Convention within the application of the DPSIR approach. Therefore, the elaboration of a table with these two dimensions of the IMAP (i.e. by using the IMAP measurement information through Common Indicators cross-checked along their potential sources and origin) would produce an assessment which should allow elucidating priority actions for natural/anthropogenic drivers and related policy responses.

12. Table 1 provides a tabular representation of interactions between pressures and impacts for EO5 and EO9, as measured by IMAP Common Indicators (left column). A full example of the GRID/Table Approach for the overall interrelationships between the IMAP Common Indicators

grouped per related Ecological Objectives (EO) and Pressures to the marine ecosystem can be found in Annex I.

13. Thus, the proposed approach is to cross-map all the anthropogenic activities with significant contribution to pressures with the Common Indicators used for its monitoring and assessment. Following the first step, expert judgment can/may better define/refine specific interactions, for these activities contributing to pressures at Common Indicator level considering sub-regions, or, if relevant and appropriate, sub-divisions or lower geographical units (using as appropriate the nested approach). Table 2 is an example of pressure/impacts interactions at sub-regional level for key pressures, which is also considering sub-divisions.

14. Table 2 is an example of a GRID/Table template taking into account the relevant geographical scale (i.e. sub-regions and sub-divisions) and is expected to be the starting point to be completed to advance in a future integrated Med QSR 2023, at least for the four sub-regions established in the Mediterranean for assessment purposes in the framework of implementing the Ecosystem Approach Roadmap.

15. Some metrics and sub-divisions are still to be refined to improve the analysis, prior to setting up any management strategy (Table 2). This approach can support the definition of areas/sectors of activities where appropriate pressures reduction and management measures will be needed. It can also support prioritization in terms of specific baselines, thresholds, and finally targets, and support the monitoring of associated measures' efficiency.

16. Finally, the total balance of the reference scales for both environmental state (e.g. healthy ecosystems) and pressures (e.g. anthropogenic impact intensity), could define the selection of geographical scales, starting from both the greatest sensitivity/ecological relevance and highest level of pressures.

Table 1: Natural and anthropogenic pressures (selected based on the main activities in terms of pressures as provided by ICZM Protocol and other Barcelona Convention`s Protocols) affecting the marine ecosystems and the related measurement IMAP Common Indicators for EO5 and EO9. Following the analysis presented in this table that is based on the expert judgment, MED POL Focal Points can better define/refine specific interactions, for activities contributing to pressures at Common Indicator level.

Pressures vs. measured IMAP Common Indicators (EO5 and EO9)	**Non-Construction Zone**	**Natural Hazards**	**Natural disasters**	**Climate Change**	**Agric. and forestry runoffs**	**Coastal Urbanization**	**Damming (demand on water)**	**Waste water discharges**	**Industry**	**Tourism frequentation**	**Yachting**	**Marine mining**	**Dredging**	**Desalinization**	**Coastal artificialization.**	**Port operations**	**Offshore structures**	**Cables and pipelines**	**Shipping**	**Oil and gas extraction**	**Renewable energy**	**Fishing (incl. recreational)**	**Sea-based food harvesting**	**Extraction of genetic**	**Aquaculture**	**Solid waste disposal**	**Storage of gases**	**Research and education**	**Defence operations**	**Damping of munitions**
C13. Nutrients																														
C14. Chlorophyll *a*																														
CI17: Key harmful contaminants																														
CI18: Pollution effects																														
CI19: Acute pollution events																														
C20: Contaminants in seafood																														
CI21: Intestinal enterococci																														

Table 2: GRID/Table for IMAP integrated assessments under the nested assessment approach. The four sub-regions have been already defined for practical reasons and for the purpose of the UN Environment/MAP 2011 Initial Integrated Assessment (UNEP(DEPI)/MED WG.363/Inf.21) and the Med QSR 2017, namely the Western Mediterranean, Ionian and Central Mediterranean, Adriatic Sea and Aegean-Levantine Seas. The sub-divisions (i.e. sub-regional seas/basins) have been defined according to availability of database sources for the purpose of development of the assessment criteria for pollution (UNEP(DEPI)/MED WG.427/Inf.3). Sub-divisions might correspond initially to the Contracting Parties` coastal zones and offshore areas. Other sub-divisions may be defined. Downscaling at sub-divisional level is also used under the EU Marine Strategy Framework Directive. Following initiated analysis presented in this table that is based on the expert judgment, MED POL Focal Points can better define/refine specific interactions, for activities contributing to pressures at Common Indicator level in Mediterranean sub-regions and sub-division.

Scaled GRID pressures/impact approach	**SUB-REGIONS**	**SUB-DIVISIONS**	**Coastal urbanization**	**Industry**	**Offshore structures**	**…**
Common Indicator 14 (Chl-a) (Ecological Objective 5)	**Western Mediterranean Sea**	North Western (NWMS)				
		Alboran Sea (ALBS)				
		Tyrrhenian Sea (TYRS)				
	Adriatic Sea	North Adriatic (NADR)				
		Middle Adriatic (MADR)				
		South Adriatic (SADR)				
	Central and Ionian Seas	Central (CEN)				
		Ionian Sea (IONS)				
	Aegean and Levantine Seas	Aegean Sea (AEGS)				
		Levantine (LEVS)				
Scaled GRID pressures/impact approach	**SUB-REGIONS**	**SUB-DIVISIONS**	**Coastal urbanization**	**Industry**	**Offshore structures**	**…**
Common Indicator 17 (Contaminants) (Ecological Objective 9)	**Western Mediterranean Sea**	North Western (NWMS)				
		Alboran Sea (ALBS)				
		Tyrrhenian Sea (TYRS)				
	Adriatic Sea	North Adriatic (NADR)				
		Middle Adriatic (MADR)				
		South Adriatic (SADR)				
	Central and Ionian Seas	Central (CEN)				
		Ionian Sea (IONS)				
	Aegean and Levantine Seas	Aegean Sea (AEGS)				
		Levantine (LEVS)				

2.2. SCOREBOARDS METHOD: Quantifying pressures/impacts relationships; risk-based approach

17. Mapping of pressures/impacts relationships can be done using a 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 elements of the ecosystem.

18. Similarly, to the GRID/Table Approach, a variety of scales are necessary to reflect state-based assessments (i.e. 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. The GRID/Table approach and the quantitative risk-based methodological scoreboard approach that rely on the calculation of numeric scores (i.e. criteria which should be based on EOs assessments along the spatial distribution of pressures-impacts and risks to the marine environment) for the IMAP integrated assessments could be seen as tools to support implementation of the DPSIR approach.

19. Scoreboard method is similar to the GRID/Table approach; however, it uses numeric scores (i.e. assignment of a numeric value by categories) rather than colours alone, to allow calculating derived quantitative information. As well, the chosen scales would shape the final results obtained by scorecard methods and these are even more powerful when used with a risk-based approach focus.

20. There are several scoreboard methodological approaches that may be used for the mapping of distribution of pressures and assessment of their impacts over different ecosystem components (e.g. species groups, pelagic or benthic habitats), with defined quality threshold values (i.e. categorizations and values assignment). An example, under the guidance of PAP/RAC-UN Environment/MAP including interrelations between the IMAP Common Indicators, coastal vulnerability assessment and management, as well as Marine Spatial Planning (MSP) was undertaken recently in Boka Kotorska Bay (Montenegro), through the CAMP initiatives. This methodological approach might guide next steps to develop the matrixes for quantifying the spatial distribution of pressures and their impacts over different marine ecosystem components.

21. Following the recommendation of the Meeting of CorMon on Pollution Monitoring, GRID/Table Approach, risk-based and the semi-quantitative approaches should be complemented with the modelling of the monitoring data in order to ensure a more reliable quantification of the magnitude of impacts. The vulnerability assessment and mapping of distribution of pressures and impacts over different ecosystem components (species groups, pelagic or benthic habitats) may be considered to support scientifically-based scoring.

22. In the absence of quantitative assessment criteria, semi-quantitative approaches should be a basis for mapping and quantifying the interrelation of drivers-pressures-impacts-state-responses relying on the best available expert judgment. Given the fact that IMAP implementation is at stage when monitoring and assessment scales are to be updated/agreed and tested, as well as aggregation and integration rules fully defined, at present, the semi-quantitative scoreboards method is useful for mapping the interrelation of drivers-pressures-impacts-state-responses of complex processes, such as those present in the marine environment (e.g. considering in the vertical axis the economic activities and the natural elements that have great relevance according to the ICZM Protocol and other Barcelona Convention`s Protocols, whilst in the horizontal axis the EcAp/IMAP EOs and CIs). Scoreboards method should provide insights on impacts, which are directly relevant to the state-based assessment of the ecosystem with sufficient detail (e.g. impact on non-commercial species by incidental by-catch which would need 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 integrated assessments, combining the state-based Common Indicators as a set of ecosystem elements in a holistic manner, should cover the overall pressure-based Common Indicators affecting it (e.g. the state assessment of the benthic ecosystem should evaluate together the impact from the pressures such as physical loss, physical disturbance, non-indigenous species, nutrient enrichment, removal of species and others). Therefore, this level of detail based on the IMAP EOs and CIs should be the primary methodological basis to develop scoreboard, as well as assign scores, while relying on the best available expert judgment.

23. The added value of the combined synthesis of the semi-quantitative approaches and expert judgment is a clear vision on the requirements and responsibilities from both the managerial and measurement systems. Table 3 details the activities (originated by main drivers) which are commonly known and aligned with the current IMAP multidimensional measurement system (with their Ecological Objectives and Common Indicators) to address current scenarios of Pressures-State-Impacts. The Table provided in UNEP/MED WG.463/Inf.9 presents an extension of this interrelation, relating specifically IMAP, as the measurements system of the Barcelona Convention with relevant responses provided through relevant regional policies.

Table 3: Template to frame the activities according to the DPSIR approach and links them to the Barcelona Convention measurements system (IMAP). Below template includes agriculture as an example, while complete template that includes all other relevant interrelations is provided in UNEP/MED WG.463/Inf.9. The list of activities elaborated in this template is not exhaustive and may be further extended and amended in line with specific circumstances related to concrete examples for which determination of the interrelation between pressure/state/impact is needed.

	SEAWARD - LAGOONS - ISLANDS - OFFSHORE					
Economic (Driver)		**Pressure**	**State**	**Impact**	**IMAP EOs CIs**	**Regional policy (Response)**
	Activity type				**Pressure, Impact and State-based indicators**	**UN Barcelona Convention**
8) Maritime activities	Awaiting areas (oil tankers, cargo transport, hazardous substances vessels)	Introduction of pollutants (oil hydrocarbons and related organic compounds)	Water column habitats decline	Healthy coastal water and habitats decline	BIODIVERSITY (EO1): CI1-CI2; SEA FLOOR INTEGRITY (EO6)	Offshore Protocol
		Risk of accidents and spills	Water quality degradation	Coastal and marine environment impacted	CINTAMINATION (EO9): CI19	Offshore Protocol
	Bunkering	Introduction of pollutants (oil hydrocarbons and related organic compounds)	Water column habitats decline	Healthy coastal water and habitats decline	CINTAMINATION (EO9): CI19; BIODIVERSITY (EO1):CI1-CI2	Offshore Protocol
		Risk of accidents and spills	Water quality degradation		CINTAMINATION (EO9): CI19	Offshore Protocol

	SEAWARD - LAGOONS - ISLANDS - OFFSHORE					
Economic (Driver)		**Pressure**	**State**	**Impact**	**IMAP EOs CIs**	**Regional policy (Response)**
	Activity type				**Pressure, Impact and State-based indicators**	**UN Barcelona Convention**
	Offshore platforms (oil and gas exploitation)	Introduction of pollutants (oil hydrocarbons and related organic compounds)	Water column habitats decline	Healthy coastal water and habitats decline	CINTAMINATION (EO9): CI17, CI18, CI20; BIODIVERSITY (EO1):CI1-CI2	Offshore Protocol
		Risk of accidents and spills	Water quality degradation		CINTAMINATION (EO9): CI19	
	Shipping traffic (commercial, ferries, military, cruise liners)	Introduction of pollutants and noise, litter	Water column habitats decline	Healthy coastal water and habitats decline	BIODIVERSITY (EO1): CI1-CI2; CONTAMIANTION (EO9): CI17, CI20; MARINE LITTER (EO10): CI22-cC24; ENERGY (EO11): CI26-CI27	Offshore Protocol
		Risk of accidents or acute spills	Water quality degradation	Healthy coastal water and habitats decline	CINTAMINATION (EO9): CI19	
		Introduction of NIS (ballastwater)	Biodiversity and functions alteration	Healthy coastal water and habitats decline	NON-INDIGENOUS SPECIES (EO2): CI6	
	Dredging (natural environments)	Extraction of soil substrates	Disturbance of sea-floor integrity impaired	Benthic species and habitats deterioration	SEA FLOOR INTEGRITY (EO6); BIODIVERSITY (EO1): CI1-CI2	Offshore Protocol
	Offshore energy (renewable)	Occupation of coastal marine space	Surface and pelagic ecosystems altered	Healthy coastal water and habitats decline	BIODIVERSITY (EO1): CI1-CI2	Offshore Protocol
	Solid waste disposal	Asfixiation of benthic habitats	Habitats and species loss	Healthy coastal benthic habitats decline	SEA FLOOR INTEGRITY (EO6); BIODIVERSITY (EO1): CI1-CI2	Dumping Protocol
	Storage of gases	Subsubstrate storage (seismic risks)	Disturbance of sea-floor integrity impaired	Healthy coastal benthic habitats decline	SEA FLOOR INTEGRITY (EO6); BIODIVERSITY (EO1): CI1-CI2	Offshore Protocol

	SEAWARD - LAGOONS - ISLANDS - OFFSHORE					
Economic (Driver)		**Pressure**	**State**	**Impact**	**IMAP EOs CIs**	**Regional policy (Response)**
	Activity type				**Pressure, Impact and State-based indicators**	**UN Barcelona Convention**
	Defence operations	Noise, contamination and waste material	Coastal and marine environment threatened	Healthy coastal water and habitats decline	SEA FLOOR INTEGRITY (EO6); BIODIVERSITY (EO1): CI1-CI2	Offshore Protocol
	Disposal of munition	Dumping of munitions (including bacteriological)	Disturbance of sea-floor integrity impaired	Healthy coastal benthic habitats decline	SEA FLOOR INTEGRITY (EO6); BIODIVERSITY (EO1): CI1-CI2	Offshore Protocol

24. Moreover, for each chain of elements part of the analysis (Drivers > Activity type > Pressure > State > Impacts (Ecosystem Services, Welfare) > Responses), the table template provides the link to the related Ecological Objective (EOs) and Common Indicators (CIs) of the Barcelona Convention measurement system (i.e. UNEP/IMAP).

25. The above described approach is then complemented by an Excel tool (see Figure 1) which can be used for an expert-based evaluation with different approaches (both item and impact scores). The structure of the Excel file reflects the content of the template provided in Table 3. On the one hand, the Excel tool could allow simply estimating (in %) how many items (i.e. Drivers/Pressures from land-based sources) have the potential to threat the marine ecosystem. Experts involved in such evaluation can provide an assessment for each activity type through a 0/1 score: 1 indicating the presence of the potential risk and 0 its absence. The final score is than expressed in percentage, dividing the sum of all scores for the number of scored items (activity types).

26. The same Excel tool (Figure 1) enables to estimate the magnitude of impacts (in %) by adapting its conceptual objective. Thus, for each Driver/Pressure, experts involved in the evaluation are invited to express a 0 to 3 score: 0 indicating the absence of the impact, while 1, 2 and 3 respectively indicating the presence of an impact with low, moderate and high magnitude. Similarly, to the analysis on the occurrence of potential threats, the final score is expressed in percentage and is obtained by dividing the sum of all scores by the maximum theoretical score (equal to the number of scored items multiplied by 3).

27. The level of detail based on the IMAP Common Indicators and Ecological Objectives should be the primary methodological basis to assign scores.

SCORECARDS: SEMI QUANTITATIVE APPROACH
(choose 0, 1, 2 or 3 to estimate impact)

None (0)	Low (1)	Moderate (2)	High (3)

Overall of Pressure-Impact (Ecosystem Services) (%):

	SEAWARD - LAGOONS - ISLANDS - OFFSHORE	IMPACT SCORE	

Economic (Driver)		Pressure	State	Impact (Ecosystem)	% of total impacts	Regional policy (Response)
	Activity type					**UN Barcelona Convention**
Maritime activities	Awaiting areas (oil tankers, cargo transport, hazardous substances vessels)	Introduction of pollutants (oil hydrocarbons and related organic compounds)	Water column habitats decline	Healthy coastal water and habitats decline	3	Offshore Protocol
		Risk of accidents and spills	Water quality degradation	Coastal and marine environment impacted	3	Offshore Protocol
	Bunkering	Introduction of pollutants (oil hydrocarbons and related organic compounds)	Water column habitats decline	Healthy coastal water and habitats decline	3	Offshore Protocol
		Risk of accidents and spills	Water quality degradation		3	Offshore Protocol
	Offshore platforms (oil and gas exploitation)	Introduction of pollutants (oil hydrocarbons and related organic compounds)	Water column habitats decline	Healthy coastal water and habitats decline	2	Offshore Protocol
		Risk of accidents and spills	Water quality degradation		1	IMO
	Shipping traffic (commercial, ferries, military, cruise liners)	Introduction of pollutants and noise, litter	Water column habitats decline	Healthy coastal water and habitats decline	0	Offshore Protocol
		Risk of accidents or acute spills	Water quality degradation	Healthy coastal water and habitats decline	0	IMO
		Introduction of NIS (ballast water)	Biodiversity and functions alteration	Healthy coastal water and habitats decline	3	IMO
	Dredging (natural environments)	Extraction of soil substrates	Disturbance of sea-floor integrity impaired	Benthic species and habitats deterioration	3	Offshore Protocol
	Offshore energy (renewable)	Occupation of coastal marine space	Surface and pelagic ecosystems altered	Healthy coastal water and habitats decline	3	Offshore Protocol
	Storage of gases	Sub substrate storage (seismic risks)	Disturbance of sea-floor integrity impaired	Healthy coastal benthic habitats decline	3	Offshore Protocol
	Disposal of munition	Dumping of munitions (including bacteriological)	Disturbance of sea-floor integrity impaired	Healthy coastal benthic habitats decline	3	Offshore Protocol
				TOTAL SEAWARD IMPACT (Ecosystem services)	**30**	

Figure 1. Example of Scoreboard, including semi quantitative assessment and risk-based approach considerations (note: fictional scoring). This tool allows to estimate the magnitude of impacts % of total (of estimated possible) pressures-impacts on the environment and ecosystem services. It also links the Drivers (with detailed forces/activities) with Responses (Action Plans, Protocols, etc. within the Barcelona Convention). The same approach could be used to estimate the item scores (see text).

2.3. The NEAT approach

28. The Nested Environmental Status Assessment Tool (NEAT) (Borja et al., 2016) is a pioneering tool developed specifically to assess the marine environment. It uses a combination of high-level integration of habitats and spatial units; therefore, allowing for specification on structural and spatial levels, applicable to any geographical scale. NEAT is a structured, averaging approach and hierarchical tool (i.e. based on a nested assessment approach) for making marine state assessments (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 (Action Med, PERSEUS, DEVOTES).

29. In the study of Pavlidou et al. (2019), the results of assessment 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.

30. The NEAT tool 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.

2.4. UN Regional Seas Programme approach

31. There is a need to link the state of the marine ecosystem with other mankind dimensions, namely, ecosystem services (i.e. food provision, tourism activities, coastal livelihoods, natural resources, etc.) and economic activities beyond the marine ecosystem boundaries; but affecting it. There is also a need to better manage and communicate their status and trends to decision-makers. A step forward for the integration and aggregation of the IMAP components with other related mankind interests in the marine environment might relay in the use of composite indicators and indices, namely, ecosystem-based indicators (combining both higher levels of aggregation of state-based and pressure-based indicators). These are powerful communication tools at the science-policy interface.

32. The United Nations Environment Programme (UNEP) Regional Seas Programme (RSP), Global Environment Facility-Large Marine Ecosystem Projects (GEF-LMEs), as well as the SGD 14 (Agenda 2030) are encouraging and promoting the use of these science-based tools, such as the Ocean Health Index (OHI) or the Environmental Vulnerability Index (EVI) (UNEP, 2014).

3. IMAP EOs RELATIONSHIPS TO ASSESS GES

33. The relationships between the UN Environment/MAP Ecological Objectives, the status of the ecosystem elements and pressures, and the IMAP Common Indicators are important to ensure the integrated assessment of GES. Building on the relevant best practices coming from the EU MSFD implementation (European Commission, 2017). Table 4 presents indicative interrelations between Ecological Objectives (EOs), whilst Table 5 further presents a possible framework enabling the integrated assessment of GES taking into account the relationship among different IMAP Ecological Objectives.

Table 4. Indicative interrelations between Ecological Objectives (EOs)

	EO1	EO2	EO3	EO4	EO5	EO6	EO7	EO8	EO9	EO10	EO11
EO1											
EO2											
EO3											
EO4											
EO5											
EO6											
EO7											
EO8											
EO9											
EO10											
EO11											

	No relation
	Limited relations
	Significant relations
	Extended relations

34. In order to make best use of this integrated framework within a DPSIR-based approach, 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 (Drivers). This can be used as proxy pressure assessment to support later identification of measures (Responses);
- 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 (pressure-based CIs);
- Assess the environmental Impacts/extent of Impacts in relation to the elements to be used for the state-based and the pressure-based assessments (state-based CIs);
- Assess the State as derived from the assessments of impacts in previous step, to lead to an overall assessment of status.

Table 5: 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.

ASSESSMENT OF GOOD ENVIRONMENTAL STATUS (GES)					Assessment of pressures				
					EO 2	EO 3	EO 5	EO 9	E0 10
					Nis	Extraction of wild species	Eutrophication	Contamination	Marine Litter
					Common Indicators of pressure				
					CI 6	CI 8, CI 10, CI 11	CI 3	CI 17, CI 19	CI 22, CI 23
Assessment of state	EO 1, EO 3	Species (birds, turtles, fish etc.)	State indCIators	CI 1 to 5, CI7, CI9	CI 3-5, C I7	CI 9, CI 12	?	CI 18, CI 20-21	CI 24
	EO 1, EO 3	Pelagic Habitats		CI 1 to 5, CI7, CI9	CI 3-5, C I7	CI 7, CI 9, CI 12	CI 14	CI 18, CI 20-21	CI 24
	EO 1, EO 3	benthic habitats		CI 1 to 5, CI7, CI9	CI 3-5, C I7	CI 7, CI 9, CI 12	CI 14	CI 18, CI 20-21	CI 24
	EO 1, 2, 3, 4	ecosystems		CI 1 to 5, CI7, CI9	CI 3-5, C I7	CI 7, CI 9, CI 12	CI 14	?	?

35. Table 5 is built on best practices from the EU countries on MSFD implementation, taking also into account IMAP and Mediterranean region specificities.

36. In order to reach a clear conclusion on whether GES is achieved or not for a specific area, there is a need for aggregation and integration across the individual assessments and data sets relating to the 11 Ecological Objectives. Geographical aggregation and integration of the various indicators need to take into consideration the scales for identifying and implementing any necessary management actions.

37. 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 aim at mitigating a pressure relevant 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;
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.

38. 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, 9 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.

39. 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. 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;

b. 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.

3.1. Geographical aggregation and integration

40. 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.

41. 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.

42. 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.

43. A proposed scheme is to base the regional assessment on the geographical aggregation 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.

44. 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.

45. 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, taking into consideration 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

3.2. Assessment scale

46. IMAP Decision recognized that further work is necessary during the initial phase of its implementation on assessment scales. A nested system (Figure 2.) 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 (drivers, pressure, state or impacts) 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 6 below, noting that this needs further discussion and adaptation;

b. Defining suitable boundaries for the areas (sub-region, sub-division or smaller) 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.

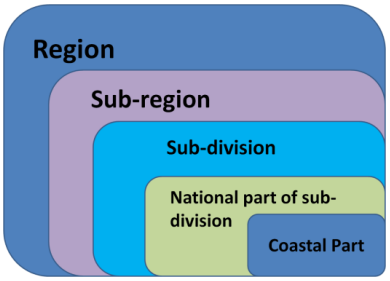

Figure 2. Schematic representation of a nested set of assessment scales to be used to cover all assessment needs for IMAP.

47. In the Mediterranean Sea the sub-regions (as defined in the 2011 Initial Integrated Assessment) provide the basis for assessments and reporting, and thus, the Contracting Parties are required to cooperate to ensure a common and coordinated approach in their monitoring and effectiveness of measures. However, assessments of whether GES has been achieved can be at a finer scale, as deemed appropriate.

48. 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 contaminant hotspots 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.

49. 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 regional waters and adoption of too fine a scale could lead to burdensome assessment processes.

50. 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 6) building on best practices from MSFD implementation for further development in the framework of IMAP implementation and possible adaptation to sub-regional needs.

Table 6: 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).

Elements for assessment	Region	Sub-region	Sub-division	National part of sub-division	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		Seabed habitats

Elements for assessment	Region	Sub-region	Sub-division	National part of sub-division	Coastal waters
			habitats beyond 1nm		
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			
Eutrophication (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	

51. Working at different spatial scales does not necessary imply that in principle the identified areas should be nested. But such nesting characteristic is of the outmost importance when integration of different spatial scales is required within the same EO or CI or between EOs or CIs in order to produce an assessment at the regional or sub-regional level as IMAP requires. Furthermore, 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. Nevertheless, agreement among the Contracting Parties is still required on the common criteria and on the borders for delimitation of transnational areas in order to define the smallest entity for each assessment. This may well vary between and within Ecological Objectives, but pragmatic approaches are needed to allow assessment and management at all relevant levels.

Table 7: Proposed assessment scales for IMAP Common Indicators (after 2017 MED QSR and 2017 MEDCIS workshop) to be further reviewed and developed by CORMON meetings. The assessment scales will be further developed taking into account specific elements (e.g. species of bird, mammal, certain habitat type).

EOs	Common Indicators	Region	Sub-region	Sub-division	National part of sub-division	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 13Nutrients	X	X	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	FAO- GFCM areas	FAO- GFCM areas	Catch or Production Area		
	CI 21 Intestinal enterococci			X	X	XXX
EO10	CI 22 Beached litter	Harmonized protocol				
	CI 23 Litter at sea	Surface litter and microplastics			Seafloor litter	

52. 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 (Action Med, 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 7 above).

53. 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).

54. The outcomes from the EU-funded project MEDCIS can be also considered. The Project agreed, in line with the new reporting format adopted for the update of Art. 8 - 10 of MSFD in 2018, on the same nested principle, proposing Mediterranean Marine Reporting Units (Med MRU), including the Mediterranean basin as region, the marine sub-regions as defined by the UN Environment/MAP 2011 Initial Integrated Assessment, sub-divisions to be further discussed, national parts of sub-divisions and territorial waters (possibly the WFD zones for the Contracting Parties, which are EU Member States). In this context, the term Reporting rather than Assessment qualifies such units as areas that should cover the all process envisaged by IMAP that is: monitoring, assessment and responses or measures to achieve or maintain GES.

55. All initiatives also recognised that (i) the sub-divisions 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.

56. An indicative set of proposed assessment scales is provided in Table 7 above, building on the initial proposal for assignment to appropriate scales of elements (see Table 6) and considering the key findings of the 2017 MED QSR and work in progress within MEDCIS Project, for further discussion and development by the CORMON meetings.

4. THE CONVERGENCE OF TRENDS AND STATUS ASSESSMENTS: FURTHER IMAP IMPLEMENTATION

57. Across the Mediterranean Sea, most of the reduction targets adopted by CPs 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 and can be referred to concentration levels as well as impact, pressure or state-indicator levels that should not be exceeded.

58. 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.

59. 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 sub-divisions (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.

60. 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 as well as an on-going revision to be up-to-date to the state-of-the-art knowledge.

61. Thresholds should ideally meet the following requirements: be based on scientific knowledge and sound and reliable monitoring data programme; 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.

62. Depending on the Common Indicators and Ecological Objectives, the definition of thresholds can include different level of warnings, such as thresholds of no concern, thresholds of toxicological concern (TTC), end points of effects, or the precautionary principle. If a threshold applies to a pressure, impact or state-indicator also the actual definition of the indicator itself has to be thoroughly explicated in terms of its metric or formulation. 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 (EOs 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, enables 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.

4.1. Options for the definition of thresholds

63. Table 8 presents different options and concepts for the definition of thresholds within IMAP.

64. 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.

65. It might be advisable to derive “provisional and commonly agreed 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).

66. In Table 8, for the threshold category ‘Zero option’, the Common Indicators 17 and 19 related to contaminants (EO9) have been included. This ‘zero option’ threshold should be the ideal criteria to evaluate GES in terms of synthetic contaminants (which should not be present in the environment) and oil spills (which should not occur in the sea), respectively. For CI17 (synthetic chemicals) and CI19, the threshold ‘zero option’ is already the norm to define targets.

67. Nevertheless, the majority of the thresholds for EO5 and EO9 classify in the ‘Lowest-end point’ option, as shown in Table 8, therefore, the eutrophication processes or environmental toxicity scenarios appear when non-effect concentration levels for these substances are surpassed.

68. Finally, it should be mentioned here, the strong link between the thresholds already set for EO5 and EO9 and the scales of monitoring. The environmental information gathered in the field allows to set and refine continuously the ‘threshold’ for pollution (namely, assessment criteria); and thus, the monitoring scales should be considered for the use of the derived thresholds information for EO5 and EO9.

Table 8. Options and concepts for the setting of thresholds within IMAP with possible associated Common Indicators

Threshold	**Concept**	**IMAP Common Indicators**	**Comment**
Zero option	Possible option when the pressure does not exist in nature, by definition (litter, synthetic contaminants, man-made noise)	CI 12, CI 21, CI17, CI19	*"zero pressure" appears unreasonable, since impossible to reach when the pressure is a common situation*
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	*This approach is well adapted to population, communities, assemblages that may be altered beyond recovery.*
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, CI17, CI 18, CI 21	*Thresholds based on the mapping of areas where concentration/abundance of a particular high impact may support this approach*
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	*The setting of low provisional threshold values is a way to initiate provisional thresholds. This couldbe an Expert Judgment*
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	*Based on concentration/abundance mapping, areas of particular high impact can be determined and tackled.*
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	*The lowest concentration approach is relevant when it is impossible to balance different adverse effects of a single pressure (toxicological, physiological effect, socioeconomic impact)*
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	*Thresholds defined through predefined targets, possibly by policy makers*

Appendix I
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Appendix VI
Schemes for Database Quality, Quality Assurance and Quality Control (QA/QC) of Data related to Pollution

Table of Contents

Annexes

Annex I: Example on Data Controls for CI17 for trace metals in biota

List of Abbreviations / Acronyms

CI	Common Indicator
CORMON	Correspondence Group on Monitoring
DDs	Data Dictionaries
DSs	Data Standards
EcAp	Ecosystem Approach
EEA	European Environmental Agency
EO	Ecological Objective
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
MEDPOL	Programme for the Assessment and Control of Marine Pollution in the Mediterranean Sea
MED QSR	Mediterranean Quality Status Report
MSFD	Marine Strategy Framework Directive
PoW	Programme of Work
QA	Quality Assurance
QC	Quality Control

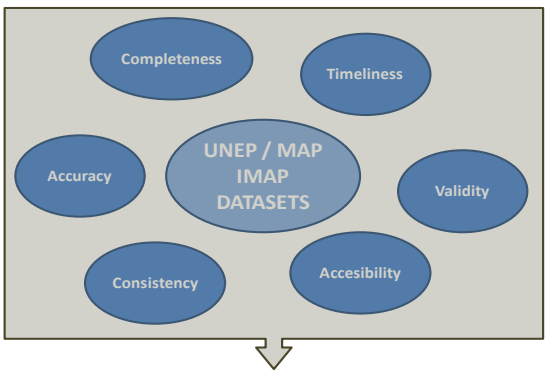
1. Introduction to data quality

1. The ‘data quality’ management process is without a doubt the most important component of the overall data management system structure to ensure ‘quality data’. The data management involves also data policy, data warehousing and data security components to mention a few. However, ‘quality data’ should guide and support any data-related endeavour, such as the gathering of environmental information through scientific-based monitoring strategies to assess the status of the marine environment (e.g. UNEP /MAP IMAP and similar programs worldwide).

2. Through guaranteeing data quality, one can be sure that the next steps, both in terms of monitoring and assessments, will be based on robust information and demonstrable environmental facts (i.e. defendable and reproducible); and therefore, the marine environmental Mediterranean knowledge will be constructed minimizing flaws. The ‘data quality’ approach is a common approach to ensure, control and optimize the value of data from observations in all fields, such as science, medicine, business and politics to mention few. However, the ‘data quality’ concept has many functional attributes.

3. The schemes for Quality Assurance and Control of Data for MED POL Monitoring Database and IMAP (Pilot) Info System can be organized on two levels. On the first level, there is a monitoring data Quality Assurance and Quality Control (QA/QC) for each IMAP Common Indicator; on the second level, there is a full Database Quality Management and Reporting Schemes. These need to be built in the IMAP (Pilot) Info System considering present functional modules (i.e. MEDPOL Database approach), both for data technical validation and data flagging, respectively. Furthermore, the reporting data flows are proposed in the present document as a three-fold QA organisational approach in the data quality chain taking into account the overarching data quality chain with regards to the Database Quality Management. For this reason, the application of herein proposed overall quality frameworks for IMAP Common Indicators under EO5 and EO9 needs the organizational levels 1 and 2 to be aligned and complemented by a flagging approach (i.e. based on Quality Categories to estimate the final value of datasets) per each IMAP Common Indicators proposed later in Table 4. A full compatibility between the two QA levels (both levels 1 and 2, plus level 3) needs to be ensured. The full compatibility and flows between the two first QA levels (i.e. 1 and 2) and the third level needs to be ensured for the optimal quality of data in the IMAP (Pilot) Info System.

4. There are basic attributes (i.e. specific requirements of the ‘data’ within the overall quality framework) to be fulfilled to guarantee both the ‘data quality’ from an objective point of view and their fit-for-purpose, under the overall Database Quality Management, including the Reporting Schemes as illustrated in Figure 1. From both technical and user perspectives, there are some main attributes which makes the data (ca. databases) to be of quality, particularly for environmental datasets.



‘Data quality’

Figure 1. Main attributes for the IMAP Common Indicators 'data quality' as one of the dimensions of the database quality management system for IMAP Info System.

5. Therefore, Completeness, Accuracy, Consistency, Timeliness, Accessibility and Validity are the main attributes to be fulfilled to obtain 'quality data'. An explanation of each is provided below:

- **Completeness:** refers to the fact that the provided information is both data (i.e. the parameter of interest) and associated metadata (i.e. environmental information, such as geographical coordinates where the sample was collected). Therefore, a dataset without its associated metadata (i.e. attributes to the data) would be useless for further data evaluation and spatial assessment purposes to derive information and environmental state assessments. The completeness needs to be ensured with good organizational practices of monitoring and sample processing flows.

- **Accuracy**: refers to the degree to which the result of a measurement approaches the correct value or reference value (i.e. the true value). To be accurate and precise (i.e. minimize the associated uncertainty to the measurement/data) is the primary objective of the analytical quality systems implemented in chemical laboratories and conforms the basis to report measurements and their associated uncertainties. To this end, internal and external quality assurance (QA) schemes and practices should be established in the Quality Assurance Manual.

- **Consistency:** refers at the attribute of being capable to produce a result (i.e. data collection, measurement) with the same level of performance over time indifferently of the external constrains. Therefore, the concept is similar to the analytical reproducibility, although extended to any type of data (i.e. data and associated metadata).

- **Accessibility:** refers to a user's ability to access or retrieve data stored within a database or other repositories, as well as its maintenance. Non-accessible data is not useful from a user's perspective.

- **Timeliness:** refers to the requisite of the data to be reported in a timely manner to ensure the maximization of the value of the collected data from a user's perspective. In environmental databases, this attribute is fundamental to generate environmental assessment that serves their purpose.

- **Validity** (fit-for-purpose): this attribute relates to the fact that the 'data quality' concept is a fit-for-purpose target and should comply with certain conditions to serve their expected use. These conditions are the Data Controls to be defined in accordance with each parameter characteristics.

6. It is necessary to understand the 'data quality' as the fulfilment of all its attributes with the ultimate purpose of data resources generation. With regards to the ecosystem-based management, the above attributes are relevant in processes such as the ÍMAP implementation. Particularly, it is important that the environmental data are managed such as to ensure completeness, timeliness and validity, beyond the accuracy (and precision), which is normally misunderstood as the sole parameter which provides 'quality' to the data. To this regard, the concept of fit-for-purpose data, such as in environmental data, should comply with the above attributes to be of utility.

7. Furthermore, it should be highlighted that the data generation from a scientific perspective by means of experimental, monitoring and instrumental techniques is a dynamic process changing over time. This fact shapes the whole data quality system in practice to manage marine environmental databases and therefore, databases updates and verifications need to be continuously performed.

8. The achievement of these basic attributes guarantees the ‘data quality’ and should be considered during all the planning process of the data generation, from data collection and reporting, through data storage up to the data usage by interested parties.

2. Background on MED POL Program Databases and next steps

9. The building of databases for the collection and use of the monitoring data and pollution load data by the Contracting Parties was seen as a necessity very early within the MED POL Programme established by the Barcelona Convention in the Mediterranean Sea. Therefore, MED POL developed a fit-for-purpose database in a pioneering effort to harmonize the Mediterranean data reported to the Secretariat to support with robust evidences the necessary policy measures and actions to be implemented (i.e. marine data and national data). Therefore, the MED POL Program also established the founding of the reporting on national baselines budget (NBB), as well as the Marine Monitoring Networks in the Mediterranean related to chemical pollution (by ecosystem compartments), eutrophication and bathing water quality along their quality control system.

10. The Monitoring MED POL Database (ca. Microsoft Access SQL database software) was created and included some components and modules, such as plotting and mapping, trend analysis, a remote access module, to mention few; in an all-in-one approach. The database was delivered to the Secretariat and has been running until these days, even though information and communication technologies have changed very rapidly, and a number of flaws have been also observed after almost 20 years. Therefore, under the latest programmes of work of UN Environment/MAP, it has been agreed the building of an IMAP Info System, which will update the current MED POL Database system, which is expected to be launched as a pilot system (to be tested) in the current biennium.

11. As mentioned above, the Secretariat has initiated the development of a new data management structure for an improved data management fit-for-purpose to the requirements of the IMAP (i.e. the Barcelona Convention marine measurement system), which will include the transfer of the current MED POL monitoring database and reported datasets by the Contracting Parties to the Secretariat. This task will be undertaken by INFO/RAC in close consultations with the Secretariat.

12. In 2018, the initial back-and-forth process of defining the structure of the data (e.g. Data Dictionaries and Data Standards) begun and it should further include a complete set of Data Controls, in a similar manner as the MED POL database is controlled, whilst ensuring the compatibility between the databases as well as the users both quick and easy adaptation.

3. Data quality organizational levels

13. In order to guarantee the ‘data quality’ of the UNEP/MAP IMAP Database, and similarly for the established MED POL Database, the relevant steps and roles in terms of database quality management and responsibilities should be defined (i.e. from the sample collection until the use of the final validated data) to ensure that the quality chain is strictly followed by the Contracting Parties.

14. There are basically three groups of stakeholders within the data management system, namely, the Contracting Parties Designated National Laboratories, the ministry or delegated national agency with the responsibility to report monitoring data to the MED POL on behalf of respective National MED POL Focal Point, which corresponds to a primary, secondary and tertiary levels in the data quality chain.

15. Each level has a different degree of responsibility to fulfil the ‘data quality’ attributes to ensure the usefulness of the monitoring data from national and regional scales within the IMAP (ca. MED POL). Table 1, below, describes the roles, levels and main responsibilities of the stakeholders related to the attributes for the ‘data quality’ achievement.

16. The roles and responsibilities described (Table 1) should be the main attributes to be fulfilled at the different organizational levels to obtain relevant environmental information for policy-makers. The ultimate goal of the marine monitoring programmes is to serve the policy (ca. political processes) to implement governance mechanisms in order to protect the environment and provided environmental services.

17. Three organizational levels of responsibilities, defined terms of 'data quality' management and data flows, help to provide the basis for a common understanding of the 'data quality' requirements and serve to the establishment of the 'data quality' categories for the data submitted to the MED POL Secretariat under the Barcelona Convention.

Table 1. Description of the main stakeholders within the 'data quality' process that are responsible for generation of the marine monitoring data for the MED POL (ca. IMAP)

Agent	Role	Level	Responsibilities	Main attributes to be fulfilled
National Laboratories (*or alternatively research institutes, agencies, etc. for each CP with the responsibility to effectively produce and report data*)	Generator (science-based)	Primary	To ensure consistent measurements and accurate (and precise) analytical data complying with international standards in terms of scientific/analytical QA and within its specific field (ca. chemistry, biology, biochemistry, etc.).	Consistency Accuracy
MED POL Focal Point	User/Transporter (national policy-oriented)	Secondary	To ensure the timely submission of the data and metadata required under one or more programs under Barcelona Convention Protocols, Action Plans and Strategies in the Mediterranean region	Completeness Timeliness
MED POL/ Barcelona Convention Secretariat	Final User/Receiver (Mediterranean regional and sub-regional policy-oriented)	Tertiary	To ensure monitoring data and relevant information is received and validated under the MED POL Programme and IMAP to perform regional and sub-regional environmental assessments	Accessibility Validity

4. Common processes and data flows for Data Quality Assurance (QA) in marine monitoring databases

4.1. Primary level (National Laboratories)

18. In marine monitoring activities the data flows for the integral quality assurance relies on different quality assured processes undertaken basically at the primary level (i.e. by National Laboratories), which should consider a number of different technical steps, such as data cleansing, standardization, laboratory data quality and control (QA/QC), to mention a few, within each monitoring process (see Table 2), in addition to the secondary and tertiary levels which should also be fulfilled to deliver an integral data quality management system in IMAP marine monitoring activities.

19. Each process should be quality assured (i.e. technically check performed); namely, sample collection, sample processing, sample determinations and data reporting. Thus, these are required to be performed and fully registered for each marine monitoring project by technical managers and/or involved staff.

20. However, it should be noted that the first level is the responsible stakeholder originating the data flows up to the last level of reporting by the Contracting Parties to the Barcelona Convention Secretariat (i.e. second and third levels). Therefore, the quality assurance within this first level requires high technical expertise referred to EO5 and EO9 within IMAP to deliver the expected QA (ca. data quality).

21. If marine monitoring activities at the first level are not performed solely by a single organization (i.e. sample collection, processing, analysis and reporting), the data flows might be separated, and additional integration will be necessary, such as the 'data quality' registry integration. Table 2 describes some general activities related to QA requirements for each of the monitoring processes.

Table 2. Total Quality Assurance (Monitoring QA) (Monitoring QA) at the primary organizational level (i.e. national laboratories) for each monitoring process under IMAP EO5 and EO9.

QA flows versus monitoring processes	QA Requirements	Internal QA	External QA	Reporting/Registry QA
1.Sample collection	Protocols/Data Registry 1	YES	NO*	NO*
2.Sample processing	Protocols/Data Registry 2	YES	YES (i.e. IAEA/MEDPOL proficiency test)	YES (i.e. Laboratory Accreditation)
3.Analytical determinations	Protocols/Data Registry 3	YES	YES (i.e. IAEA/MEDPOL proficiency test)	YES (i.e. Laboratory Accreditation)
4.Reporting	Templates for Data Registry 1 + 2 + 3 (e.g. MED POL data format reporting)	(not applicable)	(not applicable)	YES

** Methodologies for Sample Collection are not externally QA, nor accredited, in general.

22. From Table 2, it could be observed that the fulfilment of the 'data quality' at the first level undertaken by National Laboratories requires a proper design of functions (as well as time and staff resources allocation) to ensure a smooth flow of the monitoring process, which starts with the sample collection and ends with the data reporting in the appropriate format. The monitoring towards

reporting process can take from months to years to be completed, and therefore, the information registration under reporting QA should be imperative.

23. Unfortunately, some of these steps merit more attention than normally given to them, such as to the Reporting/Registry QA for all the processes in monitoring activities. That means summarizing the process undertaken and reporting the results (as per format template) for each, as well as any incidences that could have occurred, particularly missing metadata to take immediately corrective actions. In practice the Reporting QA in each process should be exquisitely guaranteed and submitted to the responsible person in the first level (e.g. laboratory manager), normally in charge of sending the report to the national authorities (level 2) as well, whilst guaranteeing the traceability of the datasets.

24. The protocols to perform Data Registries 1, 2 and 3 (and/or Data Registries themselves) need to be further prepared along with new IMAP Metadata Templates for the IMAP (Pilot) Info System Metadata templates aligned with the Data Standards and Data Dictionaries presented in document UNEP/MED WG. 463/9. The aim is to ensure that data quality checked and assured are reported to the next level, especially when operations are performed by different persons and/or different periods of time (see Table 2, Monitoring processes 1, 2, 3 and 4).

25. Another important insight into the data flows for QA in marine pollution monitoring is to ensure, as much as possible, that the generated data at each process is quality assured by two or more persons, which might not have participated in the process (e.g. sampling, processing, analysis and reporting). This means that if solely a person participated in the sample processing and analytical determinations he/she should not be the solely the person performing the reporting/registry QA for the entire process. This is applicable to all the processes including the final reporting (Process 4, Table 2) which should be checked by a second staff member. In brief, the person(s) that does the operations could not be the same that perform the quality assurance (QA) for a given process and data reporting.

4.2. Secondary (Contracting Parties)

26. At the secondary level, the national MED POL Focal Points should ensure the performance of the first level observing two main elements, namely, Completeness and Timeliness of datasets to be fulfilled. Both attributes are necessary for internal national purposes, as well as for the contribution to the database quality of submitted pollution monitoring data to the Secretariat.

27. Based on MED POL and other Regional Seas Programme, Table 3 presents a number of principles to guide the Contracting Parties to enable the execution and reporting under marine pollution monitoring programmes.

Table 3. Th**e** principles to guide the Contracting Parties in enabling execution of their reporting obligations under marine pollution monitoring programme.

Principle 1	*Only reliable information can provide the basis for effective and economic environmental policy and management regarding the Convention area*
Principle 2	*Environmental information is the product of a chain of activities, constituting program design, execution, evaluation and reporting, and that each activity has to meet certain quality requirements*
Principle 3	*Quality assurance requirements shall be set for each of these activities*
Principle 4	*Suitable resources should become available nationally (e.g. ships, laboratories, trained staff, etc.) to achieve this goal*
Principle 5	*Commitment to follow available protocols and guidelines to ensure full procedures for quality assurance and quality management systems*

4.3. Tertiary level (the Secretariat)

28. The Secretariat observes the basic principles at the secondary level and this should be sufficient to ensure completed and timely data sets submissions by the MED POL Focal Points.

29. At the level of the Secretariat, the main attributes to be fulfilled should be the data validity and accessibility by the Contracting Parties at national, regional and sub-regional levels. In fact, the MED POL monitoring database includes functional modules for data validation and data flagging, according to single parameter characteristics. The same approach should be incorporated into the IMAP Info System under preparation by INFO/RAC.

5. Proposed QA schemes for EO5 and EO9 and Data Controls

30. Despite Table 2 is meant to be detailed, generic QA schemes exist for any Common Indicator to be measured and reported at the primary level. To that extent, QA can be adapted for each Common Indicator within EO5 and EO9 with the purpose of establishing a common understanding for QA reporting. Tables 4a and 4b describes both the QA Schemes and QA Categories for each Common Indicator according to its specificities and overall 'data quality' needs to be reported by the Contracting Parties to the Secretariat under IMAP. Level 1 of QA/QC in Table 4a provides the scheme for data quality assurance, whilst Level 2 provides the scheme for QA of data assessment.

31. Therefore, the new categorization of the datasets received by the Secretariat should be agreed; but importantly, should allow performing the data validation from the reported data by the Contracting Parties from both scientific and policy points of view (i.e. considering the full attributes associated with 'data quality' at levels 1 and 2).

32. The above proposal responds to the experience gathered by the Secretariat, in collaboration with the Marine Environmental Studies Laboratory (MESL)of IAEA, and it should serve as a new framework to build a stronger quality flagging scheme within the INFO/RAC IMAP Info System with enough flexibility to accommodate the situations observed after 20 years of MED POL reporting activities.

33. There is a need for an urgent Mediterranean IMAP database quality management system capable to both incorporate and synthesize the marine environmental information generated in the Mediterranean region in a more dynamic way, as well as to visualize related assessment findings; that is incorporating different sources of data including scientific literature but strictly conserving a QA scheme that will allow to track the data sources and evaluate the uncertainty in the environmental assessments (i.e. different products with different levels of uncertainty).

34. The IMAP QA database should serve better for national quality improvements in the short term by clarifying the 'data quality' objectives and the processes to deliver quality data in the Mediterranean in a harmonized way.

35. The Data Controls (i.e. algorithms such as minimum and maximum values allowed for a parameter for example) within Database Quality Management needs to be built-in the IMAP Info System to improve the current scheme of the MED POL database as well, which is mainly based in format requirements. The 'flagging quality' scheme based on the Database QA and Reporting Procedures will help to develop an accurate assessment with known source uncertainty, as well as boost the national capabilities and resources to fit the requirements.

36. The finalization of this phase should be performed once the Data Standards and Data Dictionaries will be agreed. Nevertheless, the templates template using the actual parameters (i.e. MED POL) in the process to be transposed to the IMAP (Pilot) Info System, is presented in Appendix I for Common Indicator 17.

Table 4a. Proposed Quality Assurance (QA) Schemes for Common Indicators under IMAP EO5 and EO9.

Common Indicator	LEVEL 1: QA/QC Data	LEVEL 2: QA of data assessment	National requirements/Remarks
CI13 (EO5)	Monitoring and reporting QA/QC	Transfer/Reporting QA level by CP	Proficiency testing/ Laboratory accreditation
CI14 (EO5)	Monitoring and reporting QA/QC)	Transfer/Reporting QA level by CP	Proficiency testing/ Laboratory accreditation
CI17 (EO9)	Monitoring and reporting QA/QC	Transfer/Reporting QA level by CP	Proficiency testing/ Laboratory accreditation
CI18 (EO9)	Monitoring and reporting QA/QC	Transfer/Reporting QA level by CP	Proficiency testing/ Laboratory accreditation
CI19 (EO9)	Transfer/Reporting QA level by CP	-	The observation method (e.g. ships, satellite) should be reported (as a proof of Monitoring QA)
CI20 (EO9)	Monitoring and reporting QA/QC	Transfer/Reporting QA level by CP	Laboratory accreditation/Proficiency testing (e.g. typically Public Health Laboratories)
CI21 (EO9)	Monitoring and reporting QA/QC	Transfer/Reporting QA level by CP	Laboratory accreditation/Proficiency testing (e.g. typically microbiology Laboratories)

Table 4b. Proposed categories for flagging datasets submitted to the Secretariat for EO5 and EO9

Category A. Laboratories/CPs reporting successful Proficiency testing (z-score<2) and/or accreditation for the chemical or parameter analysed; metadata completed and timely submitted (max2 years delay).
Category B. Laboratories/CPs reporting Proficiency testing for the chemical or parameter analysed (2<z<3) and/or accreditation; metadata completed and timely submitted (max2 years delay).
Category C. Laboratories/CPs with no participation in Proficiency testing (for the last 2 years); metadata completed and timely submitted. It also could include scientific literature with full QA reported.
Category D. Laboratories/CPs with no participation in Proficiency testing (for the latest 5 years); metadata completed but not timely submitted. Also includes scientific literature without QA specifically reported.
Category E. Laboratories/CPs with gross reporting errors, although might be completed and timely submitted.

6. References

MEDPOL DATABASE, User Manual. IMS METU, 2003

Appendix I
Example on Data Controls for CI17 for trace metals in biota

As an example of Data Controls, the table below corresponding to the MED POL Metadata template for heavy metals in biota, includes two final columns to be filled with detailed content once the IMAP (Pilot) Info System Metadata templates will be built (see footnote) for the Contracting Parties.

	Fields	Description	Format	Units	A*	B*
1	SAMPLE_ID	Individual sample code given to each sample by the laboratory				
2	YEAR	Monitoring Year	NUM (4)			X
3	COUNTRY	Country Code (MED POL Codes)	CHAR (3)		X	
4	AREA	Area Code	CHAR (6)		X	
5	STATION	Station Code	CHAR (6)		X	
6	STATION_TYPE	for Hot Spots (H), Coastal (C), Reference (R)	CHAR (2)		X	
7	SAMP_DATE	Date of Sampling (dd/mm/yy)	DATE		X	
8	LON_DEG	Longitude in degrees	NUM (2)	Degree	X	
9	LON_MIN	Longitude minute, seconds (In case of GPS application use this field for minutes and seconds in decimals, otherwise use only for minutes)	NUM (5,2)	Minute	X	
10	LON_SEC	Longitude seconds (Use this field only when GPS is not used for positioning)	NUM (2)	Second	X	
11	LON_HEMIS	Longitude hemisphere (codes: W=west, E=east)	CHAR (1)		X	
12	LAT_DEG	Latitude degree	NUM (2)	Degree	X	
13	LAT_MIN	Latitude minute, seconds (In case of GPS application use this field for minutes and seconds in decimals, otherwise use only for minutes)	NUM (2,2)	Minute	X	
14	LAT_SEC	Latitude seconds (Use this field only when GPS is not used for positioning)	NUM (2)	Second	X	
15	BOT_DEPTH	Bottom depth of the sampling station	NUM (5,1)	meters	X	X
16	SAM_DEPTH	Sampling depth	NUM (5,1)	meters	X	X

	Fields	Description	Format	Units	A*	B*
17	SAM_TEMP	Temperature at the sampling station and depth	NUM (5,2)	ºC	X	X
18	SAM_SALIN	Salinity at the sampling station and depth (indicate exact unit)	NUM (5,2)	mS	X	X
19	SAM_DO	Dissolved oxygen at the sampling station and depth	NUM (5,2)	mg/L	X	X
20	SPECY	Selected Specie for analysis (MED POL codes)	CHAR (2)		X	
21	TISSUE	Selected Tissue for analysis (MED POL codes)	CHAR (2)		X	
22	SAM_NO	Sample no. (1,...n) (“n” as used in trend objectives of the programme)	NUM (2)			
23	NS	Number of specimens (=number of pooled organisms in a sample)	NUM (2)		X	X
24	LENGTH_AVG	Average length of specimens in a pool (Important: Use “fork length” for fish and “shell length” for mussels)	NUM (7,2)	cm	X	
25	LENGTH_STD	Standard deviation of average length of specimens in a pool	NUM (6,2)	cm	X	
26	LENGTH_UNIT	Unit given for length of organisms	CHAR (5)	“cm”	X	
27	WEIGHT_AVG	Average weight of specimens in a pool	NUM (8,1)	g	X	X
28	WEIGHT_STD	Standard deviation of average weight of specimens in a pool	NUM (7,1)	g	X	
29	WEIGHT_UNIT	Unit given for weight of organisms	CHAR (5)	“g”	X	
30	EOM	Extractable Organic Matter	NUM (5,2)	mg/g	X	X
31	EOM_UNIT	Extractable Organic Matter	CHAR (5)	“mg/g”	X	
32	DW / FW	Ratio of dry weight to fresh weight (dried to constant temperature)	NUM (5,2)		X	X
33	INST_CODE_TM	Trace Metal Institute code (Country code+institute no. given in the MEDPOL Phase III Agreement)	CHAR (5)			

	Fields	Description	Format	Units	A*	B*
34	ANALY_DATE_TM	TM Analysis Date (dd/mm/yy)	DATE		X	
35	ANALY_METH_TM	TM Analysis method (MED POL codes)	CHAR (5)			
36	FW_DW	Mention if concentrations are based on fresh or dry weight (code as "**F**" for fresh weight and "**D**" for dry weight	CHAR (1)		X	X
37	AS_CONC	Arsenic concentration	NUM (7,3)	µg/kg	X	X
38	AS_BDL	enter **BDL** if As conc. is below detection limit or level of determination	CHAR (3)		X	
39	AS_DL	Detection limit value	NUM (7,3)	µg/kg	X	
40	AS_UNIT	Unit for As_conc	CHAR (5)		X	
41	CD_CONC	Cadmium Concentration	NUM (7,3)	µg/kg	X	X
42	CD_BDL	Enter BDL if Cd conc. is below detection limit or level of determination	CHAR (3)		X	
43	CD_DL	Detection limit value	NUM (7,3)	µg/kg	X	
44	CD_UNIT	Unit for Cd_conc	CHAR (5)		X	
45	CR_CONC	Chromium Concentration	NUM (7,3)	µg/kg	X	X
46	CR_BDL	enter BDL if Cr conc. Is below detection limit or level of determination	CHAR (3)		X	
47	CR_DL	Detection limit value	NUM (7,3)	µg/kg	X	
48	CR_UNIT	Unit for Cr_conc	CHAR (5)		X	
49	CU_CONC	Cupper concentration	NUM (7,3)	µg/kg	X	X
50	CU_BDL	Enter BDL if Cu conc. Is below the detection limit or level of determination	CHAR (3)		X	

	Fields	Description	Format	Units	A*	B*
51	CU_DL	Detection limit value	NUM (7,3)	µg/kg	X	
52	CU_UNIT	Unit for Cu_conc	CHAR (5)		X	
53	HGT_CONC	Total Hg concentration	NUM (7,3)	µg/kg	X	X
54	HGT_BDL	enter BDL if HgT conc. is below detection limit or level of determination	CHAR (3)		X	
55	HGT_DL	Detection limit value	NUM (7,3)	µg/kg	X	
56	HGT_UNIT	Unit for Hgt_conc	CHAR (5)		X	
57	PB_CONC	Lead Concentration	NUM (7,3)	µg/kg	X	X
58	PB_BDL	enter BDL if Pb conc. Is below detection limit or level of determination	CHAR (2)		X	
59	PB_DL	Detection limit value	NUM (7,3)	µg/kg	X	
60	PB_UNIT	Unit for Pb_conc	CHAR (5)		X	
61	ZN_CONC	Zinc concentration	NUM (7,3)	µg/kg	X	X
62	ZN_BDL	Enter **BDL** if Zn conc. Is below the detection limit or level of determination	CHAR (3)		X	
63	ZN_DL	Detection limit value	NUM (7,3)	µg/kg	X	
64	ZN_UNIT	Unit for Zn_conc	CHAR (5)		X	
	Other Trace Metals	to be included by the laboratories depending on the country agreements				

A= Exact specifications, otherwise a range or alternative cumulative option should be established
B= Data control requirement (e.g. LOD, LOQ, valid concentration range, etc.)

Appendix VII
Practical Implementation Guidelines on PRTR

Table of Contents

Tables

Figures

ABBREVIATIONS

BREF	Best Available Techniques Reference Document
CAS	Chemical Abstracts Service
CORINAIR	Core Inventory of Air Emissions
EMAS	Eco-management and Audit Scheme
EMEP	European Monitoring and Evaluation Programme
EPA	Environmental Protection Agency
EPER	European Pollutants Emission Register
GIS	Geographic Information System
E-PRTR	European Pollutant Release and Transfer Register
EU	European Union
H2020	Horizon 2020
ISO	International Organisation for Standardisation
ISIC	International Standard Industrial Classification
IPCC	Intergovernmental Panel on Climate Change
NACE	Nomenclature of Economic Activities
NAP	National Action Plan
NBB	National Baseline Budget
OECD	Organisation for Economic Cooperation and Development
PRTR	Pollutant Release and Transfer Register
RET	Release Estimation Techniques
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNECE	United Nations Economic Commission for Europe
UNIDO	United Nations Industrial Development Organisation
UNITAR	United Nations Institute for Training and Research
WHO	World Health Organisation

1. AIM OF DOCUMENT

1. The Pollutant Release and Transfer Register (PRTR) Implementation Guide is prepared with the aim to support users in the implementation of PRTR by addressing in particular:

- reporting procedures;
- the data to be reported;
- quality assurance and assessment;
- confidentiality;
- release determination, analytical methods and sampling methodologies;
- indication of parent companies and
- coding of activities.

2. Particularly, this Guide will help industrial operators/owners to correctly report to their respective competent authorities the emissions generated by relevant activities; thus, ensuring submission of well documented and comprehensive reports. Additionally, this Guide provides complementarity of the main features between PRTR and NBB update, so that it will be obvious for users what types of classifications have to be followed in each case.

2. SCOPE OF DOCUMENT

3. Implementation of PRTRs at national level will enhance public access to information through the establishment of a coherent, integrated, nationwide pollutant release and transfer registers, which could facilitate public participation in environmental decision making as well as contribute to reporting under the framework of Article 13 of LBS Protocol for the National Baseline Budget (NBB) updates.

4. This document also underlines the linkages between NBB and PRTRs for ease of reference while reporting. Basically, NBB takes into consideration 30 sectors of activities, listed in 13 groups of substances enumerated in section C of Annex I of LBS Protocol, whereas for instance, E-PRTR[35] has 65 activities and 7 groups of pollutants Furthermore, PRTRs have thresholds for reporting, whereas NBB does not have any threshold. A comparison between the two instruments is presented in Table 14 in this document. A full mapping of corresponding sectors/subsectors of activities is presented in Appendix X.

3. INTRODUCTION

5. PRTR is a system for inventory of releases and transfers to air, water and soil as well as waste transported off site for treatment or disposal. In addition to collecting data for PRTR from stationary sources, PRTR is also designed to include estimations of releases from diffuse sources such as agriculture and transport/traffic activities.

6. PRTR data are useful in identifying some of the sources of pollutants and their possible risks to human health and to the environment. These data represent a portion of all chemical releases and transfers to the environment from a range of industrial and non-industrial sources.

In accordance with Article 4 of the PRTR Protocol, the PRTR:

a) Is facility-specific with respect to reporting on point sources;
b) Is pollutant-specific or waste-specific, as appropriate;
c) Is multimedia, distinguishing among releases to air, land and water;
d) Includes information on transfers;
e) Is based on mandatory reporting on a periodic basis;

[35] http://ec.europa.eu/environment/industry/stationary/eper/implementation.htm

f) Includes standardized and timely data, a limited number of standardized reporting thresholds and limited provisions, if any, for confidentiality;
g) Is coherent and designed to be user-friendly and publicly accessible, including in electronic form;
h) Allows for public participation in its development and modification;
i) Is a structured, computerized database or several linked databases maintained by the competent authority.

7. The United Nations Conference on Environment and Development (UNCED) and the adoption of Agenda 21 at that conference awoke the interest of the international community and national governments for the creation of Pollutant Release and Transfer Registers (PRTRs) as a basic environmental management tool at the country level.

8. As a result, a wealth of experience has been developed internationally on this topic: PRTR programs now exist in the majority of developed countries, among others, including the Toxic Release Inventory (TRI) in the U.S., the National Pollutant Release Inventory (NPRI) in Canada, the National Pollutant Inventory (NPI) in Australia, and the European pollution registry (E-PRTR) in Europe.

9. In 2003 the UNECE Kiev Protocol was adopted which forms a broad PRTR framework which acted as basis for the E-PRTR introduction in Europe (EU Regulation 166/2006[36]).

10. In parallel to these developments, UNITAR[37] in cooperation with the OECD,[38] the World Health Organization (WHO), the United Nations Environment Programme (UNEP), and the United Nations Organization for Industrial Development (UNIDO), have pooled efforts to enable developing countries to introduce PRTRs for effective environmental management.

PRTRs in the Mediterranean region

11. In the Mediterranean area, the PRTR implementation process started with a typical bottom-up approach by launching pilot proactive projects in different countries in 2003 under the framework of the collaboration between UNEP and UNIDO. Pilot projects have been carried out in Egypt (Alexandria), in Syria (Latakia) and in Turkey (Izmir). Other regional pilot projects followed. The general idea of promoting such pilot projects is that each of them should act as a seed for the growth of a PRTR at national level. The pilot project therefore was considered as a test system for setting up the procedure, the workflow of information, the supporting tools, including the development of ad hoc software as well as to help the creation of a legal framework in which to operate the PRTR at national level.

12. The final goal of the activities carried out at regional level and then scaled up at national level can be stated as "having similar systems in all the countries interested to the development of a national PRTR." The approach followed is a bottom-up strategy for the development of an integrated system for the Mediterranean area. The experience achieved so far in the pilot projects, starting from the pioneer project in Alexandria, Egypt allowed UNEP and UNIDO to set up a procedure and a suite of tools to ensure uniformity in the workflow of the data collection and in the data structure. A conceptual schema for the data base has been developed and implemented in a logical and physical schema of a multi-language database. Chemicals and methods are stored in the data base according to international standards (CAS number and international CODE).

[36] http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32006R0166&from=EN
[37] https://unitar.org/about/news-stories/news/updated-unitar-prtr-platform
[38] http://www.oecd.org/env/ehs/pollutant-release-transfer-register/publicationsintheseriesonpollutantreleaseandtransferregisters.htm

THE PRTR IMPLEMENTATION

13. The general concept of the PRTR scheme is depicted in figure 1, showing the role of single entities.

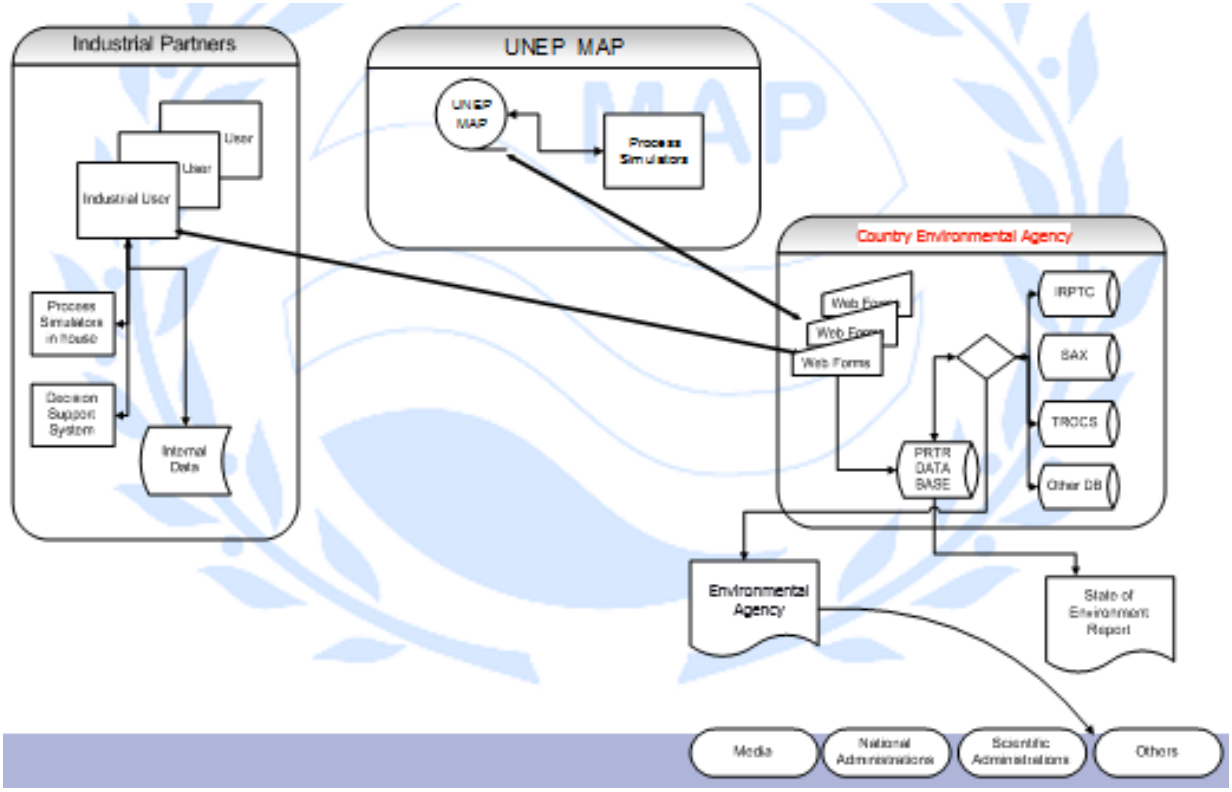


Figure 1: General schema of the PRTR procedure

14. UNEP-MAP **would** provide the necessary support to establish NBB/PRTR Infosystem as a new tool in which the PRTR data could be linked and uploaded by the Contracting Parties for fulfilling their reporting obligations. The software is made up by the reporting system in web, the database with the GIS interface and the links to the pure component database necessary for the estimation of the physical data. The competent authorities (access right for MEDPOL FPs) can use the NBB/PRTR Infosystem on the meaning of each data to be stored in the PRTR database.

THE DATA BASE

15. The development and implementation of a PRTR system to national needs represents a mean for governments to track generation, release and the fate of various pollutants over time. A PRTR can therefore be an important tool in the total environment policy of a government by identifying the major actors who contribute the most in the overall pollution loads. It is essential to develop an efficient system for storing all the data generated by the industrial partners and a system easy to be used to transfer data in the central database developed by INFO-RAC (https://idc.info-rac.org/). A description of the Data Repository is presented in the Spatial Data Infrastructure and Reporting System User Guideline.

16. Reports are provided on regular basis (yearly normally) by the industrial partners on pollutants included in the national list of chemicals/substances taking into count also LBS Protocol Annex I, Section C.

17. The primary focus of the MEDPOL PRTR Regional Guidelines is the final link of the reporting chain, namely the information generated by facility operators/owners who are responsible to

report the data to competent authority and the quality of this information is assessed by the competent authorities. With a reliable information flow established (to be generated by the facilities operators) the authorities will be able to access the information provided and consequently use the PRTR system as a policy tool to introduce mitigation measures. Therefore, the Guidelines form the general reporting framework to be used as a reference document describing the issues to be considered when facilities data has to be reported.

Which PRTR?

18. As stated above, there are several PRTR systems applied worldwide; the UNECE Protocol has defined a comprehensive PRTR system which forms a comprehensive framework also followed by the EU (E-PRTR). a full mapping between PRTR and NBB is presented in Chapter 3 and in Appendix X of the PRTR Guidance.

19. The MEDPOL PRTR system is practically following the E-PRTR classification (Annex I of the 166/2006 Regulation) of activities and thresholds which are identical to those referred in the UNECE Protocol. Following the E-PRTR system (which uses the PRTR Protocol activity capacity thresholds approach) will also ensure the harmonisation of PRTR procedures among all Mediterranean countries.

20. There are several activities grouped by sectors (energy, metal production and processing, mineral industry, chemical industry, waste and waste-water management, paper/wood processing industries, intensive livestock and aquaculture, animal and vegetable products and others) which are referred in the UNECE Protocol as well as in the EU Regulation as subject to PRTR reporting with specific capacity thresholds which, if exceeded, the relevant facilities' owners/operators have to report the quantities emitted into the environment.

FACILITY IDENTIFICATION

Who has to report?

21. Activities subject to PRTR reporting are grouped in 9 activity sectors and listed in detail in Appendix 1 of this document, including additional NBB sectors of activity according to LBS Protocol Annex I, Section A.

1. Energy;
2. Production and processing of metals;
3. Mineral industry;
4. Chemical industry;
5. Waste and waste water management;
6. Paper and wood production and processing;
7. Intensive livestock production and aquaculture;
8. Animal and vegetable products from the food and beverage sector;
9. Other activities.

22. Reporting is required if the capacity threshold (Appendix 1) and release thresholds (Appendix 2) or off-site transfer thresholds for pollutants in waste water or for wastes are exceeded. If the thresholds are only equaled but not exceeded, reporting is not required. If no capacity threshold is specified (activities marked with *) it is expected that all facilities of the relevant activity are subject to reporting if a release threshold is exceeded. If only the capacity thresholds are exceeded but the release or off-site transfer thresholds are not exceeded, reporting is not required, each country can decide to report beyond the suggested thresholds.

23. If one operator carries out several activities falling under the same activity of the same facility at the same site, the capacities of such activities are added together. The sum of the capacities is then compared with the capacity threshold for the specific activity as listed in Appendix 1.

Reporting Period

24. This is the calendar period (usually 1 year) to which the reported information applies, not the period in which you are submitting the report.

Certification

25. The certification statement, if applicable, should be signed by the owner /operator or a senior official of the facility with management responsibility for the person (or persons) completing the form. The owner, operator, or official must certify the accuracy and completeness of the information reported on the form by signing and dating the certification statement.

Facility Name and Location

26. Enter the name of your facility (plant site name or appropriate facility designation), street address, mailing address and city in the space provided.

Full or Partial Facility Information

27. As facility is meant any industrial unit(s) carrying out a distinctive activity of Appendix 1; that means that an integrated facility consisting of various activities has to report for each specific activity is performing.

Example *: The main Appendix 1 activity of facility P is the production of paper and board and other primary wood products. The main Annex I activity of facility Q is the production of pulp from timber or fibrous materials. Facility Q also includes a combustion plant and a waste-water treatment plant all run by operator Q. In addition, operator Q runs another installation as part of facility Q, which is a non-Appendix 1 activity (figure 2). In table 1 the reporting requirements for each facility is presented.

* Guidance Document for the implementation of the European PRTR, EU Commission (2006)

Table 3: Example - Reporting requirements for facilities P + Q

Reporting facility	Activity	Release/ Off-site transfer	Reporting requirements
Facility P	Production of paper and board and other primary wood products	A B C	To be reported as release to air To be reported as release to water To be reported as off-site transfer of pollutants in waste water
Facility Q	Production of pulp from timber or similar fibrous materials Thermal power station Waste-water treatment plant Other installation (non-Appendix 1)	D F E	Sum of releases to be reported as release to air Sum of all releases (E+F) to be reported as release to water

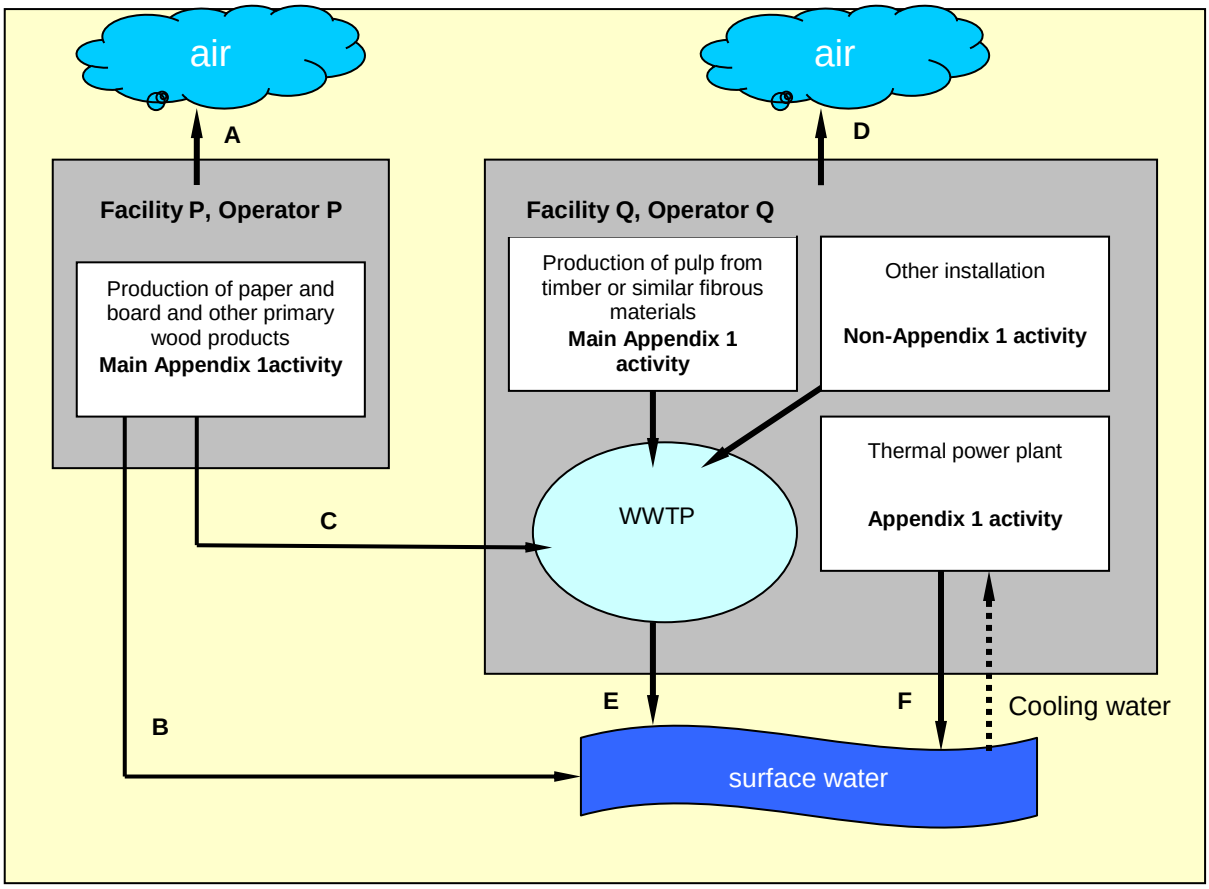


Figure 2: Example - Integrated facility P + Q

How is facility P classified?

28. The only Appendix 1 activity of facility P is the production of paper and board. Therefore, it is a 6 (b) activity (Industrial plants for the production of paper and board and other primary wood products (such as chipboard, fibreboard and plywood).

How is facility Q classified?

29. The main activity of facility Q is the production of pulp from timber or fibrous materials. This is also the main Appendix 1 activity to be reported. Facility Q also includes a combustion plant of a capacity greater than 50 MW, which is also an Appendix 1 activity. The waste water is treated in a wastewater treatment plant operated by the facility. Therefore (table 2):

Table 4: Example - Classification of facility Q

Activity	PRTR Code	Description
1 (main)	6 (a)	Industrial plants for the production of pulp from timber or similar fibrous materials
2	1 (c)	Thermal power stations and other combustion installations

Technical Contact

30. Enter the name and telephone number of a technical representative to whom the competent authorities may contact for clarification of the information reported. This contact person does not have to be the same person who prepares the report or signs the certification statement and does not necessarily need to be someone at the location of the reporting facility. However, this person must be familiar with the details of the report so that he/she can answer questions about the information provided.

Public Contact

31. The name and telephone number of the company should be entered to respond to questions from the public about the report. This contact person does not have to be the same person who prepares the report or signs the certification statement and does not necessarily need to be someone at the location of the reporting facility.

International Standard Industrial Classification (ISIC)/NACE Code

32. Depending on the decision of the Contracting Party, use the United Nations International Standard Industrial Classification Code (4-digits) or the NACE Code (4-digits) to classify your activity. Both Codes have exactly the same items at the highest levels, where NACE is more detailed at lower levels. The ISIC classification is listed in Appendix 3.

Latitude and Longitude

33. Enter the latitudinal and longitudinal coordinates of your facility. **T**he format has to follow the relevant international standards for georeferencing, i.e. ISO.

34. Latitude and longitude coordinates of your facility are very important for pinpointing the location of reporting facilities and are required elements.

Parent Company Information

35. Enter the name of the corporation or other business entity that is your ultimate parent company. If your facility has no parent company, check the NA box.

River Basin District Information

36. In the reporting format (Appendix 8) except the general information about the facilities its location in the relevant river basin district has also to be indicated thus allowing the competent authorities to assess the pollution loads accordingly. In doing so, the authorities should inform the operators/owners about the exact name and codification of the relevant river basin district.

Summary:
1. Facilities falling into the activities listed in Appendix 1 and exceed the relevant capacity thresholds have to report their releases and off-site transfers; If integrated facilities consist of more than one installation which falls into more than one of the activities listed in Appendix I, it is to be decided by the competent authority whether activities prepare separately their releases and off-site transfers **(**to be included in the overall facility's report); 2. In cases of more than one activity installed in the facility, the main activity has to be identified. "Main" activity is referred to the activity categories described in Appendix I.

4. REPORTING REQUIREMENTS

What has to be reported?

37. If an activity specified in Appendix 1 is carried out and the capacity threshold specified therein is exceeded, there is an obligation to report releases and off-site transfers: for 91 PRTR pollutants there is an obligation to report their emitted loads if they exceed the thresholds listed in Appendix 2 which includes also the three additional substances from NBB reporting. For some of the pollutants listed there the Chemical Abstracts Service (CAS) Registry Numbers[39] are also defined when available.

38. Releases of pollutants falling into several categories (of pollutants) shall be reported for each of these categories, if the relevant thresholds are exceeded. Since, for example 1,2-dichloroethane is a NMVOC, releases of pollutant number 34 (1,2-dichloroethane) are also included under pollutant number 7 (NMVOC). In the case of tributyltin and triphenyltin (organotin compounds), the releases of pollutant number 74 (tributyltin and its compounds) and 75 (triphenyltin and its compounds) are also included under pollutant number 69 (Organotin compounds as total Sn).

39. Following E-PRTR guidance, reported releases and off-site transfers are totals of releases and off-site transfers from all accidental, routine and non-routine activities at the site of the facility.

- **Accidental** releases are all releases which are not deliberate, routine or non-routine and result from uncontrolled developments

- **Non-routine** activities are extraordinary activities that are carried out under controlled operation and may lead to increased releases of pollutants e.g. shut-down and start-up processes before and after maintenance operations.

40. Accidental/non-routine releases have to be added to those from the routine operation of the facility. Usually it is possible to quantify accidental releases e.g. by considering the duration of an accidental release and relating this to assumed flow rates. Since these cases do occur rarely they have to be also noted as separate data set in the reporting format (Appendix 8).

41. According to the E-PRTR Guidance, for each activity there is a typical set of pollutants[40] released into the air (Appendix 4) and into the water (Appendix 5). Both tables are indicative only and

[39] http://support.cas.org/content/chemical-substances
[40] Guidance Document for the implementation of the European PRTR, EU Commission (2006)

should not be interpreted as a standard list of parameters for specific sub-sectors. To decide which parameters are relevant to each specific installation, information contained in Environmental Impact Assessments (EIA), permit applications, site inspection reports, process flow sheets, material balances etc. have to be taken into consideration. Therefore, it might be possible that for a certain activity fewer or possibly more pollutants than indicated have to be considered and it is in the hands of operators/owners to decide which will be the final list of pollutants for PRTR reporting.

42. In table 3 the reporting requirements are summarized.

Table 5: Reporting requirements

Releases		**Quantity** [1]	**M/C/E** [3]	**Method used** [4]		
	to air	**kg/year** [2]	**X**	**X**		
	to water	**kg/year** [2]	**X**	**X**		
	to land	**kg/year** [2]	**X**	**X**		
Off-site transfers of:		**Quantity** [1]	**M/C/E** [3]	**Method used** [4]	**Name and address of recoverer/ disposer**	**Address of actual recovery/ disposal site receiving the transfer**
Pollutants in wastewater [5]		**kg/year** [2]	**X**	**x**		
Non-hazardous waste	for disposal (D[6])	**t/year**	**x**	**x**		
	for recovery (R[7])	**t/year**	**x**	**x**		
Hazardous waste within the country	for disposal (D)	**t/year**	**x**	**x**		
	for recovery (R)	**t/year**	**x**	**x**		
Hazardous waste transboundary	for recovery (R)	**t/year**	**x**	**x**	**x**	**x**
	for disposal (D	**t/year**	**x**	**x**	**x**	**x**

[1)] Quantities are totals of releases from all deliberate, accidental, routine and non-routine activities at the site of the facility or of off-site transfers.

[2)] The total quantity of each pollutant that exceeds the threshold value specified in Appendix 2. In addition, any data that relate to accidental releases have to be reported separately whenever available.

[3)] It has to be indicated whether the reported information is based on measurement (M), calculation (C) or estimation (E).

[4)] Where data are measured or calculated, the method of measurement and/or the method for calculation shall be indicated.

[5)] Off-site transfer of each pollutant destined for waste-water treatment that exceeds the threshold value specified in Appendix 2

[6)] Disposal process coding (see Appendix 7)

[7)] Recycling process coding (see Appendix 7)

(source: http://ec.europa.eu/environment/industry/stationary/eper/pdf/en_prtr.pdf)

1.1. Measurement, calculation, estimation methods

43. Sometimes the total release of a pollutant at a facility is determined by more than one determination method; in that case, the determination method with the highest amount of release is chosen for reporting. Example: The release of an air pollutant occurs at two stacks (stack A and stack B). The total release exceeds the relevant release threshold. The release at stack A is measured and amounts 100 kg/year. The release at stack B is calculated and amounts 50 kg/year. Since the highest amount of release (100 kg/year) is measured, the total release (150 kg/year) has to be indicated as being based on measurement.

1.1.1. Measurement (M)

44. For facilities of capacities mentioned in Appendix 1, it is expected that most of the released pollutants are measured and recorded. In this case the relevant measuring method should be cited. In Appendix 6 an indicative list of internationally approved measuring methods for releases of air and water pollutants is presented.

45. "M" is used when the releases of a facility are derived from direct monitoring results for specific processes at the facility, based on actual continuous or discontinuous measurements of pollutant concentrations for a given release route. "M" should also be used when the annual releases are determined based on the results of short term and spot measurements.

1.1.2. Calculation (C)

46. "C" is used when the releases are based on calculations using activity data (fuel used, production rate, etc.) and emission factors or mass balances. A good guidance is the set of emission **factors** developed by MEDPOL which relate production capacities with releases (UNEP(DEPI)/MED WG. 399/Inf.3); however not all releases are covered by these factors. In that case the operator has to report which calculation method has been considered.

47. Other Internationally approved calculation methods are:

- EU Guidelines for the monitoring and reporting for greenhouse gas emissions under the Emission Trading Scheme[41]
- IPCC Guidelines[42]
- EMEP/CORINAIR Emission Inventory Guidebook[43]

1.1.3. Estimation (E)

48. "E" is used when the releases are determined by best assumptions (e.g. mass balances) or expert guesses which are not based on publicly available references or in case of absence of recognized emission estimation methodologies or good practice guidelines.

1.1.4. Additional information sources for the determination of releases

49. It is strongly recommended to use the relevant reference documents presented below for determination of releases and conducting measurements:

- The BREF document "Reference Document on the General Principles of Monitoring"[44]

[41] https://ec.europa.eu/clima/sites/clima/files/ets/monitoring/docs/gd1_guidance_installations_en.pdf
[42] http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.html
[43] https://www.eea.europa.eu/publications/emep-eea-guidebook-2016
[44] http://eippcb.jrc.ec.europa.eu/reference/BREF/ROM/ROM_2018_08_20.pdf

contains a list of CEN-standards and pre-standards for determination of releases.

- The United Nations Institute for Training and Research (UNITAR) "Guidance for Facilities on PRTR Data Estimation and Reporting"[45]
- The website of the OECD "Resource Centre for PRTR Release Estimation Techniques" (RETs)[46] provides a clearing-house of guidance manuals/documents of release estimation techniques for the principal pollutant release and transfer registries developed by OECD member countries.
- Information about air emission factors can be found in the US EPA website[47]

1.1.5. Other calculation/estimation techniques

50. The operator/owners may use "equivalent" methodologies other than internationally approved methodologies, even when available, if one or more of the conditions are fulfilled which are listed in table 4: there should also be a short description of the methodology applied (see example in table 5).

Table 6: Codification of M/C/E methodologies

Method used for determination of releases/off-site transfers	Designation of the method used
Measurement methodologies	
Internationally approved measurement standard	short designation of the relevant standard (e.g. EN 14385:2004)
Measurement methodology already prescribed by the competent authority in a license or an operating permit for that facility	PER
National or regional binding measurement methodology prescribed by legal act for the pollutant and facility concerned	NRB
Alternative Measurement Method in accordance with existing CEN/ISO measurement standards	ALT
Measurement methodology the performance of which is demonstrated by means of certified reference materials and accepted by competent authority	CRM
Other measurement methodology	OTH
Calculation methodologies	
Internationally approved calculation method	short designation of the method used: ETS, IPCC, UNECE/EMEP
Calculation methodology already prescribed by the competent authority in a license or an operating permit for that facility	PER
National or regional binding calculation methodology prescribed by legal act for the pollutant and facility concerned	NRB
Mass balance method which is accepted by the competent authority	MAB
European-wide sector specific calculation method	SSC
Other calculation methodology	OTH

(source : http://ec.europa.eu/environment/industry/stationary/eper/pdf/en_prtr.pdf)

[45] http://cwm.unitar.org/publications/publications/cw/prtr/prtr_en/prtr_tech_support_2_nov2003.pdf
[46] http://www.oecd.org/env/prtr/rc
[47] https://www.epa.gov/air-emissions-factors-and-quantification/basic-information-air-emissions-factors-and-quantification

Table 7: Example of M/C/E methodologies description

Releases to air						
Pollutant		Method			Quantity	
No[1].	Name	M/C/E	Method used		T (total) (kg/year)	A (accidental) kg/year
			Code	Designation or description		
1	CH_4	**C**	**NRB**	regional binding measurement methodology using specific gas chromatography	125,000	-
3	CO_2	**C**	**ETS**	-	244,000,000	-
14	HCFCs	**E**	**-**	-	1.28	1.28
18	Cd	**M**	**EN 14385: 2004**	-	12.5	-
72	PAH	**M**	**NRB**	**VDI 3873**	122	-

[1)] As numbered in Appendix 2
(source: http://ec.europa.eu/environment/industry/stationary/eper/pdf/en_prtr.pdf)

1.2. Examples of releases

51. All releases have to be accurately reported so that the necessary information is complete and comprehensive; that means that, except of the pollutants quantities data about the method used, the accidental releases and the total loads should be mentioned.

1.2.1. Releases to air

52. A total of 60 substances are specified as relevant air pollutants. Releases from a facility of air pollutants in excess of the threshold values in column 1a (Appendix 2) must be reported.

53. An example of releases to air from an oil refinery installation is presented in table 6

Table 8: Releases to air (example: oil refinery)

			Releases to air			
Pollutant			Method		Quantity	
No[1]	CAS Number	Name	M/C/E	Method used	T (total) (kg/year)	A (accidental) kg/year
1	74-82-8	Methane (CH_4)	C	IPCC	521,000	-
3	124-38-9	Carbon dioxide (CO_2)	M	ISO 12039:2001	413,000,000	-
21		Mercury	M	EN 13211:2001	17.0	2.00

[1)] As numbered in Appendix 2
(source: http://ec.europa.eu/environment/industry/stationary/eper/pdf/en_prtr.pdf)

1.2.2. Releases to water

54. A total of 71 substances are specified as relevant water pollutants. Releases of water pollutants which exceed the threshold values in column 1b (Appendix 2) must be reported by the facility.

55. An example of releases to water from a plant for the pre-treatment of fibres and textiles is presented in table 7.

Table 9: Releases to water (example: pre-treatment of fibres and textiles)

Releases to water						
Pollutant			Method		Quantity	
No[1]	CAS Number	Name	M/C/E	Method used	T (total) kg/year	A (accidental) kg/year
63		Brominated diphenylethers (PBDE)	E		25.5	20.0
76		Total organic carbon (TOC)	M	EN 1484:1997	304,000	-
N						

[1)] As numbered in Appendix 2
(source: http://ec.europa.eu/environment/industry/stationary/eper/pdf/en_prtr.pdf)

1.2.3. Releases to land

56. As releases to land are those pollutants contained in wastes which are subject to land treatment (D 1) e.g. spreading of oily sludges and/or deep injection (D 3) e.g. of saline solutions as described in Appendix 7. Sludge and manure spreading are recovery operations and therefore not reported as releases to land.

57. A total of 61 substances are specified as relevant pollutants for releases to land. Accidental releases of pollutants onto the soil on the site of a facility (e.g. spillages) do not have to be reported. Accidental releases to land are theoretically possible (e.g. due to the leakage of a pipeline at the location of deep injection) but it is expected that they will only occur in very rare cases.

58. An example of releases to land by deep injection of liquid wastes is presented in table 8.

Table 10: Releases to land (example: deep injection)

	Releases to land					
Pollutant			Method		Quantity	
No[1]	CAS Number	Name	M/C/E	Method used	T (total) kg/year	A (accidental) kg/year
24		Zinc and compounds (as Zn)	M	EN ISO 11885:1997	125	-
79		Chloride (as total Cl)	M	EN ISO 10304-1	2,850,000	-

1) As numbered in Appendix 2

(source: http://ec.europa.eu/environment/industry/stationary/eper/pdf/en_prtr.pdf)

1.3. Off-site transfers

1.3.1. Off-site transfers to water

59. An off-site transfer of pollutants in waste water means the movement beyond the boundaries of a facility of pollutants in wastewater destined for wastewater treatment including industrial waste water treatment. The off-site transfer may be carried out via a sewer or any other means such as containers or (road) tankers.

60. Operators/owners shall report off-site transfers of any pollutant specified in Appendix 2 in waste water destined for waste-water treatment for which the threshold value specified in column 1b of the table in Appendix 2 is exceeded.

61. An example of off-site transfer of wastewaters (containing nitrogen and phosphorous) is given in table 9.

Table 11: Off-site transfer of wastewaters (example)

Off-site transfers of pollutants in waste water					
Pollutant		Method		Quantity	
No[1]	Name	M/C/E	Method used	T (total) kg/year	A (accidental) kg/year
12	Total nitrogen	M	EN 12260	76,400,000	-
13	Total phosphorus	M	EN ISO 6878:2004	10,900,000	-

[1)] As numbered in Appendix 2

1.3.2. Off-site transfer of waste

62. An off-site transfer of waste means the movement beyond the boundaries of a facility of waste destined for disposal or recovery. Operators/owners shall report off-site transfers of

- hazardous waste (HW) exceeding 2 tons per year
- non-hazardous waste (non-HW) exceeding 2,000 tons per year

63. for any operations of recovery or disposal (see Appendix 7) with the exception of the disposal operations of land treatment and deep injection, as these have to be reported as releases to land.

64. The operator has to indicate whether the waste is destined for recovery (“R”) or for disposal (“D”). If the waste is destined for waste treatment that includes both recovery and disposal operations (e.g. sorting), the treatment operation (R or D) for which more than 50% of the waste is destined should be reported. In cases where the facility is not able to trace whether more than 50% of the waste is disposed or recovered, then code “D” should be used.
An example of off-site transfer of wastes is given in table 10.

Table 12: Off-transfer of wastes (example)

Off-site transfer of waste	Quantity (t/year)	Waste treatment operation	M/C/E	**Method used**
Hazardous waste within the country	10.5	R	M	weighing
Non-hazardous waste	2,500	D	C	PER

65. The indication of the method used for the off-site transfer of hazardous waste is based on "weighing", that of non-hazardous waste on calculation by using a methodology prescribed by the competent authority in the operating permit for the facility (method name to be reported).

1.4. Quality assurance

1.4.1. Operators

66. The reported data by the facility operators/owners shall use “best available data” when preparing their reports. The reported data shall be:

Complete: the reported data should cover all releases and off-site transfers of all pollutants and wastes exceeding thresholds for all facilities with Appendix 1 activities above the capacity thresholds. The data should also contain all additionally required information (e.g. description of calculation methods).

Consistent: the data shall be reported on the basis of unambiguous and uniform definitions, source identification and reliable methodologies for the determination of the releases. Consistent reporting by facilities will enable the competent authorities to carry out consistent reporting in standardised formats to MEDPOL and any other institutions (e.g. EEA) concerned. This will enable comparison of the reported data with previous release data of reporting facilities or with data of similar sources in other countries. In this respect a consistent use of the identification number of facilities and of the pollutants is essential.

Credible: the data must be authentic, reliable, comparable and transparent. In the context of pollutant release and transfer registers credibility is closely linked to consistency. If the approaches and data sources used in an inventory development project are considered consistent, then users will have an acceptable degree of confidence in the releases data developed from those techniques.

1.4.2. Authorities

67. Reported data shall be validated and approved by competent authorities before disclosure Competent authorities shall assess the data provided against information that is already available, as appropriate. For example, competent authorities may wish to check the data received against the following:

a) information received by the competent authorities arisen as part of licensing procedures or compliance checking of permits;
b) information received as a result of self-monitoring by facilities that is reported to the authorities;
c) information related to the application by the facilities of eco-management and audit scheme (EMAS) or ISO 14001

68. In the case of any discrepancies, uncertainties or doubts in respect of the information provided by facilities, the competent authority could ask for clarification from the facility concerned. The facility could also be asked to amend the information supplied if appropriate. This includes examination by the competent authorities of the records held by operators especially the data from which the reported information was derived and the description of the methodology used for data gathering.

69. E-PRTR validation tool[48] can support the authorities; it is a software application which can easily detect erroneous data such as incorrect co-ordinates and figures, pollutants reported twice and facilities with no reported releases.

[48] https://www.eionet.europa.eu/schemas/eprtr/EPRTRUserManual.pdf

1.5. Confidentiality

70. If an operator of a facility has justifiable reasons that specific information concerning releases or off-site transfers should be kept confidential, he has to inform the competent authorities and justify this decision. The authorities have to approve which data has to be kept confidential (possibly upon an indication to that effect by the operator) and inform the MEDPOL Secretariat accordingly.

71. In practice, this means that only the name of the pollutant should be kept confidential and instead should be replaced by the name of a group of pollutants. The method of measurement/calculation should not be reported either.

72. An example of confidential data reporting is given in table 11.

Table 13: Confidential data reporting (example)

	Pollutant No[1]	Pollutant name/category	M/C/E	Method used	Quantity kg/year
Confidential data	-	Heavy metal	M	-	8.45

[1)] As numbered in Appendix 2
(source: http://ec.europa.eu/environment/industry/stationary/eper/pdf/en_prtr.pdf)

73. The groups of pollutants can be seen in table 12.

Table 14: Groups of pollutants

Groups of pollutants	No. of pollutant according to Appendix 2
Greenhouse gases	1, 3, 4, 5, 9, 10
Other gases	2, 6, 7, 8, 11, 14, 15, 16, 80, 84, 85
Heavy metals	17-24
Pesticides	25-30, 32, 33, 36-39, 41, 44-46, 51, 59, 67, 74, 75, 77, 89
Chlorinated organic substances	31, 34, 35, 40, 42, 43, 47-50, 52-58, 60, 63, 90
Other organic substances	61, 62, 64-66, 68-73, 76, 78, 87, 88, 91
Inorganic substances	12, 13, 79, 81-83, 86.

(source: http://ec.europa.eu/environment/industry/stationary/eper/pdf/en_prtr.pdf)

74. In case that the name of the facility should be confidential the reporting format is presented in table 13. The geographical coordinates of the facility shall not be kept confidential in this case in order to enable the public to look at the total of industrial releases and off-site transfers in their neighbourhood.

Table 15: Confidentiality (example)

Name	Address	Geogra-phical co-ordinates	Pollutant no.	Pollutant	M/C/E	Method used	Quantity (total in kg/year)	Quantity (accidental in kg/year)	Reason for confi-dentiality
-	-	8.665055 48.576678	1	Methane (CH_4)	C	IPCC	550,000	-	

2. **PRTR – NBB**

75. The National Baseline Budget (NBB) and the PRTR aim both at the most accurate assessment of pollutants released into the environment. Their set-up and content are of similar characteristics; however, there are some discrepancies which are presented in table 14.

Table 16: E-PRTR/NBB comparison

Issue	NBB	PRTR
Geographical scope	Administrative regions located in drainage basins that outflow into the Mediterranean.	All regions and river basin districts
Source type	Point sources (industry and urban centres).	Industrial facilities and diffuse sources
Scope of point sources	All point sources irrespective of their capacity.	The facilities obliged to report under PRTR are those that exceed the capacity/activity thresholds described in the activities listed in Appendix 1of this document these facilities have also to report any transfers of waste off-site exceeding the specific thresholds and all pollutant released which exceed specific thresholds specified for each media - air, water and land in Appendix 2 of this document.
Media	Water and air	Amounts of pollutant releases to air, water and land as well as off-site transfers of waste and of pollutants in waste water
Emission scope	Direct emissions to drainage basins or into the sea.	Direct emissions and indirect emissions (going to an external treatment plant).
Sector categories (see Appendix X of this document)	Sectors according to LBS Protocol Annex I, 30 categories Subsectors: 97 categories	Annex I of the E-PRTR Regulation: 9 industrial sector categories and 65 categories in total
Groups of pollutants	Organohalogen compounds; Organophosphorus compounds; Organotin compounds; Polycyclic aromatic hydrocarbons; Heavy metals and compounds; Used lubricating oils; Radioactive substances; Biocides and their derivatives; Pathogenic microorganisms; Cyanides and fluorides; Acid or alkaline compounds; Compounds of nitrogen and phosphorus; SS, BOD, COD/TOC	Greenhouse gases Other gases Heavy metals Pesticides Chlorinated organic substances Other organic substances Inorganic substances
Method of quantification	Measurement of the concentration levels of emissions at the source and quantification using additional data on the source activity. Calculations of emissions based on emission factors and industrial activity rates, material flow, etc.	Measured (M): Release data are based on measurements. Additional calculations are needed to convert the results of measurements into annual release data. Calculated (C): Release data are based on calculations using activity data (fuel used, production rate, etc.) and emission factors or mass balances. Estimated (E): Release data are based on non-standardized estimations.

76. In principal, the PRTR system is focusing on relatively large point sources and on a more detailed inventory of pollutants (by including off-site transfers); on the other hand, some main pollutants for the assessment of water pollution i.e. BOD, suspended solids (SS) are covered by the NBB reporting requirements, but not by E-PRTR.

77. In order to get the necessary information for the assessment of pollutants releases into the Mediterranean environment, both NBB and PRTR should be used and harmonised to the largest possible extent by applying the following selection criteria:

1) To select/filter only regions and river basin districts located in drainage basins that outflow into the Mediterranean
2) To compare the sector and subsectors dictionaries under NBB and under PRTR in order to identify the corresponding source categories and to highlight consequently sectors/subsectors which are not fully matching (Appendix X)

    a) dictionary entries not corresponding to any coded item in any list should be left in the NBB dictionaries;
    b) the sector dictionaries are the union of the PRTR and NBB sector dictionaries;
    c) for a specific sector the subsectors dictionaries are the union of the PRTR and NBB subsectors dictionaries;

3. To gather all emission data from industrial facilities regardless of specific capacity thresholds set by the PRTR or, alternatively, ensure that data collected are representative of the total discharges from such sector/subsector at national level, i.e.:
    a) For NBB reporting purposes **w**hich include all emissions regardless of quantities discharged**,** it is recommended neither to adopt PRTR capacity thresholds nor to set national capacity thresholds;
    b) However, if national thresholds are set, to ensure that emissions gathered from each industrial sector/subsector in the country are representative of the total sector/subsector emissions in the country, i.e. they are at least 80% of the total emissions per sector/subsector. It is then up to each country to set such national capacity thresholds;

4. To compare the pollutant dictionaries under NBB and under PRTR in order to identify the corresponding loads of pollutants and to identify not matching pollutants:
    a) dictionary entries not corresponding to any coded item in any list should be left in the NBB dictionaries;
    b) the pollutant dictionaries in the NBB are the union of the PRTR and NBB pollutant dictionaries.

5. To gather all emission data from industrial facilities regardless of specific pollutant thresholds set in Appendix 2 or, alternatively, ensure that data collected are representative of the total discharges from such pollutants at national level, i.e.:

    a) For NBB reporting [aims gathering all pollutants loads, it is recommended neither to adopt PRTR pollutant thresholds nor to set national pollutant thresholds;
    b) However, if national pollutant thresholds are set, to ensure that pollutant emissions gathered in the country are representative of the total pollutant emissions in the country, i.e. they are at least 80% of the total emissions per pollutant. It is then up to each country to set such specific pollutant thresholds.

6. In order to assure the coherency among NBB data and PRTR it is proposed to use in the NBB the same codification of the method of estimation of emissions used in the PRTR. For the

sectors which do not allow the PRTR coding it is proposed to add a text field where the operator can draft the estimation method used.

3. AUTHORITIES REPORTING

3.1. General framework – NAP/H2020 indicators

78. NBB/PRTR Infosystem, as a database, can also facilitate the process of populating H2020/NAP indicators which were developed and agreed under the H2020 Initiative and ENI SEIS II Project.

79. After having accessed the reported data and checked its reliability from all relevant facilities the competent authorities should define their involvement in the reporting process and in particular the path towards a comprehensive and targeted report to the MEDPOL system in light of the NAP/H2020 indicators set. In doing so, the received information has to be focused on the priority industrial sectors which prevail in the Mediterranean region.

80. The major industrial sectors are:
1. Petroleum refineries
2. Food industries and food processing
3. Fertilizers and inorganic chemicals
4. Metallurgy
5. Leather processing
6. Cement
7. Textile dyeing
8. Paper and pulp
9. Organic chemicals
10. Energy production
11. Gas production
12. Pharmaceuticals

81. The grouping of the data in such a way that the envisaged NAP/H2020 indicators can be populated. These indicators focus not only on pressures to the environment (i.e. releases) but also on remediation measures (i.e. response indicators) taken so far to reduce the pollution loads (e.g. treatment installations, legal/administrative measures etc.).

82. The work on the preparation/updating of the NAP/H2020 indicators has resulted to the set presented in Table 15.

Table 17: NAP/H2020 indicators

No.	Title of indicator	Sub-indicators	Type
IND 6.1	Release of nutrients from industrial sectors	6.1.1. Total BOD load discharged from industrial installations to the Mediterranean marine environment. 6.1.2. Total Nitrogen load discharged from industrial installations to the Mediterranean marine environment 6.1.3. Total Phosphorus load discharged from industrial installations to the Mediterranean marine environment.	Pressure indicator

No.	Title of indicator	Sub-indicators	Type
IND 6.2	Release of toxic substances from industrial sectors	6.2.1. Total heavy metals load released from industrial installations to the Mediterranean marine environment. 6.2.2. Furans and dioxins load released from industrial installations to the Mediterranean marine environment. 6.2.3. Polycyclic aromatic hydrocarbons (PAH) load released from industrial installations to the Mediterranean marine environment. 6.2.4. Volatile organic compounds (VOC) load released from industrial installations to the Mediterranean marine environment.	Pressure indicator
IND 6.3	Industrial hazardous waste disposed in environmentally sound manner	6.3.1. Total quantity of generated hazardous waste from industrial installations. 6.3.2. Quantity of industrial hazardous waste disposed in environmentally sound manner relative to total quantity of generated hazardous waste from industrial installations.	Response indicator
IND 6.4	Compliance measures aiming at the reduction and/or elimination of pollutants generated by industrial sectors	6.4.1. Number of industrial installations reporting periodically loads of pollutants discharged to the marine and coastal environments relative to the total number of industrial installations. 6.4.2. Number of environmental inspections carried out by enforcement authorities in which industrial installations were found to be in breach of laws and regulations relative to the total number of executed inspections. 6.4.3. Number of eliminated hotspots identified in the updated NAPs relative to the 2001 and 2015 baselines.	Response indicator

NAP/H2020 reporting

83. In order to fulfil the reporting requirements associated with the NAP/H2020 indicators there are some methodological activities to be undertaken by the competent authorities (if not already applied) namely:

a. Define the river basin districts which directly/indirectly affect the Mediterranean environment;
b. Get the cumulative loads of the water pollutants referring to indicators 6.1 and 6.2;
c. Identify the areas from where air emissions are likely to influence the Mediterranean environment. In doing so, geographical and climatic considerations have to be considered i.e. the wind directions/intensities and the proximity to the Mediterranean coast;
d. Map all point sources within the river basin for which PRTR data exists;
e. Get the cumulative loads of the relevant air emissions referring to indicator 6.2;
f. Group all relevant loads as required by the indicator 6.3 (hazardous/non-hazardous waste).

84. These actions are also foreseen in the framework of the NBB preparation; that means that the reporting requirements for the indicators 6.1, 6.2 and 6.3 can be met by the authorities responsible for the NBB exercise.

85. Indicator 6.4, a response indicator, is focusing on mitigation measures of technical (treatment plants), regulatory/administrative (permitting/inspection) nature. That means that the authorities have to:

- Review/evaluate issued permits for “strategic” facilities i.e. for those which are considered, according to the PRTR data, as major pollutants
- Assess the already performed inspection reports by listing any interventions implied by the relevant authorities
- Report the administrative/technical measures taken by these facilities to improve their environmental performance i.e. revised permits with stricter emission limit values, treatment plants, recycling/prevention measures etc.

86. The format for meeting the reporting requirements of indicator 6.4.2 is presented in Appendix 9.

Appendix I
List of Activities

No	Activity	Capacity threshold
1.	Energy sector	
(a)	Mineral oil and gas refineries	*
(b)	Installations for gasification and liquefaction	*
(c)	Thermal power stations and other combustion installations	With a heat input of 50 megawatts (MW)
(d)	Coke ovens	*
(e)	Coal rolling mills	With a capacity of 1 tonne per hour
(f)	Installations for the manufacture of coal products and solid smokeless fuel	*
2.	Production and processing of metals	
(a)	Metal ore (including sulphide ore) roasting or sintering installations	*
(b)	Installations for the production of pig iron or steel (primary or secondary melting) including continuous casting	With a capacity of 2,5 tonnes per hour
(c)	Installations for the processing of ferrous metals: (i) Hot-rolling mills (ii) Smitheries with hammers (iii) Application of protective fused metal coats	With a capacity of 20 tonnes of crude steel per hour With an energy of 50 kilojoules per hammer, where the calorific power used exceeds 20 MW With an input of 2 tonnes of crude steel per hour
(d)	Ferrous metal foundries	With a production capacity of 20 tonnes per day
(e)	Installations: (i) For the production of non-ferrous crude metals from ore, concentrates or secondary raw materials by metallurgical, chemical or electrolytic processes (ii) For the smelting, including the alloying, of non-ferrous metals, including recovered products (refining, foundry casting, etc.)	* With a melting capacity of 4 tonnes per day for lead and cadmium or 20 tonnes per day for all other metals
(f)	Installations for surface treatment of metals and plastic materials using an electrolytic or chemical process	Where the volume of the treatment vats equals 30 m^3
3.	Mineral industry	
(a)	Underground mining and related operations	*
(b)	Opencast mining and quarrying	Where the surface of the area effectively under extractive operation equals 25 hectares
(c)	Installations for the production of: (i) Cement clinker in rotary kilns (ii) Lime in rotary kilns (iii) Cement clinker or lime in other furnaces	With a production capacity of 500 tonnes per day With a production capacity of 50 tonnes per day With a production capacity of 50 tonnes per day
(d)	Installations for the production of asbestos and the manufacture of asbestos-based products	*
(e)	Installations for the manufacture of glass, including glass fibre	With a melting capacity of 20 tonnes per day
(f)	Installations for melting mineral substances, including the production of mineral fibres	With a melting capacity of 20 tonnes per day
(g)	Installations for the manufacture of ceramic products by firing, in particular roofing tiles, bricks, refractory bricks, tiles, stoneware or porcelain	With a production capacity of 75 tonnes per day, or with a kiln capacity of 4 m3 and with a setting density per kiln of 300 kg/m3
4. (a)	Chemical industry Chemical installations for the production on an industrial scale of basic organic chemicals, such as: (i) Simple hydrocarbons (linear or cyclic, saturated or unsaturated, aliphatic or aromatic)	*

No	Activity	Capacity threshold
	(ii) Oxygen-containing hydrocarbons such as alcohols, aldehydes, ketones, carboxylic acids, esters, acetates, ethers, peroxides, epoxy resins (iii) Sulphurous hydrocarbons (iv) Nitrogenous hydrocarbons such as amines, amides, nitrous compounds, nitro compounds or nitrate com- pounds, nitriles, cyanates, isocyanates (v) Phosphorus-containing hydrocarbons (vi) Halogenic hydrocarbons (vii) Organometallic compounds (viii) Basic plastic materials (polymers, synthetic fibres and cellulose-based fibres) (ix) Synthetic rubbers (x) Dyes and pigments (xi) Surface-active agents and surfactants	
(b)	Chemical installations for the production on an industrial scale of basic inorganic chemicals, such as: (i) Gases, such as ammonia, chlorine or hydrogen chloride, fluorine or hydrogen fluoride, carbon oxides, sulphur com- pounds, nitrogen oxides, hydrogen, sulphur dioxide, carbonyl chloride (ii) Acids, such as chromic acid, hydrofluoric acid, phosphoric acid, nitric acid, hydrochloric acid, sulphuric acid, oleum, sulphurous acids (iii) Bases, such as ammonium hydroxide, potassium hydroxide, sodium hydroxide (iv) Salts, such as ammonium chloride, potassium chlorate, potassium carbonate, sodium carbonate, perborate, silver nitrate (v) Non-metals, metal oxides or other inorganic compounds such as calcium carbide, silicon, silicon carbide	*
(c)	Chemical installations for the production on an industrial scale of phosphorous-, nitrogen- or potassium-based fertilisers (simple or compound fertilisers)	*
(d)	Chemical installations for the production on an industrial scale of basic plant health products and of biocides	*
(e)	Installations using a chemical or biological process for the production on an industrial scale of basic pharmaceutical products	*
(f)	Installations for the production on an industrial scale of explosives and pyrotechnic products	*
5.	Waste and wastewater management	
(a)	Installations for the recovery or disposal of hazardous waste	Receiving 10 tonnes per day
(b)	Installations for the incineration of non-hazardous waste	With capacity of 3 tonnes per hour
(c)	Installations for the disposal of non-hazardous waste	With a capacity of 50 tonnes per day
(d)	Landfills	Receiving 10 tonnes per day or with a total capacity of 25 000 tonnes
(e)	Installations for the disposal or recycling of animal carcasses and animal waste	With a treatment capacity of 10 tonnes per day
(f)	Urban waste-water treatment plants	With a capacity of 100000 population equivalents
(g)	Independently operated industrial waste-water treatment plants which serve one or more activities of this annex	With a capacity of 10 000 m3 per day (4)
6.	Paper and wood production and processing	
(a)	Industrial plants for the production of pulp from timber or similar fibrous materials	*
(b)	Industrial plants for the production of paper and board and other primary wood products (such as chipboard, fibreboard and plywood)	With a production capacity of 20 tonnes per day
(c)	Industrial plants for the preservation of wood and wood products with chemicals	With a production capacity of 50 m3 per day
7.	Intensive livestock production and aquaculture	

No	Activity	Capacity threshold
(a)	Installations for the intensive rearing of poultry or pigs	(i) With 40 000 places for poultry (ii) With 2 000 places for production pigs (over 30 kg) (iii) With 750 places for sows
(b)	Intensive aquaculture	With a production capacity of 1 000 tonnes of fish or shellfish per year
No	Activity	Capacity threshold
8.	Animal and vegetable products from the food and beverage sector	
(a)	Slaughterhouses	With a carcass production capacity of 50 tonnes per day
(b)	Treatment and processing intended for the production of food and beverage products from: (i) Animal raw materials (other than milk) (ii) Vegetable raw materials	With a finished product production capacity of 75 tonnes per day With a finished product production capacity of 300 tonnes per day (average value on a quarterly basis)
(c)	Treatment and processing of milk	With a capacity to receive 200 tonnes of milk per day (average value on an annual basis)
9.	Other activities	
(a)	Plants for the pre-treatment (operations such as washing, bleaching, mercerisation) or dyeing of fibres or textiles	With a treatment capacity of 10 tonnes per day
(b)	Plants for the tanning of hides and skins	With a treatment capacity of 12 tonnes of finished product per day
(c)	Installations for the surface treatment of substances, objects or products using organic solvents, in particular for dressing, printing, coating, degreasing, waterproofing, sizing, painting, cleaning or impregnating	With a consumption capacity of 150 kg per hour or 200 tonnes per year
(d)	Installations for the production of carbon (hard-burnt coal) or electro-graphite by means of incineration or graphitisation	*
(e)	Installations for the building of, and painting or removal of paint from ships	With a capacity for ships 100 m long

*No threshold (any capacity)

Additional sector of activities deriving from Annex I, Section A of LBS Protocol which are mandatory for NBB reporting are:

- Harbor operations;
- The electronic industry
- Tourism;
- Agriculture;
- Transport and
- Works which cause physical alteration of the natural state of coastline.

Appendix II
List of Pollutants

No	CAS number	Pollutant (1)	Threshold for releases (column 1)		
			to air (column 1a) kg/year	to water (column 1b) kg/year	to land (column 1c) kg/year
1	74-82-8	Methane (CH_4)	100 000	— (2)	—
2	630-08-0	Carbon monoxide (CO)	500 000	—	—
3	124-38-9	Carbon dioxide (CO_2)	100 million	—	—
4		Hydro-fluorocarbons (HFCs) (3)	100	—	—
5	10024-97-	Nitrous oxide (N_2O)	10 000	—	—
6	7664-41-7	Ammonia (NH_3)	10 000	—	—
7		Non-methane volatile organic compounds (NMVOC)	100 000	—	—
8		Nitrogen oxides (NO_x/NO_2)	100 000	—	—
9		Perfluorocarbons (PFCs) (4)	100	—	—
10	2551-62-4	Sulphur hexafluoride (SF_6)	50	—	—
11		Sulphur oxides (SO_x/SO_2)	150 000	—	—
12		Total nitrogen	—	50 000	50 000
13		Total phosphorus	—	5 000	5 000
14		Hydrochlorofluorocarbons(HCFCs) (5)	1	—	—
15		Chlorofluorocarbons (CFCs) (6)	1	—	—
16		Halons (7)	1	—	—
17		Arsenic and compounds (as As) (8)	20	5	5
18		Cadmium and compounds (as Cd) (8)	10	5	5
19		Chromium and compounds (as Cr) (8)	100	50	50
20		Copper and compounds (as Cu) (8)	100	50	50
21		Mercury and compounds (as Hg) (8)	10	1	1
22		Nickel and compounds (as Ni) (8)	50	20	20
23		Lead and compounds (as Pb) (8)	200	20	20
24		Zinc and compounds (as Zn) (8)	200	100	100
25	15972-60-	Alachlor	—	1	1
26	309-00-2	Aldrin	1	1	1
27	1912-24-9	Atrazine	—	1	1
28	57-74-9	Chlordane	1	1	1
29	143-50-0	Chlordecone	1	1	1
30	470-90-6	Chlorfenvinphos	—	1	1
31	85535-84-	Chloro-alkanes, C_{10}-C_{13}	—	1	1

No	CAS number	Pollutant (1)	Threshold for releases (column 1)		
			to air (column 1a) kg/year	to water (column 1b) kg/year	to land (column 1c) kg/year
	8				
32	2921-88-2	Chlorpyrifos	—	1	1
33	50-29-3	DDT	1	1	1
34	107-06-2	1,2-dichloroethane (EDC)	1 000	10	10
35	75-09-2	Dichloromethane (DCM)	1 000	10	10
36	60-57-1	Dieldrin	1	1	1
37	330-54-1	Diuron	—	1	1
38	115-29-7	Endosulphan	—	1	1
39	72-20-8	Endrin	1	1	1
40		Halogenated organic compounds (as AOX) (9)	—	1 000	1 000
41	76-44-8	Heptachlor	1	1	1
42	118-74-1	Hexachlorobenzene (HCB)	10	1	1
43	87-68-3	Hexachlorobutadiene (HCBD)	—	1	1
44	608-73-1	1,2,3,4,5,6- hexachlorocyclohexane(HCH)	10	1	1
45	58-89-9	Lindane	1	1	1
46	2385-85-5	Mirex	1	1	1
47		PCDD + PCDF (dioxins + furans) (as Teq) (10)	0,0001	0,0001	0,0001
48	608-93-5	Pentachlorobenzene	1	1	1
49	87-86-5	Pentachlorophenol (PCP)	10	1	1
50	1336-36-3	Polychlorinated biphenyls (PCBs)	0,1	0,1	0,1
51	122-34-9	Simazine	—	1	1
52	127-18-4	Tetrachloroethylene (PER)	2 000	10	—
53	56-23-5	Tetrachloromethane (TCM)	100	1	—
54	12002-48-1	Trichlorobenzenes (TCBs) (all isomers)	10	1	—
55	71-55-6	1,1,1-trichloroethane	100	—	—
56	79-34-5	1,1,2,2-tetrachloroethane	50	—	—
57	79-01-6	Trichloroethylene	2 000	10	—

No	CAS number	Pollutant (1)	Threshold for releases (column 1)		
			to air (column 1a) kg/year	to water (column 1b) kg/year	to land (column 1c) kg/year
58	67-66-3	Trichloromethane	500	10	—
59	8001-35-2	Toxaphene	1	1	1
60	75-01-4	Vinyl chloride	1 000	10	10
61	120-12-7	Anthracene	50	1	1
62	71-43-2	Benzene	1 000	200 (as BTEX) (11)	200 (as BTEX) (11)
63		Brominated diphenylethers (PBDE) (12)	—	1	1
64		Nonylphenol and Nonylphenol ethoxylates (NP/NPEs)	—	1	1
65	100-41-4	Ethyl benzene	—	200 (as BTEX) (11)	200 (as BTEX) (11)
66	75-21-8	Ethylene oxide	1 000	10	10
67	34123-59-6	Isoproturon	—	1	1
68	91-20-3	Naphthalene	100	10	10
69		Organotin compounds (as total Sn)	—	50	50
70	117-81-7	Di-(2-ethyl hexyl) phthalate (DEHP)	10	1	1
71	108-95-2	Phenols (as total C) (13)	—	20	20
72		Polycyclic aromatic hydrocarbons (PAHs) (14)	50	5	5
73	108-88-3	Toluene	—	200 (as BTEX) (11)	200 (as BTEX) (11)
74		Tributyltin and compounds (15)	—	1	1
75		Triphenyltin and compounds (16)	—	1	1
76		Total organic carbon (TOC) (as total C or COD/3)	—	50 000	—
77	1582-09-8	Trifluralin	—	1	1
78	1330-20-7	Xylenes (17)	—	200 (as BTEX) (11)	200 (as BTEX) (11)
79		Chlorides (as total Cl)	—	2 million	2 million
80		Chlorine and inorganic com- pounds (as HCl)	10 000	—	—
1	1332-21-4	Asbestos	1	1	1
82		Cyanides (as total CN)	—	50	50
83		Fluorides (as total F)	—	2 000	2 000
84		Fluorine and inorganic com- pounds (as HF)	5 000	—	—
85	74-90-8	Hydrogen cyanide (HCN)	200	—	—
86		Particulate matter (PM_{10})	50 000	—	—

No	CAS number	Pollutant (1)	Threshold for releases (column 1)		
			to air (column 1a) kg/year	to water (column 1b) kg/year	to land (column 1c) kg/year
87	1806-26-4	Octylphenols and Octylphenol ethoxylates	—	1	—
88	206-44-0	Fluoranthene	—	1	—
89	465-73-6	Isodrin	—	1	—
90	36355-1-8	Hexabromobiphenyl	0.1	0,1	0,1
91	191-24-2	Benzo(g,h,i)perylene		1	
92					

(1) Unless otherwise specified any pollutant shall be reported as the total mass of that pollutant or, where the pollutant is a group of substances, as the total mass of the group.

(2) A hyphen (—) indicates that the parameter and medium in question do not trigger a reporting requirement.

(3) Total mass of hydrogen fluorocarbons: sum of HFC23, HFC32, HFC41, HFC4310mee, HFC125, HFC134, HFC134a, HFC152a, HFC143, HFC143a, HFC227ea, HFC236fa, HFC245ca, HFC365mfc.

(4) Total mass of perfluorocarbons: sum of CF_4, C_2F_6, C_3F_8, C_4F_{10}, c-C_4F_8, C_5F_{12}, C_6F_{14}.

(5) Total mass of substances including their isomers.

(6) Total mass of substances including their isomers.

(7) Total mass of substances including their isomers.

(8) All metals shall be reported as the total mass of the element in all chemical forms present in the release.

(9) Halogenated organic compounds which can be adsorbed to activated carbon expressed as chloride.

(10) Expressed as I-TEQ.

(11) Single pollutants are to be reported if the threshold for BTEX (the sum parameter of benzene, toluene, ethyl benzene, xylenes) is exceeded.

(12) Total mass of the following brominated diphenylethers: penta-BDE, octa-BDE and deca-BDE.

(13) Total mass of phenol and simple substituted phenols expressed as total carbon.

(14) Polycyclic aromatic hydrocarbons (PAHs) are to be measured for reporting of releases to air as benzo(a)pyrene (50-32-8), benzo(b)fluo- ranthene (205-99-2), benzo(k)fluoranthene (207-08-9), indeno(1,2,3-cd)pyrene (193-39-5).

(15) Total mass of tributyltin compounds, expressed as mass of tributyltin.

(16) Total mass of triphenyltin compounds, expressed as mass of triphenyltin.

(17) Total mass of xylene (ortho-xylene, meta-xylene, para-xylene).

Additional pollutants deriving from NBB reporting obligation:

- Biochemical Oxygen Demand (BOD_5);
- Chemical Oxygen Demand (COD) and,
- Suspended Solids (SS)

Appendix III
ISIC Codes

ISIC Codes

Section	Divisions	Description	LBS Protocol Activities (Annex I)
A	01–03	Agriculture, forestry and fishing	Agriculture (19)
B	05–09	Mining and quarrying	Mining (10)
C	10–33	Manufacturing	Fertilizer production (2) Production and formulation of biocides (3) Pharmaceutical industry (4) Paper and paper-pulp industry (6) Cement production (7) Tanning industry (8) Metal industry (9) Textile industry (13) Electronic industry (14) Other sectors of the organic chemical industry (16) Other sectors of the inorganic chemical industry (17) Food processing (21)
D	35	Electricity, gas, steam and air conditioning supply	
E	36–39	Water supply; sewerage, waste management and remediation	Treatment and disposal of domestic waste water (24)
F	41–43	Construction	
G	45–47	Wholesale and retail trade; repair of motor vehicles and motorcycles	
H	49–53	Transportation and storage	
I	55–56	Accommodation and food service activities	
J	58–63	Information and communication	
K	64–66	Financial and insurance activities	
L	68	Real estate activities	
M	69–75	Professional, scientific and technical activities	
N	77–82	Administrative and support service activities	
O	84	Public administration and defence; compulsory social security	
P	85	Education	
Q	86–88	Human health and social work activities	
R	90–93	Arts, entertainment and recreation	
S	94–96	Other service activities	
T	97–98	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use	
U	99	Activities of extraterritorial organizations and bodies	

Appendix IV
Indicative list of sector air pollutants

Indicative list of sector air pollutants

Pollutant no			1	2	3	4	5	6	7	8	9	10	11	14	15	16	17	18	19	20	21	22	23	24	26	28	29	33	34	35	36	39	41
		Pollutant name	Methane (CH_4)	Carbon monoxide (CO)	Carbon dioxide (CO_2)	Hydro-fluorocarbons (HFCs)	Nitrous oxide (N_2O)	Ammonia (NH_3)	Non-methane volatile organic	Nitrogen oxides (NO_x/NO_2)	Perfluorocarbons (PFCs)	Sulphur hexafluoride (SF_6)	Sulphur oxides (SO_x/SO_2)	Hydrochlorofluorocarbons	Chlorofluorocarbons (CFCs)	Halons	Arsenic and compounds (as As)	Cadmium and compounds (as Cd)	Chromium and compounds(as Cr)	Copper and compounds (as Cu)	Mercury and compounds (as Hg)	Nickel and compounds (as Ni)	Lead and compounds (as Pb)	Zinc and compounds (as Zn)	Aldrin	Chlordane	Chlordecone	DDT	1,2-dichloroethane (EDC)	Dichloromethane (DCM)	Dieldrin	Endrin	Heptachlor
no	b	activity																															
1		**Energy sector**																															
	(a)	Mineral oil and gas refineries	□	□	□	□	□	□	□	□			□	□			□	□	□	□	□	□	□	□									
	(b)	Installations for gasification and liquefaction	□	□	□	□	□	□	□	□			□	□			□	□	□	□	□	□	□	□									
	(c)	Thermal power stations and other combustion installations	□	□	□	□	□	□	□	□		□	□	□			□	□	□	□	□	□	□	□									
	(d)	Coke ovens	□	□	□			□	□	□			□				□	□	□	□	□	□	□	□									
	(e)	Coal rolling mills	□	□	□	□	□	□	□	□	□		□				□	□	□	□	□	□	□	□									
	(f)	Installations for the manufacture of coal products and solid smokeless fuel	□	□	□	□	□	□	□	□	□		□				□	□	□	□	□	□	□	□									
2		**Production and processing of metals**																															
	(a)	Metal ore (including sulphide ore) roasting or sintering installations	□	□	□		□	□	□	□			□				□	□	□	□	□	□	□	□									
	(b)	Installations for the production of pig iron or steel (primary or secondary melting) including continuous casting	□	□	□	□	□	□	□	□			□				□	□	□	□	□	□	□	□									

	(c)	Installations for the processing of ferrous metals	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□						□				
	(d)	Ferrous metal foundries	□	□	□			□	□	□			□		□		□	□	□	□	□	□	□	□										
	(e)	Installations for the production of non-ferrous crude metals from ore, concentrates or secondary raw materials by metallurgical, chemical or electrolytic processes and for the smelting, including the alloying, of non-ferrous metals, including recovered products (refining, foundry casting, etc.)	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□						□				
	(f)	Installations for surface treatment of metals and plastic materials using an electrolytic or chemical process	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□						□				

Pollutant no			42	44	45	46	47	48	49	50	52	53	54	55	56	57	58	59	60	61	62	66	68	70	72	80	81	84	85	86	90
		Pollutant name	Hexachlorobenzene (HCB)	1,2,3,4,5, 6 -hexachlorocyclohexane	Lindane	Mirex	PCDD + PCDF (dioxins + furans)	Pentachlorobenzene	Pentachlorophenol (PCP)	Polychlorinated biphenyls (PCBs)	Tetrachloroethylene (PER)	Tetrachloromethane (TCM)	Trichlorobenzenes (TCBs) (all	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	Trichloroethylene	Trichloromethane	Toxaphene	Vinyl chloride	Anthracene	Benzene	Ethylene oxide	Naphthalene	Di-(2-ethyl hexyl) phthalate (DEHP)	Polycyclic aromatic hydrocarbons	Chlorine and inorganic compounds	Asbestos	Fluorine and inorganic compounds	Hydrogen cyanide (HCN)	Particulate matter (PM_{10})	Hexabromobiphenyl
no	b	activity																													
1		**Energy sector**																													
	(a)	Mineral oil and gas refineries																			□				□	□				□	
	(b)	Installations for gasification and liquefaction																			□				□	□				□	
	(c)	Thermal power stations and other combustion installations					□									□					□				□	□				□	
	(d)	Coke ovens					□													□	□		□		□				□	□	
	(e)	Coal rolling mills																			□				□	□				□	
	(f)	Installations for the manufacture of coal products and solid smokeless fuel																			□				□	□				□	
2		**Production and processing of metals**																													
	(a)	Metal ore (including sulphide ore) roasting or sintering installations					□	□	□	□					□						□				□	□		□	□	□	
	(b)	Installations for the production of pig iron or steel (primary or secondary melting) including continuous casting					□	□	□	□					□					□	□		□		□	□		□	□	□	
	(c)	Installations for the processing of ferrous metals	□				□	□	□	□	□					□					□				□	□		□	□	□	
	(d)	Ferrous metal foundries					□													□	□		□		□	□		□	□	□	
	(e)	Installations for the production of non-ferrous crude metals from ore, concentrates or secondary raw materials by metallurgical, chemical or electrolytic processes and for the	□				□	□	□	□	□					□					□				□	□		□	□	□	

Pollutant no			42	44	45	46	47	48	49	50	52	53	54	55	56	57	58	59	60	61	62	66	68	70	72	80	81	84	85	86	90
		Pollutant name	Hexachlorobenzene (HCB)	1,2,3,4,5, 6 -hexachlorocyclohexane	Lindane	Mirex	PCDD + PCDF (dioxins + furans)	Pentachlorobenzene	Pentachlorophenol (PCP)	Polychlorinated biphenyls (PCBs)	Tetrachloroethylene (PER)	Tetrachloromethane (TCM)	Trichlorobenzenes (TCBs) (all	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	Trichloroethylene	Trichloromethane	Toxaphene	Vinyl chloride	Anthracene	Benzene	Ethylene oxide	Naphthalene	Di-(2-ethyl hexyl) phthalate (DEHP)	Polycyclic aromatic hydrocarbons	Chlorine and inorganic compounds	Asbestos	Fluorine and inorganic compounds	Hydrogen cyanide (HCN)	Particulate matter (PM_{10})	Hexabromobiphenyl
		smelting, including the alloying, of non-ferrous metals, including recovered products (refining, foundry casting, etc.)																													
	(f)	Installations for surface treatment of metals and plastic materials using an electrolytic or chemical process	☐				☐	☐	☐	☐	☐					☐					☐			☐	☐	☐		☐	☐	☐	☐

Pollutant no			1	2	3	4	5	6	7	8	9	10	11	14	15	16	17	18	19	20	21	22	23	24	26	28	29	33	34	35	36	39	41
		Pollutant name	Methane (CH_4)	Carbon monoxide (CO)	Carbon dioxide (CO_2)	Hydro-fluorocarbons (HFCs)	Nitrous oxide (N_2O)	Ammonia (NH_3)	Non-methane volatile organic	Nitrogen oxides (NO_x/NO_2)	Perfluorocarbons (PFCs)	Sulphur hexafluoride (SF_6)	Sulphur oxides (SO_x/SO_2)	Hydrochlorofluorocarbons (HCFCs)	Chlorofluorocarbons (CFCs)	Halons	Arsenic and compounds (as As)	Cadmium and compounds (as Cd)	Chromium and compounds(as Cr)	Copper and compounds (as Cu)	Mercury and compounds (as Hg)	Nickel and compounds (as Ni)	Lead and compounds (as Pb)	Zinc and compounds (as Zn)	Aldrin	Chlordane	Chlordecone	DDT	1,2-dichloroethane (EDC)	Dichloromethane (DCM)	Dieldrin	Endrin	Heptachlor
no	b	activity																															
3		**Mineral industry**																															
	(a)	Underground mining and related operations	□	□	□					□			□				□	□	□	□		□	□	□								
	(b)	Opencast mining and quarrying	□	□	□					□			□				□	□	□	□		□	□	□								
	(c)	Installations for the production of cement clinker in rotary kilns, lime in rotary kilns, cement clinker or lime in other furnaces		□	□		□	□	□	□			□				□	□	□	□	□	□	□	□								
	(d)	Installations for the production of asbestos and the manufacture of asbestos-based products																															
	(e)	Installations for the manufacture of glass, including glass fibre		□	□	□	□	□	□	□			□				□	□	□	□	□	□	□	□								
	(f)	Installations for melting mineral substances, including the production of mineral fibres		□	□	□	□	□	□	□			□				□	□	□	□	□	□	□	□								
	(g)	Installations for the manufacture of ceramic products by firing, in particular roofing tiles, bricks,		□	□				□	□			□				□	□	□	□	□	□	□	□								

Pollutant no			1	2	3	4	5	6	7	8	9	10	11	14	15	16	17	18	19	20	21	22	23	24	26	28	29	33	34	35	36	39	41
		Pollutant name	Methane (CH_4)	Carbon monoxide (CO)	Carbon dioxide (CO_2)	Hydro-fluorocarbons (HFCs)	Nitrous oxide (N_2O)	Ammonia (NH_3)	Non-methane volatile organic	Nitrogen oxides (NO_x/NO_2)	Perfluorocarbons (PFCs)	Sulphur hexafluoride (SF_6)	Sulphur oxides (SO_x/SO_2)	Hydrochlorofluorocarbons (HCFCs)	Chlorofluorocarbons (CFCs)	Halons	Arsenic and compounds (as As)	Cadmium and compounds (as Cd)	Chromium and compounds(as Cr)	Copper and compounds (as Cu)	Mercury and compounds (as Hg)	Nickel and compounds (as Ni)	Lead and compounds (as Pb)	Zinc and compounds (as Zn)	Aldrin	Chlordane	Chlordecone	DDT	1,2-dichloroethane (EDC)	Dichloromethane (DCM)	Dieldrin	Endrin	Heptachlor
		refractory bricks, tiles, stoneware or porcelain																															
4		**Chemical industry**																															
	(a)	Chemical installations for the production on an industrial scale of basic organic chemicals	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□
	(b)	Chemical installations for the production on an industrial scale of basic inorganic chemicals	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□					□	□			
	(c)	Chemical installations for the production on an industrial scale of phosphorous-, nitrogen- or potassium-based fertilizers (simple or compound fertilizers)	□	□	□	□	□	□	□	□	□	□	□				□	□	□	□	□	□	□	□					□	□			
	(d)	Chemical installations for the production on an industrial scale of basic plant health products and of biocides			□	□	□	□	□	□			□				□	□	□	□	□	□	□	□					□	□	□	□	□
	(e)	Installations using a chemical or biological process for the production on an			□	□	□	□	□	□			□				□	□	□	□	□	□	□	□					□				

Pollutant no			1	2	3	4	5	6	7	8	9	10	11	14	15	16	17	18	19	20	21	22	23	24	26	28	29	33	34	35	36	39	41
		Pollutant name	Methane (CH_4)	Carbon monoxide (CO)	Carbon dioxide (CO_2)	Hydro-fluorocarbons (HFCs)	Nitrous oxide (N_2O)	Ammonia (NH_3)	Non-methane volatile organic	Nitrogen oxides (NO_x/NO_2)	Perfluorocarbons (PFCs)	Sulphur hexafluoride (SF_6)	Sulphur oxides (SO_x/SO_2)	Hydrochlorofluorocarbons (HCFCs)	Chlorofluorocarbons (CFCs)	Halons	Arsenic and compounds (as As)	Cadmium and compounds (as Cd)	Chromium and compounds(as Cr)	Copper and compounds (as Cu)	Mercury and compounds (as Hg)	Nickel and compounds (as Ni)	Lead and compounds (as Pb)	Zinc and compounds (as Zn)	Aldrin	Chlordane	Chlordecone	DDT	1,2-dichloroethane (EDC)	Dichloromethane (DCM)	Dieldrin	Endrin	Heptachlor
		industrial scale of basic pharmaceutical products																															
	(f)	Installations for the production on an industrial scale of explosives and pyrotechnic products			☐	☐	☐	☐	☐	☐			☐				☐	☐	☐	☐	☐	☐	☐	☐					☐	☐			

Pollutant no			42	44	45	46	47	48	49	50	52	53	54	55	56	57	58	59	60	61	62	66	68	70	72	80	81	84	85	86	90
		Pollutant name	Hexachlorobenzene (HCB)	1,2,3,4,5, 6 -hexachlorocyclohexane (HCH)	Lindane	Mirex	PCDD + PCDF (dioxins + furans) (as Teq)	Pentachlorobenzene	Pentachlorophenol (PCP)	Polychlorinated biphenyls (PCBs)	Tetrachloroethylene (PER)	Tetrachloromethane (TCM)	Trichlorobenzenes (TCBs) (all isomers)	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	Trichloroethylene	Trichloromethane	Toxaphene	Vinyl chloride	Anthracene	Benzene	Ethylene oxide	Naphthalene	Di-(2-ethyl hexyl) phthalate (DEHP)	Polycyclic aromatic hydrocarbons (PAHs)	Chlorine and inorganic compounds (as HCl)	Asbestos	Fluorine and inorganic compounds (as)	Hydrogen cyanide (HCN)	Particulate matter (PM_{10})	Hexabromobiphenyl
no	b	activity																													
3		**Mineral industry**																													
	(a)	Underground mining and related operations																								□				□	
	(b)	Opencast mining and quarrying																								□				□	
	(c)	Installations for the production of cement clinker in rotary kilns, lime in rotary kilns, cement clinker or lime in other furnaces					□			□										□	□		□	□	□	□		□	□	□	
	(d)	Installations for the production of asbestos and the manufacture of asbestos-based products														□										□	□			□	
	(e)	Installations for the manufacture of glass, including glass fibre					□			□											□				□	□		□		□	
	(f)	Installations for melting mineral substances, including the production of mineral fibres					□			□											□				□	□		□		□	
	(g)	Installations for the manufacture of ceramic products by firing, in particular roofing tiles, bricks, refractory bricks, tiles, stoneware or porcelain																			□				□	□		□		□	

Pollutant no			42	44	45	46	47	48	49	50	52	53	54	55	56	57	58	59	60	61	62	66	68	70	72	80	81	84	85	86	90
		Pollutant name	Hexachlorobenzene (HCB)	1,2,3,4,5, 6 -hexachlorocyclohexane (HCH)	Lindane	Mirex	PCDD + PCDF (dioxins + furans) (as Teq)	Pentachlorobenzene	Pentachlorophenol (PCP)	Polychlorinated biphenyls (PCBs)	Tetrachloroethylene (PER)	Tetrachloromethane (TCM)	Trichlorobenzenes (TCBs) (all isomers)	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	Trichloroethylene	Trichloromethane	Toxaphene	Vinyl chloride	Anthracene	Benzene	Ethylene oxide	Naphthalene	Di-(2-ethyl hexyl) phthalate (DEHP)	Polycyclic aromatic hydrocarbons (PAHs)	Chlorine and inorganic compounds (as HCl)	Asbestos	Fluorine and inorganic compounds (as F)	Hydrogen cyanide (HCN)	Particulate matter (PM_{10})	Hexabromobiphenyl
4		**Chemical industry**																													
	(a)	Chemical installations for the production on an industrial scale of basic organic chemicals	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□		□	□	□	
	(b)	Chemical installations for the production on an industrial scale of basic inorganic chemicals	□	□			□	□	□		□	□	□	□	□	□	□		□		□				□	□		□	□	□	
	(c)	Chemical installations for the production on an industrial scale of phosphorous-, nitrogen- or potassium-based fertilizers (simple or compound fertilizers)	□	□			□	□	□		□	□	□	□	□	□	□		□							□				□	
	(d)	Chemical installations for the production on an industrial scale of basic plant health products and of biocides			□	□		□							□	□		□	□	□		□	□	□		□				□	
	(e)	Installations using a chemical or biological process for the production on an industrial scale of basic pharmaceutical products					□	□			□	□			□	□	□		□					□		□			□	□	
	(f)	Installations for the production on an industrial scale of explosives and pyrotechnic products						□								□			□							□				□	

Pollutant no			1	2	3	4	5	6	7	8	9	10	11	14	15	16	17	18	19	20	21	22	23	24	26	28	29	33	34	35	36	39	41
		Pollutant name	Methane (CH_4)	Carbon monoxide (CO)	Carbon dioxide (CO_2)	Hydro-fluorocarbons (HFCs)	Nitrous oxide (N_2O)	Ammonia (NH_3)	Non-methane volatile organic	Nitrogen oxides (NO_x/NO_2)	Perfluorocarbons (PFCs)	Sulphur hexafluoride (SF_6)	Sulphur oxides (SO_x/SO_2)	Hydrochlorofluorocarbons (HCFCs)	Chlorofluorocarbons (CFCs)	Halons	Arsenic and compounds (as As)	Cadmium and compounds (as Cd)	Chromium and compounds(as Cr)	Copper and compounds (as Cu)	Mercury and compounds (as Hg)	Nickel and compounds (as Ni)	Lead and compounds (as Pb)	Zinc and compounds (as Zn)	Aldrin	Chlordane	Chlordecone	DDT	1,2-dichloroethane (EDC)	Dichloromethane (DCM)	Dieldrin	Endrin	Heptachlor
no	b	activity																															
5		**Waste and wastewater management**																															
	(a)	Installations for the disposal or recovery of hazardous waste	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□						□	□	□	□
	(b)	Installations for the incineration of non-hazardous waste	□	□	□		□	□	□	□			□				□	□	□	□	□	□	□	□									
	(c)	Installations for the disposal of non-hazardous waste	□		□	□	□	□	□	□		□					□	□	□	□	□	□	□	□									
	(d)	Landfills	□	□	□		□	□		□			□				□	□	□	□	□	□		□									
	(e)	Installations for the disposal or recycling of animal carcasses and animal waste	□		□	□		□		□			□																				
	(f)	Urban waste-water treatment plants	□	□	□		□	□	□	□			□																□	□			
	(g)	Independently operated industrial waste-water treatment plants which serve one or more activities	□	□	□	□	□	□	□	□	□	□	□																				
6		**Paper and wood production and processing**																															

Pollutant no			1	2	3	4	5	6	7	8	9	10	11	14	15	16	17	18	19	20	21	22	23	24	26	28	29	33	34	35	36	39	41
		Pollutant name	Methane (CH_4)	Carbon monoxide (CO)	Carbon dioxide (CO_2)	Hydro-fluorocarbons (HFCs)	Nitrous oxide (N_2O)	Ammonia (NH_3)	Non-methane volatile organic	Nitrogen oxides (NO_x/NO_2)	Perfluorocarbons (PFCs)	Sulphur hexafluoride (SF_6)	Sulphur oxides (SO_x/SO_2)	Hydrochlorofluorocarbons (HCFCs)	Chlorofluorocarbons (CFCs)	Halons	Arsenic and compounds (as As)	Cadmium and compounds (as Cd)	Chromium and compounds(as Cr)	Copper and compounds (as Cu)	Mercury and compounds (as Hg)	Nickel and compounds (as Ni)	Lead and compounds (as Pb)	Zinc and compounds (as Zn)	Aldrin	Chlordane	Chlordecone	DDT	1,2-dichloroethane (EDC)	Dichloromethane (DCM)	Dieldrin	Endrin	Heptachlor
	(a)	Industrial plants for the production of pulp from timber or similar fibrous materials	□	□	□	□	□	□	□	□			□				□	□	□	□	□	□	□	□									
	(b)	Industrial plants for the production of paper and board and other primary wood products (such as chipboard, fibreboard and plywood)	□	□	□	□	□	□	□	□			□				□	□		□	□	□	□	□									
	(c)	Industrial plants for the preservation of wood and wood products with chemicals						□	□								□		□	□													
7		**Intensive livestock production and aquaculture**																															
	(a)	Installations for the intensive rearing of poultry or pigs	□				□	□																									
	(b)	Intensive aquaculture																															

Pollutant no			42	44	45	46	47	48	49	50	52	53	54	55	56	57	58	59	60	61	62	66	68	70	72	80	81	84	85	86	90
		Pollutant name	Hexachlorobenzene (HCB)	1,2,3,4,5, 6 -hexachlorocyclohexane	Lindane	Mirex	PCDD + PCDF (dioxins + furans) (as	Pentachlorobenzene	Pentachlorophenol (PCP)	Polychlorinated biphenyls (PCBs)	Tetrachloroethylene (PER)	Tetrachloromethane (TCM)	Trichlorobenzenes (TCBs) (all	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	Trichloroethylene	Trichloromethane	Toxaphene	Vinyl chloride	Anthracene	Benzene	Ethylene oxide	Naphthalene	Di-(2-ethyl hexyl) phthalate (DEHP)	Polycyclic aromatic hydrocarbons	Chlorine and inorganic compounds (as	Asbestos	Fluorine and inorganic compounds (as	Hydrogen cyanide (HCN)	Particulate matter (PM_{10})	Hexabromobiphenyl
no	b	activity																													
5		**Waste and wastewater management**																													
	(a)	Installations for the disposal or recovery of hazardous waste	□	□			□	□			□	□	□		□	□	□		□		□	□	□	□	□	□		□	□	□	
	(b)	Installations for the incineration of non-hazardous waste	□				□	□			□					□					□				□	□		□		□	
	(c)	Installations for the disposal of non-hazardous waste	□				□	□				□		□																□	
	(d)	Landfills	□				□																							□	
	(e)	Installations for the disposal or recycling of animal carcasses and animal waste					□	□																	□					□	
	(f)	Urban waste-water treatment plants	□					□			□	□		□		□	□				□										
	(g)	Independently operated industrial wastewater treatment plants which serve one or more activities						□			□	□	□	□		□	□				□				□	□		□	□		
6		**Paper and wood production and processing**																													
	(a)	Industrial plants for the production of pulp from timber or similar fibrous materials					□				□					□	□				□					□		□		□	
	(b)	Industrial plants for the production of paper and board					□				□					□	□				□			□		□		□		□	

Pollutant no			42	44	45	46	47	48	49	50	52	53	54	55	56	57	58	59	60	61	62	66	68	70	72	80	81	84	85	86	90
		Pollutant name	Hexachlorobenzene (HCB)	1,2,3,4,5, 6 -hexachlorocyclohexane	Lindane	Mirex	PCDD + PCDF (dioxins + furans) (as	Pentachlorobenzene	Pentachlorophenol (PCP)	Polychlorinated biphenyls (PCBs)	Tetrachloroethylene (PER)	Tetrachloromethane (TCM)	Trichlorobenzenes (TCBs) (all	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	Trichloroethylene	Trichloromethane	Toxaphene	Vinyl chloride	Anthracene	Benzene	Ethylene oxide	Naphthalene	Di-(2-ethyl hexyl) phthalate (DEHP)	Polycyclic aromatic hydrocarbons	Chlorine and inorganic compounds (as	Asbestos	Fluorine and inorganic compounds (as	Hydrogen cyanide (HCN)	Particulate matter (PM_{10})	Hexabromobiphenyl
		and other primary wood products (such as chipboard, fibreboard and plywood)																													
	(c)	Industrial plants for the preservation of wood and wood products with chemicals																		☐	☐		☐		☐					☐	
7		**Intensive livestock production and aquaculture**																													
	(a)	Installations for the intensive rearing of poultry or pigs																												☐	
	(b)	Intensive aquaculture																													

Pollutant no			1	2	3	4	5	6	7	8	9	10	11	14	15	16	17	18	19	20	21	22	23	24	26	28	29	33	34	35	36	39	41
		Pollutant name	Methane (CH_4)	Carbon monoxide (CO)	Carbon dioxide (CO_2)	Hydro-fluorocarbons (HFCs)	Nitrous oxide (N_2O)	Ammonia (NH_3)	Non-methane volatile organic compounds (NMVOC)	Nitrogen oxides (NO_x/NO_2)	Perfluorocarbons (PFCs)	Sulphur hexafluoride (SF_6)	Sulphur oxides (SO_x/SO_2)	Hydrochlorofluorocarbons (HCFCs)	Chlorofluorocarbons (CFCs)	Halons	Arsenic and compounds (as As)	Cadmium and compounds (as Cd)	Chromium and compounds (as Cr)	Copper and compounds (as Cu)	Mercury and compounds (as Hg)	Nickel and compounds (as Ni)	Lead and compounds (as Pb)	Zinc and compounds (as Zn)	Aldrin	Chlordane	Chlordecone	DDT	1,2-dichloroethane (EDC)	Dichloromethane (DCM)	Dieldrin	Endrin	Heptachlor
no	b	activity																															
8		**Animal and vegetable products from the food and beverage sector**																															
	(a)	Slaughterhouses	□	□	□	□	□	□	□	□			□				□	□			□	□								□			
	(b)	Treatment and processing intended for the production of food and beverage products from animal raw materials (other than milk) and vegetable raw materials	□	□	□	□	□	□	□	□			□				□	□			□	□								□			
	(c)	Treatment and processing of milk	□	□	□	□	□	□	□	□			□				□	□			□	□								□			
9		**Other activities**																															
	(a)	Plants for the pretreatment (operations such as washing, bleaching, mercerization) or dyeing of fibres or textiles		□	□			□	□	□			□																				
	(b)	Plants for the tanning of hides and skins			□			□	□	□																				□			

Pollutant no			1	2	3	4	5	6	7	8	9	10	11	14	15	16	17	18	19	20	21	22	23	24	26	28	29	33	34	35	36	39	41
		Pollutant name	Methane (CH_4)	Carbon monoxide (CO)	Carbon dioxide (CO_2)	Hydro-fluorocarbons (HFCs)	Nitrous oxide (N_2O)	Ammonia (NH_3)	Non-methane volatile organic compounds (NMVOC)	Nitrogen oxides (NO_x/NO_2)	Perfluorocarbons (PFCs)	Sulphur hexafluoride (SF_6)	Sulphur oxides (SO_x/SO_2)	Hydrochlorofluorocarbons (HCFCs)	Chlorofluorocarbons (CFCs)	Halons	Arsenic and compounds (as As)	Cadmium and compounds (as Cd)	Chromium and compounds (as Cr)	Copper and compounds (as Cu)	Mercury and compounds (as Hg)	Nickel and compounds (as Ni)	Lead and compounds (as Pb)	Zinc and compounds (as Zn)	Aldrin	Chlordane	Chlordecone	DDT	1,2-dichloroethane (EDC)	Dichloromethane (DCM)	Dieldrin	Endrin	Heptachlor
	(c)	Installations for the surface treatment of substances, objects or products using organic solvents, in particular for dressing, printing, coating, degreasing, waterproofing, sizing, painting, cleaning or impregnating		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐				☐	☐	☐	☐	☐	☐	☐	☐					☐	☐			
	(d)	Installations for the production of carbon (hard-burnt coal) or electro-graphite by means of incineration or graphitization		☐					☐	☐			☐							☐	☐		☐										
	(e)	Installations for the building of, and painting or removal of paint from ships		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐				☐	☐	☐	☐	☐	☐	☐	☐					☐	☐			

Pollutant no			42	44	45	46	47	48	49	50	52	53	54	55	56	57	58	59	60	61	62	66	68	70	72	80	81	84	85	86	90
		Pollutant name	Hexachlorobenzene (HCB)	1,2,3,4,5, 6 -hexachlorocyclohexane	Lindane	Mirex	PCDD + PCDF (dioxins + furans) (as	Pentachlorobenzene	Pentachlorophenol (PCP)	Polychlorinated biphenyls (PCBs)	Tetrachloroethylene (PER)	Tetrachloromethane (TCM)	Trichlorobenzenes (TCBs) (all isomers)	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	Trichloroethylene	Trichloromethane	Toxaphene	Vinyl chloride	Anthracene	Benzene	Ethylene oxide	Naphthalene	Di-(2-ethyl hexyl) phthalate (DEHP)	Polycyclic aromatic hydrocarbons	Chlorine and inorganic compounds (as	Asbestos	Fluorine and inorganic compounds (as	Hydrogen cyanide (HCN)	Particulate matter (PM_{10})	Hexabromobiphenyl
no	b	activity																													
8		**Animal and vegetable products from the food and beverage sector**																													
	(a)	Slaughterhouses					☐	☐																		☐				☐	
	(b)	Treatment and processing intended for the production of food and beverage products from animal raw materials (other than milk) and vegetable raw materials					☐	☐																		☐				☐	
	(c)	Treatment and processing of milk					☐	☐																		☐				☐	
9		**Other activities**																													
	(a)	Plants for the pre-treatment (operations such as washing, bleaching, mercerization) or dyeing of fibres or textiles									☐					☐								☐					☐	☐	
	(b)	Plants for the tanning of hides and skins									☐																				
	(c)	Installations for the surface treatment of substances, objects or products using organic solvents, in particular for dressing, printing, coating, degreasing, waterproofing, sizing, painting, cleaning or impregnating	☐	☐			☐	☐	☐		☐	☐	☐	☐		☐	☐				☐			☐	☐	☐				☐	

Pollutant no			42	44	45	46	47	48	49	50	52	53	54	55	56	57	58	59	60	61	62	66	68	70	72	80	81	84	85	86	90
		Pollutant name	Hexachlorobenzene (HCB)	1,2,3,4,5, 6 -hexachlorocyclohexane	Lindane	Mirex	PCDD + PCDF (dioxins + furans) (as	Pentachlorobenzene	Pentachlorophenol (PCP)	Polychlorinated biphenyls (PCBs)	Tetrachloroethylene (PER)	Tetrachloromethane (TCM)	Trichlorobenzenes (TCBs) (all isomers)	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	Trichloroethylene	Trichloromethane	Toxaphene	Vinyl chloride	Anthracene	Benzene	Ethylene oxide	Naphthalene	Di-(2-ethyl hexyl) phthalate (DEHP)	Polycyclic aromatic hydrocarbons	Chlorine and inorganic compounds (as	Asbestos	Fluorine and inorganic compounds (as	Hydrogen cyanide (HCN)	Particulate matter (PM_{10})	Hexabromobiphenyl
	(d)	Installations for the production of carbon (hard-burnt coal) or electro-graphite by means of incineration or graphitization																			□				□			□		□	
	(e)	Installations for the building of, and painting or removal of paint from ships					□			□				□		□	□				□			□	□	□		□		□	

Appendix V
Indicative list of sector water pollutants*

Indicative list of sector water pollutants*

Pollutant no			12	13	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
		Pollutant name	Total nitrogen	Total phosphorus	Arsenic and compounds (as	Cadmium and compounds	Chromium and	Copper and compounds (as	Mercury and compounds (as	Nickel and compounds (as	Lead and compounds (as	Zinc and compounds (as	Alachlor	Aldrin	Atrazine	Chlordane	Chlordecone	Chlorfenvinphos	Chloro-alkanes, C_{10}-C_{13}	Chlorpyrifos	DDT	1,2-dichloroethane (EDC)	Dichloromethane (DCM)	Dieldrin	Diuron	Endosulphan	Endrin	Halogenated organic	Heptachlor	Hexachlorobenzene (HCB)	Hexachlorobutadiene	1,2,3,4,5, 6 -	Lindane	Mirex	PCDD + PCDF (dioxins +	Pentachlorobenzene	Pentachlorophenol (PCP)	Polychlorinated biphenyls
no	b	activity																																				
1		**Energy sector**																																				
	(a)	Mineral oil and gas refineries	□	□	□	□	□	□	□	□	□	□											□					□							□	□		
	(b)	Installations for gasification and liquefaction	□	□	□	□	□	□	□	□	□	□											□					□							□	□		
	(c)	Thermal power stations and other combustion installations	□	□	□	□	□	□	□	□	□	□																□							□			
	(d)	Coke ovens	□	□	□				□		□																	□							□		□	
	(e)	Coal rolling mills																																				
	(f)	Installations for the manufacture of coal products and solid smokeless fuel	□	□	□	□	□	□	□	□	□	□							□				□					□										
2		**Production and processing of metals**																																				

Pollutant no			12	13	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
		Pollutant name	Total nitrogen	Total phosphorus	Arsenic and compounds (as	Cadmium and compounds	Chromium and	Copper and compounds (as	Mercury and compounds (as	Nickel and compounds (as	Lead and compounds (as	Zinc and compounds (as	Alachlor	Aldrin	Atrazine	Chlordane	Chlordecone	Chlorfenvinphos	Chloro-alkanes, C_{10}-C_{13}	Chlorpyrifos	DDT	1,2-dichloroethane (EDC)	Dichloromethane (DCM)	Dieldrin	Diuron	Endosulphan	Endrin	Halogenated organic	Heptachlor	Hexachlorobenzene (HCB)	Hexachlorobutadiene	1,2,3,4,5, 6 -	Lindane	Mirex	PCDD + PCDF (dioxins +	Pentachlorobenzene	Pentachlorophenol (PCP)	Polychlorinated biphenyls
	(a)	Metal ore (including sulphide ore) roasting or sintering installations	□	□	□	□	□	□	□	□	□	□																□										
	(b)	Installations for the production of pig iron or steel (primary or secondary melting) including continuous casting	□	□	□	□	□	□	□	□	□	□																□										
	(c)	Installations for the processing of ferrous metals	□	□	□	□	□	□	□	□	□	□																□										
	(d)	Ferrous metal foundries	□	□	□	□	□	□	□	□	□	□																										
	(e)	Installations for the production of non-ferrous crude metals from ore, concentrates or secondary raw materials by	□	□	□	□	□	□	□	□	□	□																□										

Pollutant no			12	13	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
		Pollutant name	Total nitrogen	Total phosphorus	Arsenic and compounds (as	Cadmium and compounds	Chromium and	Copper and compounds (as	Mercury and compounds (as	Nickel and compounds (as	Lead and compounds (as	Zinc and compounds (as	Alachlor	Aldrin	Atrazine	Chlordane	Chlordecone	Chlorfenvinphos	Chloro-alkanes, C_{10}-C_{13}	Chlorpyrifos	DDT	1,2-dichloroethane (EDC)	Dichloromethane (DCM)	Dieldrin	Diuron	Endosulphan	Endrin	Halogenated organic	Heptachlor	Hexachlorobenzene (HCB)	Hexachlorobutadiene	1,2,3,4,5, 6 -	Lindane	Mirex	PCDD + PCDF (dioxins +	Pentachlorobenzene	Pentachlorophenol (PCP)	Polychlorinated biphenyls
		metallurgical, chemical or electrolytic processes and for the smelting, including the alloying, of non-ferrous metals, including recovered products (refining, foundry casting, etc.)																																				
	(f)	Installations for surface treatment of metals and plastic materials using an electrolytic or chemical process	□	□	□	□	□	□	□	□	□	□																□										

Pollutant no			51	52	53	54	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	81	82	83	87	88	89	90	91
		Pollutant name	Simazine	Tetrachloroethylene (PER)	Tetrachloromethane (TCM)	Trichlorobenzenes (TCBs) (all isomers)	Trichloroethylene	Trichloromethane	Toxaphene	Vinyl chloride	Anthracene	Benzene	Brominated diphenylethers (PBDE)	Nonylphenol and Nonylphenol	Ethyl benzene	Ethylene oxide	Isoproturon	Naphthalene	Organotin compounds (as total Sn)	Di-(2-ethyl hexyl) phthalate (DEHP)	Phenols (as total C)	Polycyclic aromatic hydrocarbons (PAHs)	Toluene	Tributyltin and compounds	Triphenyltin and compounds	Total organic carbon (TOC) (as total C or	Trifluralin	Xylenes	Chlorides (as total Cl)	Asbestos	Cyanides (as total CN)	Fluorides (as total F)	Octylphenols and Octylphenol	Fluoranthene	Isodrin	Hexabromobiphenyl	Benzo(g,h,i)perylene
no	b	activity																																			
1		**Energy sector**																																			
	(a)	Mineral oil and gas refineries										□			□						□	□	□			□		□	□		□	□		□			□
	(b)	Installations for gasification and liquefaction										□			□						□	□	□			□		□	□		□	□		□			□
	(c)	Thermal power stations and other combustion installations																			□	□				□			□			□		□			□
	(d)	Coke ovens										□			□					□	□	□	□			□		□	□		□	□		□			□
	(e)	Coal rolling mills																																			
	(f)	Installations for the manufacture of coal products and solid smokeless fuel													□						□	□	□			□		□	□			□		□			□

Pollutant no			51	52	53	54	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	81	82	83	87	88	89	90	91
		Pollutant name	Simazine	Tetrachloroethylene (PER)	Tetrachloromethane (TCM)	Trichlorobenzenes (TCBs) (all isomers)	Trichloroethylene	Trichloromethane	Toxaphene	Vinyl chloride	Anthracene	Benzene	Brominated diphenylethers (PBDE)	Nonylphenol and Nonylphenol	Ethyl benzene	Ethylene oxide	Isoproturon	Naphthalene	Organotin compounds (as total Sn)	Di-(2-ethyl hexyl) phthalate (DEHP)	Phenols (as total C)	Polycyclic aromatic hydrocarbons (PAHs)	Toluene	Tributyltin and compounds	Triphenyltin and compounds	Total organic carbon (TOC)	Trifluralin	Xylenes	Chlorides (as total Cl)	Asbestos	Cyanides (as total CN)	Fluorides (as total F)	Octylphenols and Octylphenol	Fluoranthene	Isodrin	Hexabromobiphenyl	Benzo(g,h,i)perylene
2		**Production and processing of metals**																																			
	(a)	Metal ore (including sulphide ore) roasting or sintering installations																			□	□				□			□			□		□			□
	(b)	Installations for the production of pig iron or steel (primary or secondary melting) including continuous casting																			□	□				□			□			□		□			□
	(c)	Installations for the processing of ferrous metals																			□	□				□			□			□		□			□
	(d)	Ferrous metal foundries																			□	□				□			□			□		□			□

Pollutant no			51	52	53	54	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	81	82	83	87	88	89	90	91
		Pollutant name	Simazine	Tetrachloroethylene (PER)	Tetrachloromethane (TCM)	Trichlorobenzenes (TCBs) (all isomers)	Trichloroethylene	Trichloromethane	Toxaphene	Vinyl chloride	Anthracene	Benzene	Brominated diphenylethers (PBDE)	Nonylphenol and Nonylphenol	Ethyl benzene	Ethylene oxide	Isoproturon	Naphthalene	Organotin compounds (as total Sn)	Di-(2-ethyl hexyl) phthalate (DEHP)	Phenols (as total C)	Polycyclic aromatic hydrocarbons (PAHs)	Toluene	Tributyltin and compounds	Triphenyltin and compounds	Total organic carbon (TOC) (as total C or	Trifluralin	Xylenes	Chlorides (as total Cl)	Asbestos	Cyanides (as total CN)	Fluorides (as total F)	Octylphenols and Octylphenol	Fluoranthene	Isodrin	Hexabromobiphenyl	Benzo(g,h,i)perylene
	(e)	Installations for the production of non-ferrous crude metals from ore, concentrates or secondary raw materials by metallurgical, chemical or electrolytic processes and for the smelting, including the alloying, of non-ferrous metals, including recovered products (refining, foundry casting, etc.)																			□	□				□			□		□	□		□			□
	(f)	Installations for surface treatment of metals and																		□	□	□				□			□		□	□		□			□

Pollutant no			51	52	53	54	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	81	82	83	87	88	89	90	91
		Pollutant name	Simazine	Tetrachloroethylene (PER)	Tetrachloromethane (TCM)	Trichlorobenzenes (TCBs) (all isomers)	Trichloroethylene	Trichloromethane	Toxaphene	Vinyl chloride	Anthracene	Benzene	Brominated diphenylethers (PBDE)	Nonylphenol and Nonylphenol	Ethyl benzene	Ethylene oxide	Isoproturon	Naphthalene	Organotin compounds (as total Sn)	Di-(2-ethyl hexyl) phthalate (DEHP)	Phenols (as total C)	Polycyclic aromatic hydrocarbons (PAHs)	Toluene	Tributyltin and compounds	Triphenyltin and compounds	Total organic carbon (TOC) (as total C or	Trifluralin	Xylenes	Chlorides (as total Cl)	Asbestos	Cyanides (as total CN)	Fluorides (as total F)	Octylphenols and Octylphenol	Fluoranthene	Isodrin	Hexabromobiphenyl	Benzo(g,h,i)perylene
		plastic materials using an electrolytic or chemical process																																			

Pollutant no			12	13	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
		Pollutant name	Total nitrogen	Total phosphorus	Arsenic and compounds (as As)	Cadmium and compounds (as Cd)	Chromium and compounds(as Cr)	Copper and compounds (as Cu)	Mercury and compounds (as Hg)	Nickel and compounds (as Ni)	Lead and compounds (as Pb)	Zinc and compounds (as Zn)	Alachlor	Aldrin	Atrazine	Chlordane	Chlordecone	Chlorfenvinphos	Chloro-alkanes, C_{10}-C_{13}	Chlorpyrifos	DDT	1,2-dichloroethane (EDC)	Dichloromethane (DCM)	Dieldrin	Diuron	Endosulphan	Endrin	Halogenated organic compounds	Heptachlor	Hexachlorobenzene (HCB)	Hexachlorobutadiene (HCBD)	1,2,3,4,5, 6 -	Lindane	Mirex	PCDD + PCDF (dioxins + furans)	Pentachlorobenzene	Pentachlorophenol (PCP)	Polychlorinated biphenyls (PCBs)
no	b	activity																																				
3		**Mineral industry**																																				
	(a)	Underground mining and related operations	□	□	□	□	□	□		□	□	□																										
	(b)	Opencast mining and quarrying	□	□	□	□	□	□		□	□	□																										
	(c)	Installations for the production of cement clinker in rotary kilns, lime in rotary kilns, cement clinker or lime in other furnaces			□	□	□		□	□	□																							□			
	(d)	Installations for the production of asbestos and the manufacture of asbestos-based products					□																					□										
	(e)	Installations for the manufacture of	□	□	□	□	□	□	□	□	□	□																							□	□		

Pollutant no		12	13	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
		Pollutant name	Total nitrogen	Total phosphorus	Arsenic and compounds (as As)	Cadmium and compounds (as Cd)	Chromium and compounds(as Cr)	Copper and compounds (as Cu)	Mercury and compounds (as Hg)	Nickel and compounds (as Ni)	Lead and compounds (as Pb)	Zinc and compounds (as Zn)	Alachlor	Aldrin	Atrazine	Chlordane	Chlordecone	Chlorfenvinphos	Chloro-alkanes, C_{10}-C_{13}	Chlorpyrifos	DDT	1,2-dichloroethane (EDC)	Dichloromethane (DCM)	Dieldrin	Diuron	Endosulphan	Endrin	Halogenated organic compounds	Heptachlor	Hexachlorobenzene (HCB)	Hexachlorobutadiene (HCBD)	1,2,3,4,5, 6 -	Lindane	Mirex	PCDD + PCDF (dioxins + furans)	Pentachlorobenzene	Pentachlorophenol (PCP)	Polychlorinated biphenyls (PCBs)
		glass, including glass fibre																																			
	(f)	Installations for melting mineral substances, including the production of mineral fibres	□	□	□	□	□	□	□	□	□	□																						□			
	(g)	Installations for the manufacture of ceramic products by firing, in particular roofing tiles, bricks, refractory bricks, tiles, stoneware or porcelain	□	□	□	□	□	□	□	□	□	□																□									
4		**Chemical industry**																																			
	(a)	Chemical installations for the production on an industrial scale of basic	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□

Pollutant no		12	13	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
		Pollutant name	Total nitrogen	Total phosphorus	Arsenic and compounds (as As)	Cadmium and compounds (as Cd)	Chromium and compounds(as Cr)	Copper and compounds (as Cu)	Mercury and compounds (as Hg)	Nickel and compounds (as Ni)	Lead and compounds (as Pb)	Zinc and compounds (as Zn)	Alachlor	Aldrin	Atrazine	Chlordane	Chlordecone	Chlorfenvinphos	Chloro-alkanes, C_{10}-C_{13}	Chlorpyrifos	DDT	1,2-dichloroethane (EDC)	Dichloromethane (DCM)	Dieldrin	Diuron	Endosulphan	Endrin	Halogenated organic compounds	Heptachlor	Hexachlorobenzene (HCB)	Hexachlorobutadiene (HCBD)	1,2,3,4,5, 6 -	Lindane	Mirex	PCDD + PCDF (dioxins + furans)	Pentachlorobenzene	Pentachlorophenol (PCP)	Polychlorinated biphenyls (PCBs)
		organic chemicals																																			
	(b)	Chemical installations for the production on an industrial scale of basic inorganic chemicals	□	□	□	□	□	□	□	□	□	□									□	□					□		□	□	□			□	□		
	(c)	Chemical installations for the production on an industrial scale of phosphorous-, nitrogen- or potassium-based fertilizers (simple or compound fertilizers)	□	□	□	□	□	□	□	□	□	□									□	□					□				□			□	□	□	
	(d)	Chemical installations for the production on an industrial scale of basic plant health	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□		□	□	□	□	□	□	□	□	□			□	□	□	□	□	□	□

Pollutant no			12	13	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
		Pollutant name	Total nitrogen	Total phosphorus	Arsenic and compounds (as As)	Cadmium and compounds (as Cd)	Chromium and compounds(as Cr)	Copper and compounds (as Cu)	Mercury and compounds (as Hg)	Nickel and compounds (as Ni)	Lead and compounds (as Pb)	Zinc and compounds (as Zn)	Alachlor	Aldrin	Atrazine	Chlordane	Chlordecone	Chlorfenvinphos	Chloro-alkanes, C_{10}-C_{13}	Chlorpyrifos	DDT	1,2-dichloroethane (EDC)	Dichloromethane (DCM)	Dieldrin	Diuron	Endosulphan	Endrin	Halogenated organic compounds	Heptachlor	Hexachlorobenzene (HCB)	Hexachlorobutadiene (HCBD)	1,2,3,4,5, 6 -	Lindane	Mirex	PCDD + PCDF (dioxins + furans)	Pentachlorobenzene	Pentachlorophenol (PCP)	Polychlorinated biphenyls (PCBs)
		products and of biocides																																				
	(e)	Installations using a chemical or biological process for the production on an industrial scale of basic pharmaceutical products	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐										☐						☐				☐			☐	☐		
	(f)	Installations for the production on an industrial scale of explosives and pyrotechnic products	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐										☐	☐					☐				☐			☐	☐		

Pollutant no			51	52	53	54	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	81	82	83	87	88	89	90	91
		Pollutant name	Simazine	Tetrachloroethylene (PER)	Tetrachloromethane (TCM)	Trichlorobenzenes (TCBs) (all)	Trichloroethylene	Trichloromethane	Toxaphene	Vinyl chloride	Anthracene	Benzene	Brominated diphenylethers (PBDE)	Nonylphenol and Nonylphenol (	Ethyl benzene	Ethylene oxide	Isoproturon	Naphthalene	Organotin compounds (as total Sn)	Di-(2-ethyl hexyl) phthalate (DEHP)	Phenols (as total C)	Polycyclic aromatic hydrocarbons (	Toluene	Tributyltin and compounds	Triphenyltin and compounds	Total organic carbon (TOC) (as total	Trifluralin	Xylenes	Chlorides (as total Cl)	Asbestos	Cyanides (as total CN)	Fluorides (as total F)	Octylphenols and Octylphenol (	Fluoranthene	Isodrin	Hexabromobiphenyl	Benzo(g,h,i)perylene
no	b	activity																																			
3		**Mineral industry**																																			
	(a)	Underground mining and related operations																								□			□								
	(b)	Opencast mining and quarrying																								□			□								
	(c)	Installations for the production of cement clinker in rotary kilns, lime in rotary kilns, cement clinker or lime in other furnaces																			□					□											
	(d)	Installations for the production of asbestos and the manufacture of asbestos-based products																								□				□			□				
	(e)	Installations for the manufacture of glass,										□			□						□		□			□		□	□		□	□	□				

Pollutant no			51	52	53	54	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	81	82	83	87	88	89	90	91
		Pollutant name	Simazine	Tetrachloroethylene (PER)	Tetrachloromethane (TCM)	Trichlorobenzenes (TCBs) (all)	Trichloroethylene	Trichloromethane	Toxaphene	Vinyl chloride	Anthracene	Benzene	Brominated diphenylethers (PBDE)	Nonylphenol and Nonylphenol	Ethyl benzene	Ethylene oxide	Isoproturon	Naphthalene	Organotin compounds (as total Sn)	Di-(2-ethyl hexyl) phthalate (DEHP)	Phenols (as total C)	Polycyclic aromatic hydrocarbons	Toluene	Tributyltin and compounds	Triphenyltin and compounds	Total organic carbon (TOC) (as total	Trifluralin	Xylenes	Chlorides (as total Cl)	Asbestos	Cyanides (as total CN)	Fluorides (as total F)	Octylphenols and Octylphenol	Fluoranthene	Isodrin	Hexabromobiphenyl	Benzo(g,h,i)perylene
		including glass fibre																																			
	(f)	Installations for melting mineral substances, including the production of mineral fibres										□			□						□		□			□		□	□		□	□					
	(g)	Installations for the manufacture of ceramic products by firing, in particular roofing tiles, bricks, refractory bricks, tiles, stoneware or porcelain																											□			□					
4		**Chemical industry**																																			
	(a)	Chemical installations for the production on an industrial scale of basic organic chemicals	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□		□

Pollutant no			51	52	53	54	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	81	82	83	87	88	89	90	91
		Pollutant name	Simazine	Tetrachloroethylene (PER)	Tetrachloromethane (TCM)	Trichlorobenzenes (TCBs) (all [illegible])	Trichloroethylene	Trichloromethane	Toxaphene	Vinyl chloride	Anthracene	Benzene	Brominated diphenylethers (PBDE)	Nonylphenol and Nonylphenol [illegible]	Ethyl benzene	Ethylene oxide	Isoproturon	Naphthalene	Organotin compounds (as total Sn)	Di-(2-ethyl hexyl) phthalate (DEHP)	Phenols (as total C)	Polycyclic aromatic hydrocarbons [illegible]	Toluene	Tributyltin and compounds	Triphenyltin and compounds	Total organic carbon (TOC) (as total [illegible]	Trifluralin	Xylenes	Chlorides (as total Cl)	Asbestos	Cyanides (as total CN)	Fluorides (as total F)	Octylphenols and Octylphenol [illegible]	Fluoranthene	Isodrin	Hexabromobiphenyl	Benzo(g,h,i)perylene
	(b)	Chemical installations for the production on an industrial scale of basic inorganic chemicals										□		□	□						□	□	□				□		□	□	□	□	□	□			□
	(c)	Chemical installations for the production on an industrial scale of phosphorous-, nitrogen- or potassium-based fertilizers (simple or compound fertilizers)			□	□	□	□				□		□	□						□	□	□				□		□	□		□	□	□			□
	(d)	Chemical installations for the production on an industrial scale of basic plant health products and of biocides	□		□	□	□		□	□	□	□		□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□		□	□	□	□		□

Pollutant no			51	52	53	54	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	81	82	83	87	88	89	90	91
		Pollutant name	Simazine	Tetrachloroethylene (PER)	Tetrachloromethane (TCM)	Trichlorobenzenes (TCBs) (all	Trichloroethylene	Trichloromethane	Toxaphene	Vinyl chloride	Anthracene	Benzene	Brominated diphenylethers (PBDE)	Nonylphenol and Nonylphenol	Ethyl benzene	Ethylene oxide	Isoproturon	Naphthalene	Organotin compounds (as total Sn)	Di-(2-ethyl hexyl) phthalate (DEHP)	Phenols (as total C)	Polycyclic aromatic hydrocarbons	Toluene	Tributyltin and compounds	Triphenyltin and compounds	Total organic carbon (TOC) (as total	Trifluralin	Xylenes	Chlorides (as total Cl)	Asbestos	Cyanides (as total CN)	Fluorides (as total F)	Octylphenols and Octylphenol	Fluoranthene	Isodrin	Hexabromobiphenyl	Benzo(g,h,i)perylene
	(e)	Installations using a chemical or biological process for the production on an industrial scale of basic pharmaceutical products		☐	☐		☐	☐				☐			☐				☐	☐	☐	☐	☐			☐		☐	☐		☐	☐		☐			☐
	(f)	Installations for the production on an industrial scale of explosives and pyrotechnic products			☐	☐	☐			☐		☐			☐				☐		☐		☐			☐		☐	☐		☐	☐					

Pollutant no			12	13	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
		Pollutant name	Total nitrogen	Total phosphorus	Arsenic and compounds (as As)	Cadmium and compounds (as Cd)	Chromium and compounds(as Cr)	Copper and compounds (as Cu)	Mercury and compounds (as Hg)	Nickel and compounds (as Ni)	Lead and compounds (as Pb)	Zinc and compounds (as Zn)	Alachlor	Aldrin	Atrazine	Chlordane	Chlordecone	Chlorfenvinphos	Chloro-alkanes, C_{10}-C_{13}	Chlorpyrifos	DDT	1,2-dichloroethane (EDC)	Dichloromethane (DCM)	Dieldrin	Diuron	Endosulphan	Endrin	Halogenated organic compounds	Heptachlor	Hexachlorobenzene (HCB)	Hexachlorobutadiene (HCBD)	1,2,3,4,5, 6 -	Lindane	Mirex	PCDD + PCDF (dioxins + furans)	Pentachlorobenzene	Pentachlorophenol (PCP)	Polychlorinated biphenyls (PCBs)
no	b	activity																																				
5		**Waste and wastewater management**																																				
	(a)	Installations for the disposal or recovery of hazardous waste	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□
	(b)	Installations for the incineration of non-hazardous waste	□	□	□	□	□	□	□	□	□	□										□	□					□							□	□		
	(c)	Installations for the disposal of non-hazardous waste	□	□	□	□	□	□	□	□	□	□											□					□							□	□		
	(d)	Landfills	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□
	(e)	Installations for the disposal or recycling of animal	□	□			□	□				□																						□	□		

Pollutant no			12	13	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
		carcasses and animal waste																																				
	(f)	Urban waste-water treatment plants	□	□	□	□	□	□	□	□	□	□			□							□	□		□			□		□			□				□	□
	(g)	Independently operated industrial waste-water treatment plants which serve one or more activities of this annex	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□
6		**Paper and wood production and processing**																																				
	(a)	Industrial plants for the production of pulp from timber or similar fibrous materials	□	□	□	□	□	□	□	□	□	□																□					□		□			
	(b)	Industrial plants for the production of paper and board and other primary wood products (such as chipboard, fibreboard and plywood)	□	□	□	□	□	□	□	□	□	□																□					□		□		□	
	(c)	Industrial plants for the preservation	□	□	□		□	□				□																□										

Pollutant no			12	13	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
		of wood and wood products with chemicals																																				
7		**Intensive livestock production and aquaculture**																																				
	(a)	Installations for the intensive rearing of poultry or pigs	□	□				□				□																										
	(b)	Intensive aquaculture	□	□				□				□																							□			

Pollutant no			51	52	53	54	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	81	82	83	87	88	89	90	91
		Pollutant name	Simazine	Tetrachloroethylene (PER)	Tetrachloromethane (TCM)	Trichlorobenzenes (TCBs) (all)	Trichloroethylene	Trichloromethane	Toxaphene	Vinyl chloride	Anthracene	Benzene	Brominated diphenylethers	Nonylphenol and Nonylphenol	Ethyl benzene	Ethylene oxide	Isoproturon	Naphthalene	Organotin compounds (as total	Di-(2-ethyl hexyl) phthalate	Phenols (as total C)	Polycyclic aromatic	Toluene	Tributyltin and compounds	Triphenyltin and compounds	Total organic carbon (TOC) (as	Trifluralin	Xylenes	Chlorides (as total Cl)	Asbestos	Cyanides (as total CN)	Fluorides (as total F)	Octylphenols and Octylphenol	Fluoranthene	Isodrin	Hexabromobiphenyl	Benzo(g,h,i)perylene
no	b	activity																																			
5		**Waste and wastewater management**																																			
	(a)	Installations for the disposal or recovery of hazardous waste	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□
	(b)	Installations for the incineration of non-hazardous waste		□			□					□			□				□		□	□	□			□		□			□	□	□	□			□
	(c)	Installations for the disposal of non-hazardous waste			□	□	□												□		□					□			□		□	□	□				
	(d)	Landfills	□	□	□	□	□	□		□	□	□	□	□	□		□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□
	(e)	Installations for the disposal or recycling of animal																								□											

Pollutant no			51	52	53	54	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	81	82	83	87	88	89	90	91
		carcasses and animal waste																																			
	(f)	Urban waste-water treatment plants	□	□	□		□	□				□		□			□	□	□	□	□	□	□	□	□	□		□	□		□	□	□	□			□
	(g)	Independently operated industrial waste-water treatment plants which serve one or more activities of this annex	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□
6		**Paper and wood production and processing**																																			
	(a)	Industrial plants for the production of pulp from timber or similar fibrous materials		□			□	□														□				□							□	□			□
	(b)	Industrial plants for the production of paper and board and other primary wood products (such as chipboard, fibreboard and plywood)		□			□	□												□		□				□							□	□			□
	(c)	Industrial plants for the preservation									□							□		□		□	□			□		□	□			□		□			□

Pollutant no			51	52	53	54	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	81	82	83	87	88	89	90	91
		of wood and wood products with chemicals																																			
7		**Intensive livestock production and aquaculture**																																			
	(a)	Installations for the intensive rearing of poultry or pigs																																			
	(b)	Intensive aquaculture																																			

Pollutant no			12	13	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
		Pollutant name	Total nitrogen	Total phosphorus	Arsenic and compounds (as As)	Cadmium and compounds (as Cd)	Chromium and compounds(as Cr)	Copper and compounds (as Cu)	Mercury and compounds (as Hg)	Nickel and compounds (as Ni)	Lead and compounds (as Pb)	Zinc and compounds (as Zn)	Alachlor	Aldrin	Atrazine	Chlordane	Chlordecone	Chlorfenvinphos	Chloro-alkanes, C_{10}-C_{13}	Chlorpyrifos	DDT	1,2-dichloroethane (EDC)	Dichloromethane (DCM)	Dieldrin	Diuron	Endosulphan	Endrin	Halogenated organic compounds	Heptachlor	Hexachlorobenzene (HCB)	Hexachlorobutadiene (HCBD)	1,2,3,4,5, 6 -	Lindane	Mirex	PCDD + PCDF (dioxins + furans)	Pentachlorobenzene	Pentachlorophenol (PCP)	Polychlorinated biphenyls (PCBs)
no	b	activity																																				
8		**Animal and vegetable products from the food and beverage sector**																																				
	(a)	Slaughterhouses	□	□	□	□	□	□	□	□	□	□																										
	(b)	Treatment and processing intended for the production of food and beverage products from animal raw materials (other than milk) and vegetable raw materials	□	□	□	□	□	□	□	□	□	□																										
	(c)	Treatment and processing of milk	□	□	□	□	□	□	□	□	□	□																										
9		**Other activities**																																				
	(a)	Plants for the pre-treatment or dyeing of fibres or textiles	□	□		□	□	□	□	□	□	□																□										
	(b)	Plants for the tanning of hides and skins	□	□	□		□	□																				□										
	(c)	Installations for the surface treatment of substances, objects or products using organic solvents, in particular for dressing, printing, coating, degreasing, waterproofing, sizing, painting, cleaning or impregnating	□	□	□	□	□	□		□	□	□							□				□					□						□	□	□	
	(d)	Installations for the production of carbon (hard-burnt coal) or electro-graphite by means of incineration or graphitization								□																												
	(e)	Installations for the building of, and painting or removal of paint from ships	□	□	□	□	□	□	□	□	□	□							□			□	□					□						□	□		□

Pollutant no			51	52	53	54	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	81	82	83	87	88	89	90	91
		Pollutant name	Simazine	Tetrachloroethylene (PER)	Tetrachloromethane (TCM)	Trichlorobenzenes (TCBs) (all	Trichloroethylene	Trichloromethane	Toxaphene	Vinyl chloride	Anthracene	Benzene	Brominated diphenylethers	Nonylphenol and Nonylphenol	Ethyl benzene	Ethylene oxide	Isoproturon	Naphthalene	Organotin compounds (as total	Di-(2-ethyl hexyl) phthalate	Phenols (as total C)	Polycyclic aromatic	Toluene	Tributyltin and compounds	Triphenyltin and compounds	Total organic carbon (TOC) (as	Trifluralin	Xylenes	Chlorides (as total Cl)	Asbestos	Cyanides (as total CN)	Fluorides (as total F)	Octylphenols and Octylphenol	Fluoranthene	Isodrin	Hexabromobiphenyl	Benzo(g,h,i)perylene
no	b	activity																																			
8		**Animal and vegetable products from the food and beverage sector**																																			
	(a)	Slaughterhouses																			□	□				□			□			□		□			□
	(b)	Treatment and processing intended for the production of food and beverage products from animal raw materials (other than milk) and vegetable raw materials																			□	□				□			□			□		□			□
	(c)	Treatment and processing of milk																			□	□				□			□			□		□			□
9		**Other activities**																																			
	(a)	Plants for the pre-treatment or dyeing of fibres or textiles										□	□	□	□					□	□	□	□			□		□	□			□	□				□

Pollutant no			51	52	53	54	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	81	82	83	87	88	89	90	91
	(b)	Plants for the tanning of hides and skins												□							□					□			□				□				
	(c)	Installations for the surface treatment of substances, objects or products using organic solvents, in particular for dressing, printing, coating, degreasing, waterproofing, sizing, painting, cleaning or impregnating	□	□	□	□	□	□						□					□	□	□	□				□			□		□	□	□	□			□
	(d)	Installations for the production of carbon (hard-burnt coal) or electro-graphite by means of incineration or graphitization		□	□			□						□							□	□				□						□	□			□
	(e)	Installations for the building of, and painting or removal of paint from ships	□		□	□	□	□				□	□	□					□	□	□	□	□			□		□	□		□	□	□	□			□

*The basic organic pollutants, BOD_5, COD, SS are not included in the list

Appendix VI
List of internationally approved measuring methods for air and water pollutants

List of internationally approved measuring methods for air and water pollutants

No.	CAS number	Pollutant	EN or ISO standard Emission to air (Abbreviations see below)	EN or ISO standard Emission to water (Abbreviations see below)
1	74-82-8	Methane (CH_4)	ISO Standard in preparation by ISO/TC 146/SC 1/ WG 22 (for information only)	---
2	630-08-0	Carbon monoxide (CO)	EN 15058:2004 ISO 12039:2001	---
3	124-38-9	Carbon dioxide (CO_2)	ISO 12039:2001	---
4		Hydro-fluorocarbons (HFCs)		---
5	10024-97-2	Nitrous oxide (N_2O)	ISO Standard in preparation by ISO/TC 146/SC 1/ WG 19 (for information only)	---
6	7664-41-7	Ammonia (NH_3)		---
7		Non-methane volatile organic compounds (NMVOC)	EN 13649:2001	---
8		Nitrogen oxides (NO_x/NO_2)	EN 14792:2005 ISO 11564:1998 ISO 10849:1996	---
9		Perfluorocarbons (PFCs)		---
10	2551-62-4	Sulphur hexafluoride (SF_6)		---
11		Sulphur oxides (SO_x/SO_2)	EN 14791:2005 ISO 7934:1989 ISO 7935:1992 ISO 11632:1998	---
12		Total nitrogen	---	EN 12260:2003 EN ISO 11905-1:1998
13		Total phosphorus	---	EN ISO 15681-1:2004 EN ISO 15681-2:2004 EN ISO 11885:1997 EN ISO 6878:2004
14		Hydrochlorofluorocarbons (HCFCs)		---
15		Chlorofluorocarbons (CFCs)		---
16		Halons		---
17		Arsenic and compounds (as As)	EN 14385:2004	EN ISO 11969:1996 EN 26595:1992
18		Cadmium and compounds (as Cd)	EN 14385:2004	EN ISO 5961:1995 EN ISO 11885:1997
19		Chromium and compounds (as Cr)	EN 14385:2004	EN 1233:1996 EN ISO 11885:1997
20		Copper and compounds (as Cu)	EN 14385:2004	EN ISO 11885:1997
21		Mercury and compounds (as Hg)	EN 13211:2001 EN 14884:2005	EN 1483:1997 EN 12338:1998 EN 13506:2001 According to the level of concentration
22		Nickel and compounds (as Ni)	EN 14385:2004	EN ISO 11885:1997
23		Lead and compounds (as Pb)	EN 14385:2004	EN ISO 11885:1997
24		Zinc and compounds (as Zn)		EN ISO 11885:1997
25	15972-60-8	Alachlor	---	
26	309-00-2	Aldrin		EN ISO 6468:1996
27	1912-24-9	Atrazine	---	EN ISO 10695:2000

No.	CAS number	Pollutant	EN or ISO standard Emission to air (Abbreviations see below)	EN or ISO standard Emission to water (Abbreviations see below)
28	57-74-9	Chlordane		
29	143-50-0	Chlordecone		
30	470-90-6	Chlorfenvinphos	---	
31	85535-84-8	Chloro-alkanes, C_{10}-C_{13}	---	
32	2921-88-2	Chlorpyrifos	---	
33	50-29-3	DDT		EN ISO 6468:1996
34	107-06-2	1,2-dichloroethane (EDC)		EN ISO 10301:1997 EN ISO 15680:2003
35	75-09-2	Dichloromethane (DCM)		EN ISO 10301:1997 EN ISO 15680:2003
36	60-57-1	Dieldrin		EN ISO 6468:1996
37	330-54-1	Diuron	---	EN ISO 11369:1997
38	115-29-7	Endosulfan	---	EN ISO 6468:1996
39	72-20-8	Endrin		EN 6468:1996
40		Halogenated organic compounds (as AOX)	---	EN ISO 9562:2004
41	76-44-8	Heptachlor		EN ISO 6468:1996
42	118-74-1	Hexachlorobenzene (HCB)		EN ISO 6468:1996
43	87-68-3	Hexachlorobutadiene (HCBD)	---	
44	608-73-1	1,2,3,4,5, 6-hexachlorocyclohexane (HCH)		EN ISO 6468:1996
45	58-89-9	Lindane		EN ISO 6468:1996
46	2385-85-5	Mirex		
47		PCDD +PCDF (dioxins +furans) (as Teq)	EN 1948-1 to -3:2003	ISO 18073:2004
48	608-93-5	Pentachlorobenzene		EN ISO 6468:1996
49	87-86-5	Pentachlorophenol (PCP)		
50	1336-36-3	Polychlorinated biphenyls (PCBs)	(prCEN/TS 1948-4) for information only	EN ISO 6468:1996
51	122-34-9	Simazine	---	EN ISO 11369:1997 EN ISO 10695:2000
52	127-18-4	Tetrachloroethylene (PER)		EN ISO 15680:2003 EN ISO 10301:1997
53	56-23-5	Tetrachloromethane (TCM)		EN ISO 10301:1997
54	12002-48-1	Trichlorobenzenes (TCBs) (all isomers)		EN ISO 15680:2003
55	71-55-6	1,1,1-trichloroethane		---
56	79-34-5	1,1,2,2-tetrachloroethane		---
57	79-01-6	Trichloroethylene		EN ISO 15680:2003 EN ISO 10301:1997
58	67-66-3	Trichloromethane		EN ISO 15680:2003 EN ISO 10301:1997
59	8001-35-2	Toxaphene		
60	75-01-4	Vinyl chloride		EN ISO 15680:2003
61	120-12-7	Anthracene	ISO 11338-1 to -2:2003	EN ISO 17993:2003
62	71-43-2	Benzene	EN 13649:2001	ISO 11423-1:1997 ISO 11423-2:1997 EN ISO 15680:2003
63		Brominated diphenylethers (PBDE)	---	ISO 22032
64		Nonylphenol *and Nonylphenol* ethoxylates *(NP/NPEs)*	---	
65	100-41-4	Ethyl benzene	---	EN ISO 15680:2003
66	75-21-8	Ethylene oxide		

No.	CAS number	Pollutant	EN or ISO standard Emission to air (Abbreviations see below)	EN or ISO standard Emission to water (Abbreviations see below)
67	34123-59-6	Isoproturon	---	
68	91-20-3	Naphthalene		EN ISO 15680:2003 EN ISO 17993:2003
69		Organotin compounds (as total Sn)	---	EN ISO 17353:2005
70	117-81-7	Di-(2-ethyl hexyl) phthalate (DEHP)		EN ISO 18856:2005
71	108-95-2	Phenols (as total C)	---	ISO 18857-1:2005
72		Polycyclic aromatic hydrocarbons (PAHs)	ISO 11338-1 to -2:2003	EN ISO 17993:2003 ISO 7981-1:2005 ISO 7981-2:2005
73	108-88-3	Toluene	---	EN ISO 15680:2003
74		Tributyltin and compounds	---	EN ISO 17353:2005
75		Triphenyltin and compounds	---	EN ISO 17353:2005
76		Total organic carbon (TOC) (as total C or COD/3)	---	EN 1484:1997
77	1582-09-8	Trifluralin	---	
78	1330-20-7	Xylenes	---	EN ISO 15680:2003
79		Chlorides (as total Cl)	---	EN ISO 10304-1:1995 EN ISO 10304-2:1996 EN ISO 10304-4:1999 EN ISO 15682:2001
80		Chlorine and inorganic compounds (as HCl)	EN 1911-1 to -3:2003	---
81	1332-21-4	Asbestos	ISO 10397:1993	
82		Cyanides (as total CN)	---	EN ISO 14403:2002
83		Fluorides (as total F)	---	EN ISO 10304-1:1995
84		Fluorine and inorganic compounds (as HF)	ISO/DIS 15713:2004	---
85	74-90-8	Hydrogen cyanide (HCN)		---
86		Particulate matter (PM10)	ISO Standard in preparation by ISO/TC 146/SC 1/ WG 20 (available as Committee Draft CD 23210) (for information only)	---
87	1806-26-4	Octylphenols and Octylphenol ethoxylates	---	
88	206-44-0	Fluoranthene	ISO 11338-1 to -2:2003	EN ISO 17993:2003
89	465-73-6	Isodrin	---	
90	36355-1-8	Hexabromobiphenyl		
91	191-24-2	Benzo(g,h,i)perylene	---	EN ISO 17993:2003
GENERAL STANDARDS for EMISSION to AIR and/or WATER				
G1	Water sampling – Part1 Guidance on the design of sampling programmes			EN ISO 5667-1 : 1996
G2	Water sampling – Part 10 Guidance on sampling waste water			EN ISO 5667-10 : 1992
G3	Water sampling – Part 3 Guidance on the preservation and handling of samples			EN ISO 5667-3 : 1994
G4	Guide to analytical quality control for water analysis			CEN/ISO TR 13530 : 1998
G5	Stationary source emission – Intra-laboratory validation procedure for an alternative method compared to a reference method		CEN/TS 14793	

No.	CAS number	Pollutant	EN or ISO standard Emission to air (Abbreviations see below)	EN or ISO standard Emission to water (Abbreviations see below)
G6	General requirements for competence of testing and calibration laboratories		EN ISO 17025 : 2005	
G7	GUM = Guide to the expression of uncertainty (1995) published by BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML		CEN TS 13005 : 2000	

Abbreviations:

EN	European Standard
CEN/TS	CEN Technical Specification
CEN/TR	CEN Technical Report
ISO	International Standard
ISO/CD	ISO Committee Draft
ISO/TC	ISO Technical Committee
ISO/TS	ISO Technical Specification
ISO/TR	ISO Technical Report
PrXXX	Draft standard (for information only)

Appendix VII
R/D codes

R/D codes

R 1 Use principally as a fuel or other means to generate energy (*)
R 2 Solvent reclamation/regeneration
R 3 Recycling/reclamation of organic substances which are not used as solvents (including composting and other
biological transformation processes) (**)
R 4 Recycling/reclamation of metals and metal compounds
R 5 Recycling/reclamation of other inorganic materials (***)
R 6 Regeneration of acids or bases
R 7 Recovery of components used for pollution abatement
R 8 Recovery of components from catalysts
R 9 Oil re-refining or other reuses of oil
R 10 Land treatment resulting in benefit to agriculture or ecological improvement
R 11 Use of waste obtained from any of the operations numbered R 1 to R 10
R 12 Exchange of waste for submission to any of the operations numbered R 1 to R 11 (****)
R 13 Storage of waste pending any of the operations numbered R 1 to R 12 (excluding temporary storage, pending
collection, on the site where the waste is produced) (*****)

(*) This includes incineration facilities dedicated to the processing of municipal solid waste only where their energy efficiency is equal
to or above:
— 0,60 for installations in operation and permitted in accordance with applicable Community legislation before 1 January 2009,
— 0,65 for installations permitted after 31 December 2008,
using the following formula:
Energy efficiency = (Ep - (Ef + Ei))/(0,97 × (Ew + Ef))
In which:
Ep means annual energy produced as heat or electricity. It is calculated with energy in the form of electricity being multiplied by
2,6 and heat produced for commercial use multiplied by 1,1 (GJ/year)
Ef means annual energy input to the system from fuels contributing to the production of steam (GJ/year)
Ew means annual energy contained in the treated waste calculated using the net calorific value of the waste (GJ/year)
Ei means annual energy imported excluding Ew and Ef (GJ/year)
0,97 is a factor accounting for energy losses due to bottom ash and radiation.
This formula shall be applied in accordance with the reference document on Best Available Techniques for waste incineration.
(**) This includes gasification and pyrolisis using the components as chemicals.
(***) This includes soil cleaning resulting in recovery of the soil and recycling of inorganic construction materials.
(****) If there is no other R code appropriate, this can include preliminary operations prior to recovery including pre-processing such as,
inter alia, dismantling, sorting, crushing, compacting, pelletising, drying, shredding, conditioning, repackaging, separating, blending
or mixing prior to submission to any of the operations numbered R1 to R11.
(*****) Temporary storage means preliminary storage according to point (10) of Article 3 of the EU Waste Framework Directive

Disposal operations

D 1 Deposit into or on to land (e.g. landfill, etc.)
D 2 Land treatment (e.g. biodegradation of liquid or sludgy discards in soils, etc.)

D 3 Deep injection (e.g. injection of pumpable discards into wells, salt domes or naturally occurring repositories, etc.)
D 4 Surface impoundment (e.g. placement of liquid or sludgy discards into pits, ponds or lagoons, etc.)
D 5 Specially engineered landfill (e.g. placement into lined discrete cells which are capped and isolated from one
another and the environment, etc.)
D 6 Release into a water body except seas/oceans
D 7 Release to seas/oceans including sea-bed insertion
D 8 Biological treatment not specified elsewhere in this Annex which results in final compounds or mixtures which are
discarded by means of any of the operations numbered D 1 to D 12
D 9 Physico-chemical treatment not specified elsewhere in this Annex which results in final compounds or mixtures
which are discarded by means of any of the operations numbered D 1 to D 12 (e.g. evaporation, drying, calcination, etc.)
D 10 Incineration on land
D 11 Incineration at sea (*)
D 12 Permanent storage (e.g. emplacement of containers in a mine, etc.)
D 13 Blending or mixing prior to submission to any of the operations numbered D 1 to D 12 (**)
D 14 Repackaging prior to submission to any of the operations numbered D 1 to D 13
D 15 Storage pending any of the operations numbered D 1 to D 14 (excluding temporary storage, pending collection,
on the site where the waste is produced) (***)

(*) This operation is prohibited by EU legislation and international conventions.
(**) If there is no other D code appropriate, this can include preliminary operations prior to disposal including pre-processing such as,
inter alia, sorting, crushing, compacting, pelletising, drying, shredding, conditioning or separating prior to submission to any of the
operations numbered D1 to D12.
(***) Temporary storage means preliminary storage according to point (10) of Article 3 of the Waste Framework Directive

Appendix VIII
Reporting format

Reporting format

Reference year		
Identification of the facility		
Name of the parent company Name of the facility Identification number of facility, if any. Street address Town Postal code Country Coordinates of the location River basin district NACE-code Main activity Production volume (optional) Number of installations (optional) Number of operating hours in year (optional) Number of employees (optional) Text field for textual information or website address delivered by facility or parent company (optional)		
All Appendix 1 activities of the facility		
Activity 1 (main activity) Activity 2 Activity N		
Release data to air for the facility for each pollutant exceeding threshold value (according to Appendix 2)		**Releases to air**
Pollutant 1 Pollutant 2 Pollutant N	M: measured; Analytical Method used C: calculated; Calculation Method used E: estimated	T: Total in kg/year A: accidental in kg/year
Technical measures	Type	Reduction of pollutants
Release data to water for the facility for each pollutant exceeding threshold value (according to Appendix 2)		**Releases to water**
Pollutant 1 Pollutant 2 Pollutant N	M: measured; Analytical Method used C: calculated; Calculation Method used E: estimated	T: Total in kg/year A: accidental in kg/year
Technical measures	Type	Reduction of pollutants
Release data to land for the facility for each pollutant exceeding threshold value (according to Appendix 2)		**Releases to land**
Pollutant 1 Pollutant 2 Pollutant N	M: measured; Analytical Method used C: calculated; Calculation Method used E: estimated	T: Total in kg/year A: accidental in kg/year

Technical measures	Type	Reduction of pollutants
Off-site transfer of each pollutant destined for wastewater treatment in quantities exceeding threshold value (according to Appendix 2)		
Pollutant 1 Pollutant 2 Pollutant N	M: measured; Analytical Method used C: calculated; Calculation Method used E: estimated	in kg/year
Off-site transfers of hazardous waste (Hazardous waste Protocol) for the facility exceeding 2 tonnes/year		
Within the country: For Recovery (R)	M: measured; Analytical Method used C: calculated; Calculation Method used	in tonnes/year
Within the country: For Disposal (D)	M: measured; Analytical Method used C: calculated; Calculation Method used	in tonnes/year
To other countries: For Recovery (R) Name of the recoverer Address of the recoverer Address of actual recovery site receiving the transfer	M: measured; Analytical Method used C: calculated; Calculation Method used E: estimated	in tonnes/year
To other countries: For Disposal (D) Name of the disposer Address of the disposer Address of actual disposal site	M: measured; Analytical Method used C: calculated; Calculation Method used E: estimated	in tonnes/year
Off-site transfer of non-hazardous waste for the facility exceeding 2000 tonnes/year		
For Recovery (R)	M: measured; Analytical Method used C: calculated; Calculation Method used	in tonnes/year
For Disposal (D)	M: measured; Analytical Method used C: calculated; Calculation Method used	in tonnes/year

Competent authority for requests of the public**: (optional)** Name Street address Town Telephone No E-mail address	

Appendix IX
Reporting format for H2020 indicator 6.4.2

Reporting format for H2020 indicator 6.4.2

River basin District (Name)	No of companies	Number of Breaches of law	Inspections (No/per year) – total (for all facilities)	Technical measures (treatment plants, recycling, preventive)
1				
2				
N				

Appendix X
Comparison Table between NBB and PRTR Sectors and Subsectors

NBB sector_name	ID	NBB sub_sector_name	ID	PRTR_sector_name	ID	PRTR_sub_sector_name
Manufacture of cement	27	Manufacture of cement	3	Mineral industry	(c)_(i)	(c) Installations for the production of: (i) Cement clinker in rotary kilns
	28	Manufacture of lime and plaster	3		(c)_(ii)	(ii) Lime in rotary kilns
Treatment of urban wastewater	95	Industrial wastewater treatment plant	5	Waste and wastewater management	(g)	(g) Independently operated industrial waste-water treatment plants
	96	Treatment plants	5		(f)	(f) Urban waste-water treatment plants
Transport	87	Manufacture of aircraft and spacecraft				
	88	Manufacture of motor vehicles				
	89	Manufacture of other transport equipment				
	90	Rail transport				
	91	Urban road transport (automobiles and buses)				
	92	Water transport (freight, passengers)				
Farming of animals	11	Farming of animals (cattle, sheep, swine, poultry) and slaughterhouses	7	Intensive livestock production and aquaculture	(a)	(a) Installations for the intensive rearing of poultry or pigs
			8	Animal and vegetable products from the food and beverage sector	(a)	(a) Slaughterhouses
	12	Farming of special animals (rabbits, goats, horses, asses, mules and hinnies, other)				
Food packing	13	Animal feeds				
	14	Animal raw materials, Vegetable raw materials				
	15	Dairy industry	8	Animal and vegetable products from the food and beverage sector	(c)	(c) Treatment and processing of milk

NBB sector_name	ID	NBB sub_sector_name	ID	PRTR_sector_name	ID	PRTR_sub_sector_name
	16	Manufacture of beer	8		(b)_(ii)	(b) Treatment and processing intended for the production of food and beverage products from: (i) Animal raw materials (other than milk) (ii) Vegetable raw materials
	17	Manufacture of non-alcoholic beverages	8		(b)_(ii)	
	18	Manufacture of olive oil	8		(b)_(ii)	
	19	Manufacture of other vegetable oils (other than olive oil)	8		(b)_(ii)	
	20	Manufacture of sugar beet	8		(b)_(ii)	
	21	Manufacture of wines and spirits	8		(b)_(ii)	
	22	Other prepared foods	8		(b)_(ii)	
					(b)_(i)	
	23	Preserving fruit and vegetables	8		(b)_(ii)	
Port services	76	Gasoline Loading				
	77	Port handling (cargo)				
Manufacture of other organic chemicals	53	Manufacture of explosives, glues, gelatine, essential oils	4	Chemical industry	(a)_(i)	(a) Chemical installations for the production on an industrial scale of basic organic chemicals, such as: (i) Simple hydrocarbons (linear or cyclic, saturated or unsaturated, aliphatic or aromatic) (ii) Oxygen-containing hydrocarbons such as alcohols, aldehydes, ketones, carboxylic acids, esters, acetates, ethers, peroxides, epoxy resins (iii) Sulphurous hydrocarbons (iv) Nitrogenous hydrocarbons such as amines, amides, nitrous compounds, nitro compounds or nitrate compounds, nitriles, cyanates, isocyanates (v) Phosphorus-containing hydrocarbons (vi) Halogenic hydrocarbons (vii) Organometallic compounds (viii) Basic plastic materials (polymers, synthetic fibres and cellulose-based fibres) (ix) Synthetic rubbers (x) Dyes and pigments (xi) Surface-active agents and surfactants
			4		(f)	(f) Installations for the production on an industrial scale of explosives and pyrotechnic products

NBB sector_name	ID	NBB sub_sector_name	ID	PRTR_sector_name	ID	PRTR_sub_sector_name
	54	Other chemicals	4			
	55	Paints and varnishes	4		(a)_(x)	
	56	Plastics, rubber, synthetic resins	4		(a)_(ix)	
	57	Polyethylene tetraphtalate	4		(a)_(viii)	
	58	Polyvinyl chloride	4		(a)_(viii)	
	59	Synthesis of pigments	4		(a)_(x)	
	99	Lead Alkyl	4		(a)_(vii)	
Agriculture	1	Growing of cereals (wheat, rice, maize, soyabeans, other)				
	2	Growing of fruit and vegetables				
	3	Horticultural specialities, nurseries				
	4	Industrial crops (cotton, tobacco, sugar cane, sugar beet, potatoes, other)				
	5	Manufacture of wines				
Manufacture of metals	34	Casting of grey iron	2	Production and processing of metals	(b)	(b) Installations for the production of pig iron or steel (primary or secondary melting) including continuous casting
	35	Casting of other non-ferrous metals	2		(e)_(i)	(e) Installations: (i) For the production of non-ferrous crude metals from ore, concentrates or secondary raw materials by metallurgical, chemical or electrolytic processes (ii) For the smelting, including the alloying, of non-ferrous metals, including recovered products (refining, foundry casting, etc.)
			2		(e)_(ii)	
	36	Casting of steel	2		(b)	(b) Installations for the production of pig iron or steel (primary or secondary melting) including continuous casting
	37	Electroplating	2		(f)	(f) Installations for surface treatment of metals and plastic materials using an electrolytic or chemical process

NBB sector_name	ID	NBB sub_sector_name	ID	PRTR_sector_name	ID	PRTR_sub_sector_name
	38	First-stage aluminium smelting	2		(e)_(ii)	(e) Installations: (i) For the production of non-ferrous crude metals from ore, concentrates or secondary raw materials by metallurgical, chemical or electrolytic processes (ii) For the smelting, including the alloying, of non-ferrous metals, including recovered products (refining, foundry casting, etc.)
	39	First-stage copper smelting	2		(e)_(ii)	
	40	Manufacture of accumulators	2		(e)_(i)	
					(e)_(ii)	
	41	Manufacture of basic iron and steel	2		(a)	(a) Metal ore (including sulphide ore) roasting or sintering installations
	42	Manufacture of lead oxides and lead-based colouring matter	2		(a)	
	43	Manufacture of other non-ferrous metals	2		(a)	
	44	Manufacture of zinc or tin	2		(a)	
	45	Second-stage aluminium smelting	2		(e)_(ii)	(e) Installations: (i) For the production of non-ferrous crude metals from ore, concentrates or secondary raw materials by metallurgical, chemical or electrolytic processes (ii) For the smelting, including the alloying, of non-ferrous metals, including recovered products (refining, foundry casting, etc.)
	46	Second-stage copper smelting	2		(e)_(ii)	
	47	Second-stage lead smelting	2		(e)_(ii)	
Manufacture of refined petroleum products	66	Manufacture of petrochemicals	1	Energy sector	(a)	(a) Mineral oil and gas refineries
	68	Transport and marketing of petroleum products				
Production of energy	78	Combustion of heating oil	1		(c)	(c) Thermal power stations and other combustion installations
	79	Combustion of lignite	1		(c)	(c) Thermal power stations and other combustion installations
	80	Gaz production	1		(b)	(b) Installations for gasification and liquefaction

NBB sector_name	ID	NBB sub_sector_name	ID	PRTR_sector_name	ID	PRTR_sub_sector_name
Tanning and dressing of leather	84	Tanning and dressing of leather	9	Other activities	(b)	(b) Plants for the tanning of hides and skins
Aquaculture	6	Fish breeding	7	Intensive livestock production and aquaculture	(b)	(b) Intensive aquaculture
	7	Fish processing	8	Animal and vegetable products from the food and beverage sector	(b)_(i)	(b) Treatment and processing intended for the production of food and beverage products from: (i) Animal raw materials (other than milk) (ii) Vegetable raw materials
Management of urban solid waste	24	Waste dumps	5	Waste and wastewater management	(c)	(c) Installations for the disposal of non-hazardous waste
Manufacture of pharmaceuticals	63	Cosmetics and perfumes			(e)	(e) Installations using a chemical or biological process for the production on an industrial scale of basic pharmaceutical products
	64	Pharmaceuticals			(e)	
	65	Soaps, detergents and sanitary preparations			(e)	
Manufacture of paper	60	Manufacture of articles of paper or paperboard	6	Paper and wood production and processing	(b)	(b) Industrial plants for the production of paper and board and other primary wood products (such as chipboard, fiberboard and plywood)
	61	Manufacture of paper and pulp	6		(a)	(a) Industrial plants for the production of pulp from timber or similar fibrous materials
	62	Printing activities	9		(c)	Installation for the surface treatment or substances, object or products using organic solvents, in particular for dressing, printing, coating, degreasing, waterproofing, sizing, painting, cleaning or impregnating
Manufacture of fertilizers	32	Nitrogenous fertilizers	4	Chemical industry	(c)	(c) Chemical installations for the production on an industrial scale of phosphorous-, nitrogen- or potassium-based fertilisers (simple or compound fertilisers)
	33	Phosphate fertilizers and phosphoric acid	4		(c)	

NBB sector_name	ID	NBB sub_sector_name	ID	PRTR_sector_name	ID	PRTR_sub_sector_name
Manufacture of other inorganic chemicals	48	Industrial gases	4		(b)_(i)	(b) Chemical installations for the production on an industrial scale of basic inorganic chemicals, such as: (i) Gases, such as ammonia, chlorine or hydrogen chloride, fluorine or hydrogen fluoride, carbon oxides, sulphur compounds, nitrogen oxides, hydrogen, sulphur dioxide, carbonyl chloride (ii) Acids, such as chromic acid, hydrofluoric acid, phosphoric acid, nitric acid, hydrochloric acid, sulphuric acid, oleum, sulphurous acids (iii) Bases, such as ammonium hydroxide, potassium hydroxide, sodium hydroxide (iv) Salts, such as ammonium chloride, potassium chlorate, potassium carbonate, sodium carbonate, perborate, silver nitrate (v) Non-metals, metal oxides or other inorganic compounds such as calcium carbide, silicon, silicon carbide
	49	Manufacture of ceramic products	3	Mineral industry	(g)	(g) Installations for the manufacture of ceramic products by firing, in particular roofing tiles, bricks, refractory bricks, tiles, stoneware or porcelain
	50	Manufacture of glass and glass products	3	Mineral industry	(e)	(e) Installations for the manufacture of glass, including glass fibre
	51	Other (activated carbon, composed of Al, Ba, Ca, Ni, â€¦)	4	Chemical industry	(b)_(v)	(b) Chemical installations for the production on an industrial scale of basic inorganic chemicals, such as: (i) Gases, such as ammonia, chlorine or hydrogen chloride, fluorine or hydrogen fluoride, carbon oxides, sulphur compounds, nitrogen oxides, hydrogen, sulphur dioxide, carbonyl chloride (ii) Acids, such as chromic acid, hydrofluoric acid, phosphoric acid, nitric acid, hydrochloric acid, sulphuric acid, oleum, sulphurous acids (iii) Bases, such as ammonium hydroxide, potassium hydroxide, sodium hydroxide (iv) Salts, such as ammonium chloride, potassium chlorate, potassium carbonate, sodium carbonate, perborate, silver nitrate (v) Non-metals, metal oxides or other inorganic compounds such as calcium carbide, silicon, silicon carbide

NBB sector_name	ID	NBB sub_sector_name	ID	PRTR_sector_name	ID	PRTR_sub_sector_name
	52	Synthesis of pigments	4		(a)_(x)	(a) Chemical installations for the production on an industrial scale of basic organic chemicals, such as: (i) Simple hydrocarbons (linear or cyclic, saturated or unsaturated, aliphatic or aromatic) (ii) Oxygen-containing hydrocarbons such as alcohols, aldehydes, ketones, carboxylic acids, esters, acetates, ethers, peroxides, epoxy resins (iii) Sulphurous hydrocarbons (iv) Nitrogenous hydrocarbons such as amines, amides, nitrous compounds, nitro compounds or nitrate com- pounds, nitriles, cyanates, isocyanates (v) Phosphorus-containing hydrocarbons (vi) Halogenic hydrocarbons (vii) Organometallic compounds (viii) Basic plastic materials (polymers, synthetic fibres and cellulose-based fibres) (ix) Synthetic rubbers (x) Dyes and pigments (xi) Surface-active agents and surfactants
Manufacture of textiles	69	Manufacture and dyeing of textiles	4		(a)_(viii)	
			9	Other activities	(a)	(a) Plants for the pre-treatment (operations such as washing, bleaching, mercerisation) or dyeing of fibres or textiles

NBB sector_name	ID	NBB sub_sector_name	ID	PRTR_sector_name	ID	PRTR_sub_sector_name
	70	Manufacture of clothing and other finished products made of fabric	4	Chemical industry	(a)_(viii)	(a) Chemical installations for the production on an industrial scale of basic organic chemicals, such as: (i) Simple hydrocarbons (linear or cyclic, saturated or unsaturated, aliphatic or aromatic) (ii) Oxygen-containing hydrocarbons such as alcohols, aldehydes, ketones, carboxylic acids, esters, acetates, ethers, peroxides, epoxy resins (iii) Sulphurous hydrocarbons (iv) Nitrogenous hydrocarbons such as amines, amides, nitrous compounds, nitro compounds or nitrate com- pounds, nitriles, cyanates, isocyanates (v) Phosphorus-containing hydrocarbons (vi) Halogenic hydrocarbons (vii) Organometallic compounds (viii) Basic plastic materials (polymers, synthetic fibres and cellulose-based fibres) (ix) Synthetic rubbers (x) Dyes and pigments (xi) Surface-active agents and surfactants
Tourism	85	Hotel, food and beverage services				
	86	Recreational activities				
Building and repairing of ships and boats	8	Drydocks				
	9	Shipyards	9	Other activities	(e)	(e) Installations for the building of, and painting or removal of paint from ships
Other	73	Installations for melting mineral substances	3	Mineral industry	(f)	(f) Installations for melting mineral substances, including the production of mineral fibres
	74	Manufacture of Wood	6	Paper and wood production and processing	(b)	(b) Industrial plants for the production of paper and board and other primary wood products (such as chipboard, fiberboard and plywood)
	75	Other				
Treatment and storage of hazardous wastes	93	Technical centres for landfill and storage	5	Waste and wastewater management	(d)	(d) Landfills (excluding landfills of inert waste and landfills, which were definitely closed)
Waste incineration and management of its residues	97	Urban waste incineration plants	5		(b)	(b) Installations for the incineration of non-hazardous waste

NBB sector_name	ID	NBB sub_sector_name	ID	PRTR_sector_name	ID	PRTR_sub_sector_name
Waste management activities	98	Refuse collection, depollution and similar activities	5		(a)	(a) Installations for the recovery or disposal of hazardous waste
Manufacture and formulation of biocides	25	Formulation of pesticides	4	Chemical industry	(d)	(d) Chemical installations for the production on an industrial scale of basic plant health products and of biocides
	26	Synthesis of phytosanitary products	4		(d)	
Mining and quarrying	71	Extraction of petroleum and gas	3	Mineral Industry	(a)	(a)Underground mining activities[49]
	72	Metal mining	3	Mineral industry	(a)	(a) Underground mining and related operations
Recycling activities	81	Recycling of lubrifying oils	5	Waste and wastewater management	(a)	(a) Installations for the recovery or disposal of hazardous waste
	82	Recycling of metal waste and scrap				
	83	Recycling of non-metal waste and scrap (paper, glass)				
Manufacture of electronics products	29	Manufacture of electric machines and appliances (condensers, transformers)				
	30	Manufacture of integrated circuits				
	31	Manufacture of radio, television and communications equipment				
Treatment of sewage sludge	94	Compost production				
Factories that cause physical changes to the environment	10	Seawater desalination plants				

[49] E-PRTR implementation practice in Spain

Appendix VIII
Legal Template on PRTR

Table of Contents

1 Introduction

1. During the Regional Meeting on PRTR and Pollution Indicators in Ankara, Turkey in June 2014, and with the view to supporting countries in the framework of MAP and H2020 Programme of work, the Meeting recommended:

- Developing PRTR legal framework based on a review of gaps, limitations and options among Mediterranean countries; and
- Agreeing on a common priority list of chemicals, activities and common methodology for emission factors among all the countries as appropriate.

2. In December 2017, the Contracting Parties at their 20th Ordinary Meeting in Tirana, Albania, adopted the Programme of Work for the biennium 2018-2019 which mandated MED POL to finalize PRTR guidelines and common emission factors to assess the load of pollutants to the Mediterranean Sea; as well as requested the support to the Contracting Parties in their implementation with regards to NBB/PRTR reporting.

3. Further to its mandate by COP 20, MED POL prepared the first draft of the legal template based on preliminary inputs on the PRTR legal framework which were discussed during the 2nd ENI SEIS II South Support Mechanism Regional Workshop on Indicators in Athens, Greece on 17-18 April 2018.

4. MEDPOL presented this document in the Regional Meeting on Reporting of Releases to Marine and Coastal Environment from Land-Based Sources and Activities and related Indicators held on 19-20 March 2019, Tirana, Albania, and the Meeting proposed a number of modifications emphasizing further need for streamlining it with the Aarhus Convention, PRTR Protocol and E-PRTR, especially regarding the clauses related to minimum requirements for reporting, establishment of thresholds, and information disclosure.

2 Main elements of the Regulation for PRTR and Promotion of Chemical Management

5. PRTRs are inventories of pollution from industrial sites and other sources. PRTR obligates owners/operators to report the amounts of pollutants released into the environment or transferred to outside facilities **based on measurements, calculations or estimations**. Although it regulates information on pollution, rather than pollution directly, the PRTR regulatory framework/law exerts a significant downward pressure on levels of pollution, as no facilities will want to be identified as among the biggest polluters.

6. This template aims at providing the "minimum requirements" for elaborating a Regulation for Contacting Parties wishing to implement and enforce a PRTR system nationally. Therefore, each Contracting Party may design a stricter PRTR national system.

7. The following core elements are proposed to be incorporated into a "legal template" for consideration by the Countries when developing their national PRTR Regulation.

2.1 Aim of the Regulation

8. The aim of PRTR Regulation Template is twofold:

a) To promote, develop and implement internationally recognized reporting tool such as PRTR to facilitate reporting under Article 13 of the LBS Protocol of the Barcelona Convention with regards to loads of pollutants released from industries and other sources as appropriate to marine and coastal environment;
b) To enhance public access to information through the establishment of a coherent, integrated, nationwide pollutant release and transfer registers, which could facilitate public participation in environmental decision making as well as contribute to the prevention and reduction of

pollution of the environment in line with relevant international regulations as well as with Article 15 of the Barcelona Convention.

2.2 Definitions

9. In line with the international regulations on PRTRs, mainly the UNECE PRTR Protocol[50] and the E-PRTR Regulation,[51] the following definitions may be considered for inclusion in the national PRTR Regulation:

'Pollutant':	A substance or a group of substances in gaseous, liquid or solid form that may be harmful to the environment or to human health on account of its properties and of its introduction into the environment;
'Release':	Any introduction of pollutants into the environment (air, water, and soil/land) as a result of any human activity, whether deliberate or accidental, routine or non-routine, including spilling, emitting, discharging, injecting, disposing or dumping, or through sewer systems without final waste-water treatment;
'Transfer':	The movement beyond the boundaries of a facility of waste destined for recovery or disposal and of pollutants in waste water destined for wastewater treatment;
'Facility':	Means one or more installations on the same site, or adjoining sites, that are owned or operated by the same natural or legal person;
'Installation':	Means a stationary technical unit where one or more activities listed in Annex I are carried out, and any other directly associated activities which have a technical connection with the activities carried out on that site and which could have an effect on emissions and pollution;
'Owner':	The natural or legal person(s) possessing a facility;
'Operator':	Any natural or legal person who operates or controls the facility or, where this is provided for in national legislation, to whom decisive economic power over the technical functioning of the facility has been delegated;
'Competent authority':	The national authority or authorities, or any other competent body or bodies, designated by the Country to manage the PRTR system;
'Public':	One or more natural or legal persons, and, in accordance with national legislation or practice, their associations, organizations or groups;
'Waste':	Substances or objects which are: a) disposed of or recovered; b) intended to be disposed of or recovered, or c) required by the provisions of national law to be disposed of or recovered.
'Hazardous waste':	Waste that is defined as hazardous by the provisions of national law[52];

[50] http://www.unece.org/env/pp/prtr.html

[51] Regulation (EC) No166/2006 of the European Parliament and of the Council of 18January 2006 concerning the establishment of a European Pollutant Release and Transfer Register and amending Council Directives 91/689/EEC and96/61/EC.

[52] Hazardous wastes are explicitly defined as stipulated in the Article 3 and national definition of hazardous waste is stipulated in Article 4 of Protocol on the Prevention of Pollution of the Mediterranean Sea by Transboundary Movements of Hazardous Wastes and their Disposal (adopted in 1996), entered into force in 2011 (http://web.unep.org/unepmap/who-we-are/legal-framework)

(*) Annex I of this document contains also the additional substances for delivery of NBB as indicated in Annex I, Section C of the LBS Protocol.

"Waste water': Used water containing substances or objects that is subject to regulation by national law.

2.3 Designated Pollutants under PRTR Regulation

10. "Designated Pollutants" are subject to the provision of the PRTR Regulation.

11. Designated pollutants subject to PRTR Regional Template are those which are deemed harmful to human health and ecosystems, and those which disperse widely in the natural environment and may be exposed. A proposed list of specified pollutants is included in Annex I of this document (*).

2.4 Targeted Activities of PRTR Reporting

12. Targeted activities referred to also as "Designated Activities," are those which generate releases or transfers of any of the pollutants specified in the "Designated Pollutants" list during their facility operations. Designated activities are obliged to report the amounts of releases and transfers of pollutants to the environment. A proposed list or designated activities is included in Annex II of this document. (**)

2.5 Minimum Requirements under the PRTR System

13. As this PRTR template regulation constitutes the minimum requirements for consideration by the Countries, competent authorities may contemplate additional requirements for reporting depending on the needs of the Country, usually in terms of pollutants, substances or group of substances, other parameters, activities, thresholds or additional reporting requirements.

14. When establishing the national PRTR system/regulation, the reporting provision under the framework of Article 13 of LBS Protocol for the National Baseline Budget updates should be considered.

15. In defining threshold values for the Designated Pollutants list and Targeted Activities list the Contracting Parties may use the information provided in Annex I and Annex II of this Regional PRTR Template.

2.6 Responsibilities of the Competent Authorities

16. The competent authorities shall design, install, operate, maintain and update the PRTR system by allocating the necessary personnel, financial and organizational means as appropriate.

17. The competent authorities shall initially guide the industrial owners/operators on their reporting obligations by preparing and disseminating the proper guidance documents or other awareness/capacity/training activities

18. The competent authorities shall check and approve the compliance of the annual reports submitted by operators.

2.7 Responsibilities of Operators

19. The operators/owners shall present the annual reports in the determined period for the facilities, as determined by the competent authority.

(**) Annex II of this document contains also the additional activities for delivery of NBB as indicated in Annex I, Section A of the LBS Protocol.

20. The operator/owner is responsible for ensuring that the information provided in the annual reports is completed and qualified.

21. The operators/owner shall correct the reports rejected by the competent authorities and to submit information and documents for the verification and/or data validation works upon request.

2.8 Reporting Obligations

22. Facilities that undertake one or more of the activities specified in Annex II, above the applicable capacity thresholds specified, shall report annually to the competent authority, the amounts, along with an indication of whether the information is based on measurement, calculation or estimation of the following (***):

- Releases to air, water and soil/land of any pollutant specified in Annex I for which the applicable threshold values specified in Annex I are exceeded;
- Off-site transfers of hazardous waste exceeding 2 tons per year, or non-hazardous waste exceeding 2,000 tons per year for any operations of recovery or disposal;
- Off-site transfers of any pollutant specified in Annex I or wastewater destined for wastewater treatment for which the threshold value specified in Annex I, column 1b is exceeded;
- The reports should include releases and transfers resulting as totals of all deliberate, accidental, routine and non-routine activities;
- The operator/owner of each facility shall collect the information of the facility's releases and off-site transfers required for reporting in an appropriate periodic frequency;
- When preparing the report, the operator/owner should use the best available information, which may include monitoring data, emission factors, mass balance equations, indirect monitoring or other calculations, engineering judgements and other methods in accordance with internationally approved methodologies where these are available.

23. The operator/owner of facility that undertakes one or more activities specified in Annex II above the applicable capacity thresholds specified therein shall communicate to its competent authority the information identifying the facility in accordance with the reporting format described in Annex III(***)

2.9 Information Required for PRTR Reporting

24. PRTR reporting requires, at least, two information components: (i) amount of release and (ii) amount of transfer.

i. Amount of release is the quantity released into air, into public bodies of water, and/or into soil/land.
ii. Amount of transfer is the quantity of pollutants transferred in a sewage collection system to a wastewater treatment facility or to an off-site facility as waste.

25. Operators/owners of facilities are required to use the best available information related to the methodologies used to determine the emission and transfer values which may include monitoring data, emission factors, mass balance equations, indirect monitoring or other calculations, engineering judgments and other methods. Where appropriate, this should be done in accordance with internationally approved methodologies.

(***) Contracting Parties can go beyond this minimum **r**equirement of reporting obligations when establishing their own PRTR system/regulation depending on their final needs and other regional commitments.

26. A sample reporting template is included in Annex III.

2.10 Information Disclosure

27. PRTR data provided by individual facilities are disclosed by public announcement by the Government as well as being disclosed on request. The data from individual facilities as well as national data are disclosed on a designated PRTR website. The PRTR Regulation may make provisions to facilitate public access to disclosed data and information based on international[54] and their national relevant regulations.

28. If an operator/owner of a facility has justifiable reasons that specific information concerning releases or off-site transfers should be kept confidential, the operator has to inform the competent authorities and justify this request. Authorities have to approve which data can be kept confidential in accordance with the national law/regulation. Considering the best practices and the international experiences worldwide, in terms of environmental information, "confidentiality claims are usually interpreted in a restrictive way.

29. A request for access to the information contained in PRTR may be refused in cases like, for example:

- The confidentiality of commercial and/or industrial information can be endangered;
- Intellectual property rights (e.g. production technologies) do not allow the dissemination of such an information;
- The information contained in the PRTR system is still in a preliminary stage or has not yet been verified and officially accepted;
- Juridical measures are in progress where any provision of information can affect their processing.

2.11 Financial Sanctions and Penalties

30. The national PRTR Regulation must include the corresponding financial sanctions and penalties for owners/operators who do not comply with the reporting obligations required. for example, facilities owners/operators may be subject to fines and penalties in case of:

- Non-submission or delay in submission of annual reports on the releases according to reporting obligations;
- Non-maintenance of monitoring records further to permitting of facility;
- Violation of environmental conditions stated in the relevant permit concerning the content of the reports to be delivered without justification of the reasons;
- Failure to provide information about the method for data collection (measured, calculated, estimated);
- No response to requirements imposed by the competent authorities concerning additional information and/or clarifications to submitted data.

[54] For the Contracting Parties that are parties to Aarhus Convention, the Article regarding public access to information as set out by the Convention is mandatory.

Appendix I
List of Designated Pollutants

No	CAS number	Pollutant (1)	Threshold for releases (column 1)		
			to air (column 1a) kg/year	to water (column 1b) kg/year	to land (column 1c) kg/year
1	74-82-8	Methane (CH_4)	100 000	— (2)	—
2	630-08-0	Carbon monoxide (CO)	500 000	—	—
3	124-38-9	Carbon dioxide (CO_2)	100 million	—	—
4		Hydro-fluorocarbons (HFCs) (3)	100	—	—
5	10024-97-2	Nitrous oxide (N_2O)	10 000	—	—
6	7664-41-7	Ammonia (NH_3)	10 000	—	—
7		Non-methane volatile organic compounds (NMVOC)	100 000	—	—
8		Nitrogen oxides (NO_x/NO_2)	100 000	—	—
9		Perfluorocarbons (PFCs) (4)	100	—	—
10	2551-62-4	Sulphur hexafluoride (SF_6)	50	—	—
11		Sulphur oxides (SO_x/SO_2)	150 000	—	—
12		Total nitrogen	—	50 000	50 000
13		Total phosphorus	—	5 000	5 000
14		Hydrochlorofluorocarbons(HCFCs) (5)	1	—	—
15		Chlorofluorocarbons (CFCs) (6)	1	—	—
16		Halons (7)	1	—	—
17		Arsenic and compounds (as As) (8)	20	5	5
18		Cadmium and compounds (as Cd) (8)	10	5	5
19		Chromium and compounds (as Cr) (8)	100	50	50
20		Copper and compounds (as Cu) (8)	100	50	50
21		Mercury and compounds (as Hg) (8)	10	1	1
22		Nickel and compounds (as Ni) (8)	50	20	20
23		Lead and compounds (as Pb) (8)	200	20	20
24		Zinc and compounds (as Zn) (8)	200	100	100
25	15972-60-8	Alachlor	—	1	1
26	309-00-2	Aldrin	1	1	1
27	1912-24-9	Atrazine	—	1	1
28	57-74-9	Chlordane	1	1	1
29	143-50-0	Chlordecone	1	1	1
30	470-90-6	Chlorfenvinphos	—	1	1
31	85535-84-8	Chloro-alkanes, C_{10}-C_{13}	—	1	1

No	CAS number	Pollutant (1)	Threshold for releases (column 1)		
			to air (column 1a) kg/year	to water (column 1b) kg/year	to land (column 1c) kg/year
32	2921-88-2	Chlorpyrifos	—	1	1
33	50-29-3	DDT	1	1	1
34	107-06-2	1,2-dichloroethane (EDC)	1 000	10	10
35	75-09-2	Dichloromethane (DCM)	1 000	10	10
36	60-57-1	Dieldrin	1	1	1
37	330-54-1	Diuron	—	1	1
38	115-29-7	Endosulphan	—	1	1
39	72-20-8	Endrin	1	1	1
40		Halogenated organic compounds (as AOX) (9)	—	1 000	1 000
41	76-44-8	Heptachlor	1	1	1
42	118-74-1	Hexachlorobenzene (HCB)	10	1	1
43	87-68-3	Hexachlorobutadiene (HCBD)	—	1	1
44	608-73-1	1,2,3,4,5,6- hexachlorocyclohexane(HCH)	10	1	1
45	58-89-9	Lindane	1	1	1
46	2385-85-5	Mirex	1	1	1
47		PCDD + PCDF (dioxins + furans) (as Teq) (10)	0,0001	0,0001	0,0001
48	608-93-5	Pentachlorobenzene	1	1	1
49	87-86-5	Pentachlorophenol (PCP)	10	1	1
50	1336-36-3	Polychlorinated biphenyls (PCBs)	0,1	0,1	0,1
51	122-34-9	Simazine	—	1	1
52	127-18-4	Tetrachloroethylene (PER)	2 000	10	—
53	56-23-5	Tetrachloromethane (TCM)	100	1	—
54	12002-48-1	Trichlorobenzenes (TCBs) (all isomers)	10	1	—
55	71-55-6	1,1,1-trichloroethane	100	—	—
56	79-34-5	1,1,2,2-tetrachloroethane	50	—	—
57	79-01-6	Trichloroethylene	2 000	10	—
58	67-66-3	Trichloromethane	500	10	—

No	CAS number	Pollutant (1)	Threshold for releases (column 1)		
			to air (column 1a) kg/year	to water (column 1b) kg/year	to land (column 1c) kg/year
59	8001-35-2	Toxaphene	1	1	1
60	75-01-4	Vinyl chloride	1 000	10	10
61	120-12-7	Anthracene	50	1	1
62	71-43-2	Benzene	1 000	200 (as BTEX) (11)	200 (as BTEX) (11)
63		Brominated diphenylethers (PBDE) (12)	—	1	1
64		Nonylphenol and Nonylphenol ethoxylates (NP/NPEs)	—	1	1
65	100-41-4	Ethyl benzene	—	200 (as BTEX) (11)	200 (as BTEX) (11)
66	75-21-8	Ethylene oxide	1 000	10	10
67	34123-59-6	Isoproturon	—	1	1
68	91-20-3	Naphthalene	100	10	10
69		Organotin compounds (as total Sn)	—	50	50
70	117-81-7	Di-(2-ethyl hexyl) phthalate (DEHP)	10	1	1
71	108-95-2	Phenols (as total C) (13)	—	20	20
72		Polycyclic aromatic hydrocarbons (PAHs) (14)	50	5	5
73	108-88-3	Toluene	—	200 (as BTEX) (11)	200 (as BTEX) (11)
74		Tributyltin and compounds (15)	—	1	1
75		Triphenyltin and compounds (16)	—	1	1
76		Total organic carbon (TOC) (as total C or COD/3)	—	50 000	—
77	1582-09-8	Trifluralin	—	1	1
78	1330-20-7	Xylenes (17)	—	200 (as BTEX) (11)	200 (as BTEX) (11)
79		Chlorides (as total Cl)	—	2 million	2 million
80		Chlorine and inorganic com- pounds (as HCl)	10 000	—	—
1	1332-21-4	Asbestos	1	1	1
82		Cyanides (as total CN)	—	50	50
83		Fluorides (as total F)	—	2 000	2 000
84		Fluorine and inorganic com- pounds (as HF)	5 000	—	—
85	74-90-8	Hydrogen cyanide (HCN)	200	—	—
86		Particulate matter (PM_{10})	50 000	—	—
87	1806-26-4	Octylphenols and Octylphenol ethoxylates	—	1	—
88	206-44-0	Fluoranthene	—	1	—
89	465-73-6	Isodrin	—	1	—
90	36355-1-8	Hexabromobiphenyl	0.1	0,1	0,1

No	CAS number	Pollutant (1)	Threshold for releases (column 1)		
			to air (column 1a) kg/year	to water (column 1b) kg/year	to land (column 1c) kg/year
91	191-24-2	Benzo(g,h,i)perylene		1	
92					

(1) Unless otherwise specified any pollutant shall be reported as the total mass of that pollutant or, where the pollutant is a group of substances, as the total mass of the group.

(2) A hyphen (—) indicates that the parameter and medium in question do not trigger a reporting requirement.

(3) Total mass of hydrogen fluorocarbons: sum of HFC23, HFC32, HFC41, HFC4310mee, HFC125, HFC134, HFC134a, HFC152a, HFC143, HFC143a, HFC227ea, HFC236fa, HFC245ca, HFC365mfc.

(4) Total mass of perfluorocarbons: sum of CF_4, C_2F_6, C_3F_8, C_4F_{10}, c-C_4F_8, C_5F_{12}, C_6F_{14}.

(5) Total mass of substances including their isomers.

(6) Total mass of substances including their isomers.

(7) Total mass of substances including their isomers.

(8) All metals shall be reported as the total mass of the element in all chemical forms present in the release.

(9) Halogenated organic compounds which can be adsorbed to activated carbon expressed as chloride.

(10) Expressed as I-TEQ.

(11) Single pollutants are to be reported if the threshold for BTEX (the sum parameter of benzene, toluene, ethyl benzene, xylenes) is exceeded.

(12) Total mass of the following brominated diphenylethers: penta-BDE, octa-BDE and deca-BDE.

(13) Total mass of phenol and simple substituted phenols expressed as total carbon.

(14) Polycyclic aromatic hydrocarbons (PAHs) are to be measured for reporting of releases to air as benzo(a)pyrene (50-32-8), benzo(b)fluo- ranthene (205-99-2), benzo(k)fluoranthene (207-08-9), indeno(1,2,3-cd)pyrene (193-39-5).

(15) Total mass of tributyltin compounds, expressed as mass of tributyltin.

(16) Total mass of triphenyltin compounds, expressed as mass of triphenyltin.

(17) Total mass of xylene (ortho-xylene, meta-xylene, para-xylene).

Additional pollutants deriving from NBB reporting obligation:

- Biochemical Oxygen Demand (BOD_5);
- Chemical Oxygen Demand (COD) and,
- Suspended Solids (SS)

Appendix II
List of Targeted Activities

No	Activity	Capacity threshold
1.	Energy sector	
(a)	Mineral oil and gas refineries	*
(b)	Installations for gasification and liquefaction	*
(c)	Thermal power stations and other combustion installations	With a heat input of 50 megawatts (MW)
(d)	Coke ovens	*
(e)	Coal rolling mills	With a capacity of 1 tonne per hour
(f)	Installations for the manufacture of coal products and solid smokeless fuel	*
2.	Production and processing of metals	
(a)	Metal ore (including sulphide ore) roasting or sintering installations	*
(b)	Installations for the production of pig iron or steel (primary or secondary melting) including continuous casting	With a capacity of 2,5 tonnes per hour
(c)	Installations for the processing of ferrous metals: (i) Hot-rolling mills (ii) Smitheries with hammers (iii) Application of protective fused metal coats	With a capacity of 20 tonnes of crude steel per hour With an energy of 50 kilojoules per hammer, where the calorific power used exceeds 20 MW With an input of 2 tonnes of crude steel per hour
(d)	Ferrous metal foundries	With a production capacity of 20 tonnes per day
(e)	Installations: (i) For the production of non-ferrous crude metals from ore, concentrates or secondary raw materials by metallurgical, chemical or electrolytic processes (ii) For the smelting, including the alloying, of non-ferrous metals, including recovered products (refining, foundry casting, etc.)	* With a melting capacity of 4 tonnes per day for lead and cadmium or 20 tonnes per day for all other metals
(f)	Installations for surface treatment of metals and plastic materials using an electrolytic or chemical process	Where the volume of the treatment vats equals 30 m^3
3.	Mineral industry	
(a)	Underground mining and related operations	*
(b)	Opencast mining and quarrying	Where the surface of the area effectively under extractive operation equals 25 hectares
(c)	Installations for the production of: (i) Cement clinker in rotary kilns (ii) Lime in rotary kilns (iii) Cement clinker or lime in other furnaces	With a production capacity of 500 tonnes per day With a production capacity of 50 tonnes per day With a production capacity of 50 tonnes per day
(d)	Installations for the production of asbestos and the manufacture of asbestos-based products	*
(e)	Installations for the manufacture of glass, including glass fibre	With a melting capacity of 20 tonnes per day
(f)	Installations for melting mineral substances, including the production of mineral fibres	With a melting capacity of 20 tonnes per day
(g)	Installations for the manufacture of ceramic products by firing, in particular roofing tiles, bricks, refractory bricks, tiles, stoneware or porcelain	With a production capacity of 75 tonnes per day, or with a kiln capacity of 4 m3 and with a setting density per kiln of 300 kg/m3

No	Activity	Capacity threshold
4. (a)	Chemical industry Chemical installations for the production on an industrial scale of basic organic chemicals, such as: (i) Simple hydrocarbons (linear or cyclic, saturated or unsaturated, aliphatic or aromatic) (ii) Oxygen-containing hydrocarbons such as alcohols, aldehydes, ketones, carboxylic acids, esters, acetates, ethers, peroxides, epoxy resins (iii) Sulphurous hydrocarbons (iv) Nitrogenous hydrocarbons such as amines, amides, nitrous compounds, nitro compounds or nitrate com-pounds, nitriles, cyanates, isocyanates (v) Phosphorus-containing hydrocarbons (vi) Halogenic hydrocarbons (vii) Organometallic compounds (viii) Basic plastic materials (polymers, synthetic fibres and cellulose-based fibres) (ix) Synthetic rubbers (x) Dyes and pigments (xi) Surface-active agents and surfactants	*
(b)	Chemical installations for the production on an industrial scale of basic inorganic chemicals, such as: (i) Gases, such as ammonia, chlorine or hydrogen chloride, fluorine or hydrogen fluoride, carbon oxides, sulphur com- pounds, nitrogen oxides, hydrogen, sulphur dioxide, carbonyl chloride (ii) Acids, such as chromic acid, hydrofluoric acid, phosphoric acid, nitric acid, hydrochloric acid, sulphuric acid, oleum, sulphurous acids (iii) Bases, such as ammonium hydroxide, potassium hydroxide, sodium hydroxide (iv) Salts, such as ammonium chloride, potassium chlorate, potassium carbonate, sodium carbonate, perborate, silver nitrate (v) Non-metals, metal oxides or other inorganic compounds such as calcium carbide, silicon, silicon carbide	*
(c)	Chemical installations for the production on an industrial scale of phosphorous-, nitrogen- or potassium-based fertilisers (simple or compound fertilisers)	*
(d)	Chemical installations for the production on an industrial scale of basic plant health products and of biocides	*
(e)	Installations using a chemical or biological process for the production on an industrial scale of basic pharmaceutical products	*
(f)	Installations for the production on an industrial scale of explosives and pyrotechnic products	*
5.	Waste and wastewater management	
(a)	Installations for the recovery or disposal of hazardous waste	Receiving 10 tonnes per day
(b)	Installations for the incineration of non-hazardous waste	With capacity of 3 tonnes per hour
(c)	Installations for the disposal of non-hazardous waste	With a capacity of 50 tonnes per day
(d)	Landfills	Receiving 10 tonnes per day or with a total capacity of 25 000 tonnes
(e)	Installations for the disposal or recycling of animal carcasses and animal waste	With a treatment capacity of 10 tonnes per day
(f)	Urban waste-water treatment plants	With a capacity of 100000 population equivalents

No	Activity	Capacity threshold
(g)	Independently operated industrial waste-water treatment plants which serve one or more activities of this annex	With a capacity of 10 000 m3 per day (4)
6.	Paper and wood production and processing	
(a)	Industrial plants for the production of pulp from timber or similar fibrous materials	*
(b)	Industrial plants for the production of paper and board and other primary wood products (such as chipboard, fibreboard and plywood)	With a production capacity of 20 tonnes per day
(c)	Industrial plants for the preservation of wood and wood products with chemicals	With a production capacity of 50 m3 per day
7.	Intensive livestock production and aquaculture	
(a)	Installations for the intensive rearing of poultry or pigs	(i) With 40 000 places for poultry (ii) With 2 000 places for production pigs (over 30 kg) (iii) With 750 places for sows
(b)	Intensive aquaculture	With a production capacity of 1 000 tonnes of fish or shellfish per year
No	Activity	Capacity threshold
8.	Animal and vegetable products from the food and beverage sector	
(a)	Slaughterhouses	With a carcass production capacity of 50 tonnes per day
(b)	Treatment and processing intended for the production of food and beverage products from: (i) Animal raw materials (other than milk) (ii) Vegetable raw materials	With a finished product production capacity of 75 tonnes per day With a finished product production capacity of 300 tonnes per day (average value on a quarterly basis)
(c)	Treatment and processing of milk	With a capacity to receive 200 tonnes of milk per day (average value on an annual basis)
9.	Other activities	
(a)	Plants for the pre-treatment (operations such as washing, bleaching, mercerisation) or dyeing of fibres or textiles	With a treatment capacity of 10 tonnes per day
(b)	Plants for the tanning of hides and skins	With a treatment capacity of 12 tonnes of finished product per day
(c)	Installations for the surface treatment of substances, objects or products using organic solvents, in particular for dressing, printing, coating, degreasing, waterproofing, sizing, painting, cleaning or impregnating	With a consumption capacity of 150 kg per hour or 200 tonnes per year
(d)	Installations for the production of carbon (hard-burnt coal) or electro-graphite by means of incineration or graphitisation	*
(e)	Installations for the building of, and painting or removal of paint from ships	With a capacity for ships 100 m long

*No threshold (any capacity)

Additional sector of activities deriving from Annex I, Section A of LBS Protocol which are mandatory for NBB reporting are:

- Harbor operations;
- The electronic industry
- Tourism;
- Agriculture;
- Transport and
- Works which cause physical alteration of the natural state of coastline.

Appendix III
Reporting Format (as a minimum obligation)

Reference year		
Identification of the facility		
Name of the parent company Name of the facility Identification number of facility Street address Town Postal code Country Coordinates of the location River basin district NACE-code (4 digits) Main activity Production volume (optional) Number of installations (optional) Number of operating hours in year (optional) Number of employees (optional) Text field for textual information or website address delivered by facility or parent company (optional)		
All Annex I activities of the facility		
Activity 1 (main activity) Activity 2 Activity N		
Release data to air for the facility for each pollutant exceeding threshold value (according to Annex II)		**Releases to air**
Pollutant 1 Pollutant 2 Pollutant N	M: measured; Analytical Method used C: calculated; Calculation Method used E: estimated	T: Total in kg/year A: accidental in kg/year
Technical measures	Type	Reduction of pollutants
Release data to water for the facility for each pollutant exceeding threshold value (according to Annex II)		**Releases to water**
Pollutant 1 Pollutant 2 Pollutant N	M: measured; Analytical Method used C: calculated; Calculation Method used E: estimated	T: Total in kg/year A: accidental in kg/year
Technical measures	Type	Reduction of pollutants
Release data to land for the facility for each pollutant exceeding threshold value (according to Annex II)		**Releases to land**
Pollutant 1 Pollutant 2 Pollutant N	M: measured; Analytical Method used C: calculated; Calculation Method used E: estimated	T: Total in kg/year A: accidental in kg/year
Technical measures	Type	Reduction of pollutants

Off-site transfer of each pollutant destined for wastewater treatment in quantities exceeding threshold value (according to Annex II)		
Pollutant 1 Pollutant 2 Pollutant N	M: measured; Analytical Method used C: calculated; Calculation Method used E: estimated	in kg/year
Off-site transfers of hazardous waste for the facility exceeding 2 tonnes/year		
Within the country: For Recovery (R)	M: measured; Analytical Method used C: calculated; Calculation Method used	in tonnes/year
Within the country: For Disposal (D)	M: measured; Analytical Method used C: calculated; Calculation Method used	in tonnes/year
To other countries: For Recovery (R) Name of the recoverer Address of the recoverer Address of actual recovery	M: measured; Analytical Method used C: calculated; Calculation Method used E: estimated	in tonnes/year
To other countries: For Disposal (D) Name of the disposer Address of the disposer Address of actual disposal site receiving the	M: measured; Analytical Method used C: calculated; Calculation Method used E: estimated	in tonnes/year
Off-site transfer of non-hazardous waste for the facility exceeding 2000 tonnes/year		
For Recovery (R)	M: measured; Analytical Method used C: calculated; Calculation Method used	in tonnes/year
For Disposal (D)	M: measured; Analytical Method used C: calculated; Calculation Method used E: estimated	in tonnes/year

Appendix IV
Comparison between sector of activity of LBS and PRTR

Part A			Part B
LBS Annex I (A)			PRTR
	LBS sector of Activity		**Corresponding Sector name**
1	Energy production	1	Energy sector
2	Fertilizer production		
3	Production and formulation of biocides	4	
4	The pharmaceutical industry		Chemical industry
5	Petroleum refining	1	Energy sector
6	The paper and paper-pulp industry	6	Paper and wood production and processing
7	Cement production	3	Mineral industry
8	The tanning industry	9	Other activities
9	The metal Industry	2	Production and processing of metals
10	Mining	3	Mineral industry
11	The shipbuilding and repairing industry	9	Other activities
12	Harbor operations		
13	The textile industry	9	Other activities
14	The electronic industry		
15	The recycling industry	5	Waste and wastewater management
16	Other sectors of the organic chemical industry	4	
17	Other sectors of the inorganic chemical industry	4	Chemical industry
18	Tourism		
19	Agriculture		
20	Animal husbandry	7	Intensive livestock production and aquaculture
21	Food processing	8	Animal and vegetable products from the food and beverage sector
22	Aquaculture	7	Intensive livestock production and aquaculture
23	Treatment and disposal of hazardous waste	5	
24	Treatment and disposal of domestic wastewater	5	
25	Management of municipal solid waste	5	
26	Disposal of sewage sludge	5	
27	The waste management industry	5	
28	Incineration of waste and management of its residues	5	Waste and wastewater management
29	Works which cause physical alteration of the natural state of coastline		
30	Transport		

Appendix IX
Guidelines for the Implementation of the Adopt-a-beach Measures in the Mediterranean

Table of Contents

List of Abbreviations / Acronyms

COP	Conference of the Parties
EU	European Union
IMAP	Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast and Related Assessment Criteria
MAP	Mediterranean Action Plan
MED POL	Mediterranean Pollution Assessment and Control Programme
NGO	Non-Governmental Organizations
PET	Polyethylene Terephthalate
PoW	Programme of Work
UN	United Nations

3 INTRODUCTION

31. The Adopt-a-Beach measures comprise of actions related to beach clean-up, coupled with beach marine litter monitoring surveys implemented at national level. The overall scope of the Adopt-a-Beach measures is to help Mediterranean public communities to increase their stewardship concept on the Mediterranean coastline to keep it clean; to raise public awareness on the threat posed by marine litter; as well as to support the Mediterranean Countries to prepare and develop their national monitoring programmes for beach marine litter.

4 SCOPE OF THE ADOPT-A-BEACH MEASURES

32. The scope of the "Adopt-a-Beach" measures is to:

i. Keep beaches clean and marine litter-free in the Mediterranean;
ii. Raise public awareness on the problem of marine litter;
iii. Inform citizens about marine litter sources, how they are produced and propose ways to minimize them;
iv. Enhance public participation at country level, to national and international clean-up actions for the coastal environment around the Mediterranean;
v. Support the preparation and development of the national monitoring programmes for beach marine litter in the Mediterranean; and
vi. Collect valuable data and information to assess the quantities and stranding fluxes of marine litter found along the Mediterranean coastlines and contribute to achieve the region-wide reduction target of 20% on beach marine litter by 2024.[55]

5 IMPLEMENTATION PHASES OF THE ADOPT-A-BEACH MEASURES

33. Adopt-a-Beach measures can be divided into four implementation phases:
a. Preparatory activities;
b. Implementation activities;
c. Reporting activities;
d. Possible integration with current IMAP-based national monitoring programmes.[56]

5.1 Preparatory activities

34. Preparatory activities entail the following tasks:

a. Appointment of a "Beach Coordinator";
b. Selection of candidate beaches;
c. Defining beach marine litter units;
d. Engagement of local communities;
e. Organizing teams of collection volunteers;
f. Development of the awareness raising campaigns and training materials needed for the organization of outreach activities targeted to the local communities; and
g. Securing necessary material and equipment needed for the cleaning/ disposal activities.

5.1.1 Tasks of the "Beach Coordinator"

[55] Decision IG.22/10: Implementing the Marine Litter Regional Plan in the Mediterranean, Annex III: Marine Litter Environmental Targets (Available in: English, French, Arabic, Spanish).

[56] Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast and Related Assessment Criteria.

35. The Beach Coordinator should be in charge of the execution of the different Adopt-a-Beach measures at local/ national level in a coordinated and consistent manner, and in synergy with the national monitoring programmes for beach marine litter. The Beach Coordinator should be responsible to report to national competent authorities and the timely execution of the required tasks. The Beach Coordinator may be a member of the community, being in charge of and responsible for, and having previous experience in the implementation of Adopt-a-Beach measures at local/national level. The Beach Coordinator may be appointed by the national authorities, or by the authorities being in charge for the implementation of the Adopt-a-Beach measures at local/national level.

36. The main tasks of the Beach Coordinator are to:

a. Engage, support, and coordinate the participation of the local communities, local authorities, NGOs, primary and secondary schools, civil society, volunteers etc.;
b. Assist in selecting the appropriate beaches for the implementation of the Adopt-a-beach measures based on the MED POL beach selection criteria;
c. Implement the adopt-a-beach methodology, proposed by MED POL under the present guidelines, in consultation with the national authorities;
d. Control the timely implementation of the Adopt-a-Beach measures based on the previously agreed work plan with the national authorities;
e. Train the volunteers, and corresponding teams, participating in the Adopt-a-Beach measures;
f. Ensure that all safety precautions are followed;
g. Develop a national photo guide for beach marine litter including the marine litter items most commonly found on beaches at national level (i.e. inclusion of a photograph and a brief description);
h. Oversee the awareness raising campaign, including the preparation and development of the campaigns' main messages and material in consultation with the national authorities;
i. Consider whether it is appropriate (e.g. for beaches of particular concern or importance) to implement additional steps as detailed below:
   - Identification of beach needs and priorities;
   - Prepare and coordinate the development of information material about the conservation of the beach.
j. Develop an inventory of Adopt-a-Beach measures implemented at national level and ensure synergies and cooperation;
k. Submit progress reports and data (e.g. number of volunteers, amounts, types and composition of the collected marine litter, etc.) to national authorities; and
l. Monitor and evaluate the costs, benefits and governance of the Adopt-a-Beach measures in order to assess the success of each measure and share lessons learnt.

5.1.2 Selection of candidate beaches

37. Information on beach environmental conditions is required to identify needs and priorities of the beach to be selected for the Adopt-a-Beach measures. This includes weather and sea prevailing conditions; proximity to local rivers, discharges of waste water, harbours, fishing grounds, shipping lanes or any other source of beach marine litter.

38. Environmental conditions of the beach should be established through an assessment checklist that considers aspects such as existing waste disposal bins and containers, type of bins and containers (with or without lids), existing recycling containers, information signs on permitted and prohibited uses, etc.

39. A typical assessment checklist is presented below:

ASSESSMENT CHECKLIST ON BEACH CONDITIONS	
Name of the beach	

Date	
Are there waste disposal bins and containers on the beach? (Y/N)	
What type of bins and containers? (with or without lids)	
Are there recycling containers on the beach? (Y/N)	
What waste fractions they collect?	
Are there information signs on permitted uses of the beach? (Y/N)	
Are there information signs that prohibit something? (Y/N)	
What is prohibited?	
Are you missing something on the beach (signs, toilets, etc.)? (Y/N)	
What are you missing?	

40. Different types of beaches should be considered for selection for the implementation of the Adopt-a-Beach measures (urban beaches, rural beaches, remote beaches, beaches close to riverine areas, river mouths, harbours, etc.). This would allow to have a comprehensive overview on the exposure of the beaches to marine litter sources. Special attention should be drawn to the contribution of local river streams on beach marine litter generation. The diversity of the beach selection criteria, during the selection process is highly desirable to ensure that all possible different sources for beach marine litter, are well addressed in the collected data and information. The more diverse criteria are applied during the selection process of the beaches, as the higher is the number of selected beaches, the less is the discrepancy that will be observed in the generated data.

41. The Adopt-a-beach measures have a very good potential for integration with the national bathing waters monitoring programmes and Blue Flag Programmes. The implementation of relevant measures can be included as part of the relevant criteria for certification. To this extent, selection of the same beaches for the implementation of the Adopt-a-beach measures, with those beaches that have received certification; and thus, are monitored in the framework of the Blue Flag Programmes, provide a very good potential for integration.

42. Further to the selection of beach, the Beach Coordinator should complete the MED POL Beach ID Form included in Annex II of this Guideline. This form should be filled for each beach respectively. The MED POL Beach ID Form should be updated once a year or earlier if the team of volunteers notice important changes in the surrounding environment (e.g. new developments or new types of uses, etc.).

43. Adopt-a-Beach measures should be implemented in conjunction with the current IMAP-based national monitoring programme for beach marine litter. Accordingly, it should be ensured that beaches are selected under common criteria. These include:

- Year-round accessibility to volunteer teams and the local communities;
- Accessibility for ease marine litter removal; and
- Posing no threat to endangered or protected species and their habitats, such as sea turtles, sea birds or shore birds, marine mammals or sensitive beach vegetation. Hence, this would exclude protected areas depending on local management arrangements.

44. It is recommended that two (2) to four (4) beaches are selected at national level for each country when implementing Adopt-a-beach measures. Selection should be based on national coastal characteristics (e.g. length of the coastline, level of engagement of public communities, etc.). The beaches should be selected in synergy, and in coordination with those beaches identified for the official monitoring programmes for beach marine litter. If no official monitoring programme for beach marine litter is already in place at national level, then the beaches selected for the implementation of

the Adopt-a-beach measures, based on the
MED POL selection criteria, could be used at a later stage as the basis for development of the national monitoring programme for beach marine litter.

5.1.3 Defining beach units

45. For Adopt-a-beach, a beach marine litter unit consists of the whole beach. In case of long beaches, and depending on capacity of volunteer teams, the beach can be divided into several units or stretches for reporting purposes.

46. Within each selected beach, a 100-m stretch should be defined where the marine litter items will be recorded by dedicated teams of volunteers, based on the specific methodology presented hereunder. The selection of the 100-m stretch should be done in synergy, and in cooperation with the 100-m stretch selected for the needs of the national monitoring programme for beach marine litter, if already in place, to ensure that no duplication occurs.

5.1.4 Defining beach marine litter units

47. The unit to be used to assess the beach marine litter density is 'number of items' and should be expressed as counts of marine litter items per 100-m stretch (i.e. items/100 m stretch). National teams may wish to also express beach marine litter density in 'number of items' per surface area[57] (i.e. marine litter items/m^2); but this should only be done in addition to the counts of marine litter items per 100-m stretch. In addition, the main category types of litter items should be weighed.

48. For the whole beach, where the volunteers are active, more aggregated results (e.g. total weight (kg) per different categories (e.g. plastic, metal, etc.), total number of items, items per main categories) could supplement the data deriving from the 100-m stretch of the beach.

5.1.5 Engagement of local communities

49. Engagement of local communities should aim to sensibilize and engage to various kinds of civil society groups (e.g. local communities, local authorities, NGOs, schools etc.[58]) to participate in the Adopt-a-Beach measures, to inform general public about the positive impacts of the measure in minimizing the stranded marine litter items along the coastlines. To this extent, no team should be excluded, having ensured in prior that a proper training of all the related communities and team members can be delivered.

5.1.6 Organizing teams of collection volunteers

50. Volunteers should be organized in teams to collect marine litter along the selected beach(es). Well-trained teams should be also assigned on the specific beach stretch (100 m), after having received special instructions from the Beach Coordinator. Volunteers should be organized in small teams, comprising of 5 to 6 persons each. According to the total number of volunteers and the corresponding number of teams, a beach grid should be established. Each team should be in charge for the collection of marine litter items on a specific cell of the beach grid.

51. Each team of volunteers should have a team leader who oversees marine litter collection, and to be in charge for the proper recording of the different marine litter items. The Beach Coordinator should control, coordinate and supervise the whole process.

[57] Based on the international experience, European (i.e. EU MSFD) and the experience from the other Regional Seas (e.g. OSPAR), the counts of marine litter items found on beaches, in items/100m stretch has proven to work quite well. The quantification of marine litter items found on beaches in items per surface areas may arise problems, especially for areas where low and high tides are present.

[58] The list is non-exhaustive. Various kinds of civil society groups are welcome to participate in the implementation of the Adopt-a-beach measures, further to obtaining the proper training.

5.1.7 Development of the awareness raising campaigns and training materials

52. When designing the awareness raising campaign, the campaign slogan could be "Adopt your Beach" in order to enhance ownership of the beach among the volunteers. The following key messages of the awareness raising campaign can be disseminated:

- Marine litter is a global environmental problem that can be solved if we act in a coordinated way;
- Marine litter is a problem that can be solved if everyone takes responsibility for their actions;
- Marine litter harms the environment, and it is in everyone's interest to solve the problem;
- Marine litter harms marine organisms (with a particular focus on sea turtles);
- Importance of recycling and reducing the use of single-use plastic items (e.g. plastic bags, PET bottles, etc.) and the need to replace these items with reusable items.

53. The following awareness raising materials are recommended:

- Logo of Adopt-a-Beach measures to enhance their corporate image;
- Poster for exhibitions and dissemination activities;
- Leaflets including information about the Adopt-a-Beach measures and national/local facts and figures on marine litter, including the marine litter definition; and
- Flags of the Adopt-a-Beach measures to be used as an identifier for the selected beaches.

54. The official launch of the Adopt-a-Beach measures should be covered by the press (e.g. local journals and other mass media). Press releases should be pre-drafted to inform the general public about the implementation of the activities and related outcomes.

55. Enhanced communication and coordination of relevant activities and initiatives under implementation at national level are highly desirable. It is of great importance to have all relevant communities and stakeholders implementing Adopt-a-beach measures, sitting around the same table, discussing elements related to the approach and methodology for implementation of required activities (e.g. different types and lists of marine litter items, selected beaches, collecting and gathering all relevant information and data, etc.). The establishment of National Coordination Platforms and/or Networks has been proven to work quite well (e.g. in France and Greece) to ensure enhanced communication and coordination at national level. The proposed Platforms and/or Networks are open-ended groups, established on a voluntary basis, aiming to include all relevant communities and stakeholders. Periodic meetings (e.g. two to four times per year), depending on available resources, participation and interest, are recommended.

5.1.8 Securing necessary material and equipment

56. Specific materials and equipment are necessary to conduct beach collections. This includes:

- Digital camera;
- Hand-held GPS unit;
- Extra batteries (ideally rechargeable batteries);
- 100-metre tape measure (fiberglass preferred);
- Flag markers/stakes;
- First aid kit (to include sunscreen, bug spray, drinking water);
- Protective gloves;
- Scissors/knife;
- Clipboard for each surveyor;
- Recording forms (printed on waterproof paper);
- Pencils;

- Rubbish bags;
- Rigid container and sealable lid to collect sharp items such as needles, etc.;
- Appropriate clothing;
- Scales (if possible to weigh your bags of collected litter);
- National photo guide to assist the volunteers with the identification and categorization of marine litter items. The photo guide should include the items commonly found on national beaches and their corresponding pictures and should be developed by the coordinator;
- Paint spray for large and/or heavy items.

5.2 Implementation activities

57. Implementation activities include three tasks:

a. Monitoring of marine litter;
b. Collection, recording and disposal of beach litter;
c. Safety and security precautions.

5.2.1 Monitoring of marine litter

58. Beach litter collection activity should be carried out on a regular basis preferably from the same groups of volunteers, on the same beaches and 100-m stretch, under the same standardized methodology which will give the opportunity to the national authority and to policy makers to compile, analyze and compare the obtained results.

59. Every effort should be made to implement monitoring procedures similar to those used for collection of data for IMAP-based national marine litter monitoring indicators. Accordingly, it is recommended that the Adopt-a-Beach measures are conducted on the selected beaches at least twice a year in spring and autumn and ideally four times in spring, summer, autumn and winter. Relevant local/national authorities should be notified for the schedule of these measures for proper coordination, if necessary.

5.2.2 Collection, recording and disposal of beach litter

60. Beach litter collection consists of collecting of all marine litter items found along the selected beaches and their disposal in beach waste bins or by means of the municipal waste collection containers, in an environmentally sound manner. The grouping of marine litter items, under same categories, while collecting marine litter items from the beaches may facilitate significantly the collection process, especially for the cases where recycling waste management schemes are in place from local or national authorities. The role of the local authorities during the collection and disposal process of the marine litter items is instrumental, and the Beach Coordinator should have made relevant arrangements in advance.

61. All marine litter items, of different sizes and types, found on the beaches should be collected and then removed from the beach by the assigned teams of volunteers. There is no upper size-limit for the collection of marine litter items found on the beaches. Special arrangements should be in place with the local authorities for the identified days during which the teams of volunteers are in the field in order to ensure the proper disposal of the collected marine litter. During these days, implementation of awareness raising campaigns from the local/national authorities, focusing on the total number and weight of collected marine litter, as well as on the main marine litter types and items, is strongly encouraged.

62. For big and heavy items, special arrangements with local waste management authorities should be made. For the selected beaches, and in particular for the 100-m stretch, items bigger than 0.5

cm should be sorted out by category type (plastic, paper, metal, glass, etc.), weighed and recorded in terms of total number of items, and total weight per each category. Items found in the 100 m stretch should be recorded on the MED POL Beach Survey Form[59], included under Annex III to the present report. Unknown marine litter items or items that are not included in the MED POL Beach Survey Form should be noted in the appropriate "other item" box. A short description of the item should then be included on the MED POL Beach Survey Form. If possible, digital photos of unknown items should be taken.

63. Larger items that cannot be removed safely by the volunteers should be left on the beach after having them marked (e.g. with a paint spray which meets environmentally friendly standards), so that they are not counted again in the next marine litter survey. Local authorities should be informed and should be responsible for their removal.

64. The collected marine litter items should be properly disposed following sound environmental disposal practices. Ideally, Adopt-a-Beach measures should use municipal waste management schemes, and therefore the collected marine litter should be disposed using municipal waste collection containers. If these do not exist, local municipalities should be informed for appropriate action, and alternatives should be explored.

65. Useful information can be also obtained with regards to beach marine litter typology, quantity, weight, seasonal variation, etc. This information should be recorded during the collection activities. This information can be used to propose ways and measures to prevent and minimize the generation and accumulation of marine litter on beaches in the future.

66. There are several examples in the Mediterranean where Adopt-a-Beach measures are combined with pilots implemented by scuba divers in shallow waters (i.e. up to approx. 20-meter depth). This approach should provide a good and integrated correlation between recorded marine litter items found on beaches and those observed in shallow waters. Such a correlation provides additional data and information on the sources (i.e. land-based and sea-based sources); the interlinkages between land and sea; as well as further strengthening and enhancing the participation of additional groups of civil society.

5.2.3 Safety and security precautions

67. Safety of volunteers should be always ensured. Any circumstances that may lead to unsafe situations for the volunteers (e.g. heavy wastes, strong winds, etc.) should be avoided. Since the Adopt-a-Beach measures are carried out in the field, there are a few inherent hazards. Caution should be used, and the general safety precautions presented below should be respected:

- Wear appropriate clothing. Be sure to wear close-toed shoes and gloves when handling marine litter as there may be sharp edges;
- If you come across a potentially hazardous material (e.g. oil or chemical drums, gas cans, propane tanks), contact competent authorities to report the item, providing as much information as possible. Do not touch the material or attempt to move it;
- Large, heavy objects should be left in place. Do not attempt to lift heavy marine litter items as they may have additional water weight and lifting them could result in injury. Inform local authorities;
- When in doubt, don't pick it up! If unsure of an item, do not touch it. If the item is potentially hazardous, report it to the appropriate authorities;
- Do not conduct field operations in severe weather conditions;

[59] The list of beach marine litter items has been updated based on the discussions and recommendations received during the Joint Meeting of the Ecosystem Approach Correspondence Group on Marine Litter Monitoring and ENI SEIS II Assessment of Horizon 2020/National Action Plans of Waste Indicators (Podgorica, Montenegro, 4-5 April 2019).

- Be aware of your surroundings and be mindful of 'trip and fall' hazards;
- Carry a means of communication for emergencies, for example a cell phone.
- Always carry a first aid kit. The kit should include an emergency water supply and sunscreen, as well as bug spray;
- Understand the symptoms of heat stress and actions to treat it;
- Make sure to carry enough water;
- Let someone know where you are and when you expect to return;
- The volunteer team should be composed of at least two people.

5.3 Reporting activities

68. Reporting activities include two key tasks:

a. Developing a national database on Adopt-a-Beach measures;
b. Posters and publicity information materials on items found on the beach.

5.3.1 Developing a national database on Adopt-a-Beach measures

69. It is recommended to develop a national database on Adopt-a-Beach measures updated and hosted by the national competent authority for the protection of the marine and coastal environment, where all relevant data and information are collected. This is a task that should be coordinated at the national level, and the Beach Coordinator should encourage national authorities to develop and maintain this database.

70. Quality Assurance (QA) and Quality Control (QC) for the generated data, streamlined into relevant national databases, should be further strengthened. This is particularly important in order to meet the requirement for integrating the Adopt-a-Beach measures at a later stage when implementation of the measure is mature enough with the national IMAP-based monitoring programmes for beach marine litter. Well trained teams of volunteers, possessing good level of knowledge on the applied methodology, reporting templates, list of marine litter items, related units, etc., are essential to meet the standards for QA and QC. Proper training of teams of volunteers and of relevant groups of civil society is one of the responsibilities of the "Beach Coordinator" and national competent authorities.

5.3.2 Posters and publicity information

71. Informative material about the conservation of the beach such us posters, panels or signs should be produced and placed at the beaches participating to the Adopt-a-Beach measures to inform the general public and also to disseminate the activities developed within these measures. These posters should be produced and developed in harmony with the surrounding environment.

72. Publicity material could also contain recommendations and advice to create a responsible behavior to beach users. Therefore, information material should be drafted according to the results of the beach needs and priorities identified and the data obtained during the beach litter collection activities, to draw attention to some frequent and abundant item for instance.

73. Main elements of the information materials may address:

- Explanation of the problem of marine litter (quantity, composition and effects) with the indication of some local and national data;
- Clarification of misinterpretations about what marine litter and relevant issues (e.g. cigarette butts are not made of paper, biodegradability and application of single-use plastics, etc.). Messages should be clear;
- Using trash bins; avoiding throwing away marine litter on beaches which adversely impact fish and other marine organisms;

- Avoid throwing away cigarette butts on beaches. Clarifying that cigarette butts are not made of paper; are not biodegradable; and persist in the marine and coastal environment for years to come, even if they are fragmented into smaller items;
- Avoiding abandoning glass bottles as they can break and cause injuries to other beach goers; and
- Picking up leftovers when consuming food items on the beach.

74. The participation of the volunteers in this process is key to enhance ownership. Editing and layout of the publicity material should be managed by the Beach Coordinator of the Adopt-a-Beach measures.

75. The Beach Coordinator should produce an assessment report containing data and results obtained above to inform local authorities about the abundance of marine litter on the selected beaches, its possible effect, as well as to provide recommendations on how to improve beach state in the future. In this sense, it is very important to include what are the most abundant items and when they are found to identify potential sources and to tackle appropriate prevention measures.

5.4 Possible integration of "Adopt-a-Beach" measures with the National Monitoring Programmes for Beach Marine Litter

76. When Adopt-a-Beach measures implementation has matured, and monitoring, collection and reporting is undertaken regularly and generating reliable data and information, national authorities may consider incorporating the selected beach(es) into the IMAP-based national monitoring system, as appropriate. Monitoring procedures recommended under IMAP are included in Annex I to this guideline.

6 References

DeFishGear Project. Methodology for Monitoring Marine Litter on Beaches-Macro-Debris (>2.5cm).

OSPAR Commission (2010). Guideline for Monitoring Marine Litter on the Beaches in the OSPAR Maritime Area.

Submon (2017). Proyecto Un mar sin desperdicio-¡Apadrinad la playa!-. https://www.estrategiasmarinas.info/un-mar-sin-desperdicio-apadrina. Available only in Spanish.

UN Environment/MAP (2016). Integrated Monitoring and Assessment Guidance (UNEP(DEPI)/MED IG.22/Inf.7).

Appendix I
Integration of "Adopt-a-Beach" measures with the
National Beach Management and IMAP related to Beach Marine Litter

Integration of "Adopt-a-Beach" measures with the National Monitoring Programmes for Beach Marine Litter

1. When Adopt-a-Beach measures are undertaken on a regular basis (2 times a year or even seasonally) in the selected beaches, a 100-m stretch of beach should be isolated to implement the official monitoring programme on beach marine litter. Such an arrangement should be priory agreed with the corresponding national authorities, being in charge and responsible for the implementation of the marine litter monitoring programme on beaches.

A. Selection of beaches to implement the national monitoring programmes

2. In the selected beaches, according to criteria stated in Section 2.2.1 with regards to typology of beaches to have a comprehensive view on exposure of the beaches to marine litter sources, the sites to be monitored should be selected randomly but taking into consideration following criteria:

- A minimum length of 100 m;
- Low to moderate slope (~1.5-4.5 º), which excludes very shallow tidal mudflat areas;
- Clear access to sea (not blocked by breakwaters or jetties);
- Accessible to survey teams all year round;
- Accessible for ease marine litter removal;
- Ideally not be subject to cleaning activities and corresponding communication should be done with the local authorities/local municipality. In case that they are subjected to marine litter collection activities the timing of non-survey related beach cleaning must be known such that marine litter flux rates (the amount of litter accumulation per unit time) can be determined.
- Posing no threat to endangered or protected species and their habitats, such as sea turtles, sea birds or shore birds, marine mammals or sensitive beach vegetation; in many cases this would exclude protected areas, but it depends on local management arrangements.

3. In each site selection, these criteria should be followed as closely as possible. However, when making the final selection of the beaches to be monitored the surveyors can use their expert judgment and experience related to the coastal area and marine litter situation in their respective country.

B. Sampling unit

4. A sampling unit is defined as a fixed section of a beach covering the whole area from the strandline to the back of the beach. The sampling unit should be one 100-metre stretch of beach, along the strandline and reaching to the back of the beach. For beaches having length of several kilometers, two stretches of 100 m, may be considered. The back of the beach needs to be explicitly identified using coastal features such as the presence of vegetation, dunes, cliff base, road, fence or other anthropogenic structures such as seawalls (either piled boulders or concrete structures).

5. The same sampling units should be monitored for all repeat surveys. In order to define the boundaries of each sampling unit, permanent reference points can be used, and coordinates should be obtained by GPS. In case of heavily littered beaches, 100-metre stretches may be too difficult to survey and therefore two (2) 50-metre stretches separated at least by a 50-metre stretch should be surveyed instead.

C. Frequency and timing of surveys

6. It is recommended that the Adopt-a-Beach measures are conducted in the selected beaches at least 2 times a year in spring and autumn and ideally 4 times in: Spring, Summer, Autumn and Winter. The proposed surveys periods are as follows:

- Winter: Mid-December–mid-January
- Spring: April
- Summer: Mid-June–mid-July
- Autumn: Mid-September–mid-October

7. Any circumstances that may lead to unsafe situations for the surveyors such as heavy winds, etc. should be avoided. The safety of the surveyors must always come first.

D. Pre-survey characterization of sites

8. Before any sampling begins, shoreline characterization should be completed for each 100 m site. The GPS coordinates of the sampling unit should be recorded. A site ID name should be created. The site's special features, including characterization of the type of substrate (sand, pebbles, etc.), beach topography, beach usage, distances from urban settlements, shipping lanes, river mouths, etc. should be recorded using the MED POL Beach ID Form, included under Annex II to the present report. Digital photographs should be taken to document the physical characteristics of the monitoring site.

E. Size limits and classes to be surveyed

9. There are no upper size-limits for marine litter items found on beaches. The lower size-limit is proposed at 0.5 cm. Smaller sized items like the caps, lids, cigarette butts and other similar items should be included in the quantification of beach marine litter. Such big items should only be noted in the monitoring sheets. It is recommended to check the entire beach for big or heavy items (or some major part if the length of the beach is very lengthy) and list all large items. Special arrangements with the local waste management authorities should be in place in order to remove those big items from the beaches in an environmentally sound way.

F. Collection and identification of litter

10. Items found in the sample unit should be classified by type and accordingly entered on the MED POL Beach Survey Form, included under Annex III to the present report. Data should be entered on the form while picking up the litter item.

1. Unknown litter or items that are not on the MED POL Beach Survey Form should be noted in the appropriate "other item box". A short description of the item should then be included on the MED POL Beach Survey Form. If possible, digital photos should be taken of unknown items.

11. For interpreting small pieces of litter in a harmonized way, this guidance should be followed:

- Pieces/fragments of marine litter items that are recognizable with a high level of confidence that are part of the same marine litter item (e.g. G3: shopping bags) should be registered as one item under the corresponding category (i.e. G3).
- Pieces of marine litter items that are not recognizable as a single marine litter item should be counted according to their material type (e.g. plastic, polystyrene pieces) and size (e.g. G75-G77).

12. During the survey, all litter items should be sorted by category type, weighed and then removed from the beach. Larger items that cannot be removed (safely) by the surveyors should be marked, for example with paint spray (which meets environmentally friendly standards) so that they are not counted again at the next survey.

13. The litter collected should be disposed of properly. Ideally, monitoring activities should use municipal waste management; therefore, marine litter collected should be disposed in the municipal selective collection containers. If these do not exist local municipalities should be informed for appropriate action.

G. Quantification of litter

14. The unit to be used to assess the marine litter density is 'number of items' and should be expressed as counts of marine litter items per 100 m (i.e. items / 100m). National teams may wish to also express counts of marine litter items per surface area[60] (i.e. marine litter items / m^2), but this should only be done in addition to the counts of marine litter items per 100 m stretch. In addition, the main category types of litter items should be weighed.

H. Materials and equipment

15. The following materials and equipment are necessary to run the beach surveys:

i. Digital camera;
ii. Hand-held GPS unit;
iii. Extra batteries (ideally rechargeable batteries);
iv. 100-metre tape measure (fiberglass preferred);
v. Flag markers/stakes;
vi. First aid kit (to include sunscreen, bug spray, drinking water);
vii. Protective gloves;
viii. Scissors/knife;
ix. Clipboard for each surveyor;
x. Recording forms (printed on waterproof paper);
xi. Pencils;
xii. Rubbish bags;
xiii. Rigid container and sealable lid to collect sharp items such as needles, etc.;
xiv. Appropriate clothing;
xv. Scales (if possible to weigh your bags of collected litter);
xvi. National photo guide to assist the volunteers with the identification and categorization of marine litter items. The photo guide should include the items commonly found on national beaches and their corresponding pictures and should be developed by the coordinator,
xvii. Paint spray for large and/or heavy items.

I. Safety and security precautions

16. Safety of surveyors should be ensured at all times. Since this work is carried out in the field, there are a few inherent hazards. Caution should be used, and the general safety guidelines presented below should be followed:

- Surveyors should wear appropriate clothing. Be sure to wear close-toed shoes and gloves when handling marine litter as there may be sharp edges.

[60] Based on the international experience, European (i.e. EU MSFD) and the experience from the other Regional Seas (e.g. OSPAR), the counts of marine litter items found on beaches, in items/100m stretch has proven to work quite well. The quantification of marine litter items found on beaches in items per surface areas may arise problems, especially for areas where low and high tides are present.

- If surveyors come across to potentially hazardous materials and/or items (e.g. oil or chemical drums, gas cans, propane tanks), the local authorities should be contacted by the Beach Coordinator in order to report the corresponding item/s. The hazardous materials and/or items should not be touched by the surveyors and no attempt to re/move it should be done.
- Large, heavy objects should be left in place. Do not attempt to lift heavy marine litter items as they may have additional water weight and lifting them could result in injury. Local authorities should be informed by the Beach Coordinator in the case of existence of such items.
- When in doubt, don't pick it up! If unsure of an item, do not touch it. If the item is potentially hazardous, the Beach Coordinator should report it to the appropriate authorities.
- Do not conduct field operations in severe weather conditions.
- Be aware of your surroundings and be mindful of 'trip and fall' hazards.
- Carry a means of communication for emergencies, for example a cell phone.
- Always carry a first aid kit. The kit should include an emergency water supply and sunscreen, as well as bug spray.
- Understand the symptoms of heat stress and actions to treat it.
- Make sure to carry enough water.
- Let someone know where you are and when you expect to return.
- The surveyor team should be composed of at least two people.

J. Additional considerations

17. The amount and type of litter found on beaches can be influenced by different circumstances. To ensure that data will be analyzed and interpreted properly these circumstances must be recorded. Indicative examples of such circumstances include: events that may lead to unusual types and/or amounts of litter (e.g. shipping container losses, overflows of sewage treatment systems, etc.); difficult weather conditions (e.g. heavy winds or rain, etc.); replenishment/nourishment of the beach; etc.

Appendix II
MED POL Beach ID Form

MED POL Beach ID Form			
Country Name:			
Region:			
Municipality:			
Beach Name:			
Beach National ID:			
① Beach width (m) at mean low spring tide:		② Beach width (m) at mean high spring tide (m):	
③ Total length of beach (m):		④ Back of the beach: (e.g dunes)	
⑤ Latitude Start 100 m *(wgs84 – dd mm ss.ss)*		⑥ Latitude End 100 m *(wgs84 – dd mm ss.ss)*	
⑤ Longitude Start 100 m *(wgs84 – dd mm ss.ss)*		⑥ Longitude End 100 m *(wgs84 – dd mm ss.ss)*	
Prevailing currents off the beach:	N – S – E – W	Prevailing winds:	N – S -
Beach Orientation?			N – S -
Type of beach material (e.g. sand, pebbles, rocky), including % of coverage: *(e.g. sand 60%, pebbles 40%)*			
Slope of the Beach: *(e.g. slope 20%)*			
Are there any objects in the sea (e.g. a pier) that influence the currents? *If YES, specify:* _____			
Major beach usage (local people, swimming and sunbathing, fishing, surfing, sailing, other etc.):			
1. _____ , seasonal or whole year round: _____			
2. _____ , seasonal or whole year round: _____			
3. _____ , seasonal or whole year round: _____			
Access to the beach: Pedestrian: ☐ Vehicle: ☐ Boats: ☐			
Nearest town close to the beach in less than 5km distance:			
Location: N – S – E – W	Distance to the beach: _____ km		
Nearest aquaculture site close to the beach in less than 5km distance:			
Name: _____	Distance to the beach: _____ km	Population: _____	
Location: N – S – E – W			
Is there any development behind the beach?	No ☐	Yes ☐ Specify: _____	
Are there food and/or drink outlets on the beach?	No ☐	Yes ☐	
Distance from the survey area (m): _____			
Present all year round:	Yes ☐	No ☐ Specify month: _____	
Position of food and/or drink outlet in relation to the survey area:		N – S – E – W	

Distance of the beach to the nearest shipping lane (km):

What is the estimated traffic density: *(number of ships/year):* _____

Is it used mainly by merchant ships, fishing vessels or all kinds: _____

Position of the shipping lane in relation to survey area: N – S – E – W

Is the beach located near a harbour, port or marina? Yes ☐

Specify: _____

Distance from the beach to the nearest harbour, port or marina (km): _____

Name of the harbour, port or marina: _____

Is the harbour entrance facing the survey area? Yes ☐ No ☐

Position of harbour in relation to survey area: N – S – E – W

What is the main type of vessels using the harbour, port or marina?
(e.g. passenger ships, merchant/cargo ships, fishing vessels) _____

Size of harbour (number of ships): _____

Beach adjacent to river mouths or drains of water? Yes ☐ No ☐ N

Name of the nearest river mouth or drain of water: _____

Distance between sampling area and nearest river mouth or water drain (km): _____

What is the position of the nearest river mouth in relation to survey area: N – S – E – W

Distance from the beach to the nearest discharge or discharges of waste water (km):

Position of discharge points in relation to survey area: N – S – E – W

Clean-up frequency of the beach?

All year round: Daily ☐ Weekly ☐ Monthly ☐ Other: _____

Seasonal, *please specify in months:* Daily ☐ Weekly ☐ Monthly ☐ Other: _____

What method is used: Manual ☐ Mechanical ☐

Who is responsible for the cleaning? _____

Additional comments and observations about this beach: _____

_____

_____

Please include:

1. A map of the beach
2. A map of the beach and of the local surroundings. When relevant please mark on this map the following:
   i) Nearest town ii) Food/drink outlets iii) Nearest shipping lane
   iv) Nearest harbour v) Nearest river mouth vi) Discharge or discharges of waste water
3. A regional map

Is this an amendment to an existing questionnaire: Yes ☐ No ☐

Date questionnaire is filled in: _____ / _____ / _____ (dd/mm/yyyy)

Name:

Phone number:

E-mail:

Appendix III
MED POL Beach Survey Form

MED POL Beach Survey Form			
Country:			
Beach Name:			
Beach National ID:			
ID Survey:			
Date of survey *(dd/mm/yyyy)***:**			
Previous conducted survey *(dd/mm/yyyy)***:**			
Time of the sampling *(HH:MM:SS)***:**			
Number of surveyors:			
Survey contact details:		Name: _____ Phone number: _____ Email address: _____	
Latitude Start 100 m *(wgs84 – dd mm ss.ss)*		Latitude End 100 m *(wgs84 – dd mm ss.ss)*	
Longitude Start 100 m *(wgs84 – dd mm ss.ss)*		Longitude End 100 m *(wgs84 – dd mm ss.ss)*	

Additional Information

Did you divert from the predetermined 100 m?

No ☐ Yes ☐

If YES, please specify new GPS coordinates: _____

Did any of the following weather conditions affect the data of the survey?

Wind ☐ Rain ☐ Sand storm ☐ Fog ☐ Snow ☐ Exceptionally high tide ☐

Exceptionally low tide ☐ Storm surge ☐

Did you find stranded or dead animals?

Yes ☐ No ☐ If YES how many: _____

Describe the animals, or note the species name if known: _____

Stranded animals: Dead ☐ Alive ☐

Is the animal entangled in litter? Yes ☐ No ☐ If YES,

specify marine litter item code: _____

Were there any circumstances that influenced the survey?

For example, tracks on the beach (cleaning or other), recent replenishment of the beach or other? Please specify:

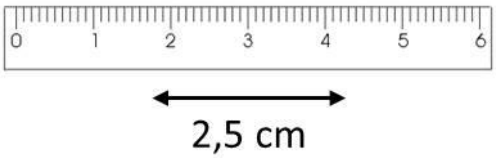
_____

_____

Were there any unusual marine litter items and/or marine litter loads?

Please specify: _____

Centimeter ruler



ID[61]	PLASTIC/POLYSTYRENE	Nº Items	Weight
G1	4/6-pack yokes, six-pack rings		
G3	Shopping bags incl. pieces		
G4	Small plastic bags, e.g. freezer bags incl. pieces		
G5	The part that remains from rip-off plastic bags		
G7/G8	Drink bottles		
G9	Cleaner bottles & containers		
G10	Food containers incl. fast food containers		
G11	Beach use related cosmetic bottles and containers, e.g. Sunblocks		
G13	Other bottles, drums and containers		
G14	Engine oil bottles & containers <50 cm		
G15	Engine oil bottles & containers >50 cm		
G16	Jerry cans (square plastic containers with handle)		
G17	Injection gun containers (including nozzles)		
G18	Crates and containers / baskets (excluding fish boxes)		
G19	Vehicle parts (made of artificial polymer or fibre glass)		
G21/24	Plastic caps and lids (including rings from bottle caps/lids)		
G26	Cigarette lighters		
G27	Cigarette butts and filters		
G28	Pens and pen lids		
G29	Combs/hair brushes/sunglasses		
G30/31	Crisps packets/sweets wrappers/ Lolly sticks		
G32	Toys and party poppers		
G33	Cups and cup lids		
G34	Cutlery, plates and trays		
G35	Straws and stirrers		
G36	Heavy duty sacks (e.g. fertiliser or animal feed sacks)		
G37	Mesh bags (e.g. vegetables, fruits and other products) excluding aquaculture mesh bags		
G40	Gloves (washing up)		
G41	Gloves (industrial/professional rubber gloves)		
G42	Crab/lobster pots and tops		
G43	Tags (fishing and industry)		
G44	Octopus pots		
G45	Mesh bags (e.g. mussels nets, net sacks, oyster nets including pieces) and plastic stoppers from mussel lines		
G46	Oyster trays (round from oyster cultures)		

[61] The allocated codes may be revised in the near future.

G47	Plastic sheeting from mussel culture (Tahitians)		
G49	Rope (diameter more than 1cm)		
G50	String and cord (diameter less than 1 cm)		
G53	Nets and pieces of net < 50 cm		
G54	Nets and pieces of net > 50 cm		
G56	Tangled nets/cord		
G57/58	Fish boxes		
G59	Fishing line/tangled and not tangled		
G60	Light sticks (tubes with fluid) incl. Packaging		
G62/63	Buoys (e.g. marking fishing gear, shipping routes, mooring boats etc.)		
G65	Buckets		
G66	Strapping bands		
G67	Sheets, industrial packaging, plastic sheeting (i.e. non-food packaging/transport packaging) excluding agriculture and greenhouse sheeting[62]		
G68	Fibre glass, items and fragments		
G69	Hard hats/Helmets		
G70	Shotgun cartridges		
G71	Shoes and/ sandals made of artificial polymeric material		
G73	Foam sponge items (i.e. matrices, sponge, etc.)		
G75	Plastic/polystyrene pieces 0 - 2.5 cm		
G76	Plastic/polystyrene pieces 2.5 cm > < 50 cm		
G77	Plastic/polystyrene pieces > 50 cm		
G91	Biomass holder from sewage treatment plants		
G124	Other plastic/polystyrene items (identifiable) including fragments		
	Please specify the items included in G124:		
		Total Nº Items	**Total Weight**

ID	RUBBER	Nº Items	Weight
G125	Balloons**, balloon ribbons, strings, plastic valves** and balloon sticks		
G127	Rubber boots		
G128	Tyres and belts		
G134	Other rubber pieces		

[62] Meeting requested to consider defining separate categories for greenhouse for agriculture and greenhouse sheeting; polystyrene and irrigation pipes

	Please specify the items included in G134		
		Total Nº Items	**Total Weight**

ID	CLOTH	Nº Items	Weight
G137	Clothing / rags (clothing, hats, towels)		
G138	Shoes and sandals (e.g. Leather, cloth)		
G141	Carpet & Furnishing		
G140	Sacking (hessian)		
G145	Other textiles (including pieces of cloths, rags, etc.)		
	Please specify the items included in G145		
		Total Nº Items	**Total Weight**

ID	PAPER / CARDBOARD	Nº Items	Weight
G147	Paper bags		
G148	Cardboard (boxes & fragments)		
G150	Cartons/Tetrapack Milk		
G151	Cartons/Tetrapack (non-milk)		
G152	Cigarette packets (including transparent covering of the cigarette packet)		
G153	Cups, food trays, food wrappers, drink containers		
G154	Newspapers & magazines		
G158	Other paper items (including non-recognizable fragments)		
	Please specify the items included in G158		
		Total Nº Items	**Total Weight**

ID	PROCESSED / WORKED WOOD	Nº Items	Weight
G159	Corks		
G160/161	Pallets / Processed timber		
G162	Crates and containers / baskets (not fish boxes)		
G163	Crab/lobster pots		
G164	Fish boxes		
G165	Ice-cream sticks, chip forks, chopsticks, toothpicks		
G166	Paint brushes		
G171	Other wood < 50 cm		
	Please specify the items included in G171		
G172	Other wood > 50 cm		
	Please specify the items included in G172		
		Total Nº Items	**Total Weight**

ID	METAL	Nº Items	Weight
G174	Aerosol/Spray cans industry		
G175	Cans (beverage)		
G176	Cans (food)		
G177	Foil wrappers, aluminium foil		
G178	Bottle caps, lids & pull tabs		
G179	Disposable BBQ's		
G180	Appliances (refrigerators, washers, etc.)		
G182	Fishing related (weights, sinkers, lures, hooks)		
G184	Lobster/crab pots		
G186	Industrial scrap		
G187	Drums and barrels (e.g. oil, chemicals)		
G190	Paint tins		
G191	Wire, wire mesh, barbed wire		
G198	Other metal pieces < 50 cm		
	Please specify the items included in G198		
G199	Other metal pieces > 50 cm		
	Please specify the items included in G199		
		Total Nº Items	**Total Weight**

ID	GLASS	Nº Items	Weight
G200	Bottles (including identifiable fragments)		
G202	Light bulbs		
G208a	Glass fragments >2.5cm		
G210a	Other glass items		
	Please specify the items included in G210a		
		Total Nº Items	**Total Weight**

ID	CERAMICS	Nº Items	Weight
G204	Construction material (brick, cement, pipes)		
G207	Octopus pots		
G208b	Ceramic fragments >2.5cm		
G210b	Other ceramics/pottery items		
	Please specify the items included in G210b		
	Please specify the items included in G158		
		Total Nº Items	**Total Weight**

ID	SANITARY WASTE	Nº Items	Weight
G95	Cotton bud sticks		
G96	Sanitary towels/panty liners/backing strips		
G97	Toilet fresheners		
G98	Diapers/nappies		
G133	Condoms (incl. packaging)		
G144	Tampons and tampon applicators		
	Other sanitary waste		
	Please specify the other sanitary items		
		Total Nº Items	**Total Weight**

ID	MEDICAL WASTE	Nº Items	Weight
G99	Syringes/needles		
G100	Medical/Pharmaceuticals containers/tubes		
G211	Other medical items (swabs, bandaging, adhesive plaster etc.)		
	Please specify the items included in G211		
		Total Nº Items	**Total Weight**

ID	PARAFFIN/WAX PIECES	Nº Items	Weight
G213	Paraffin/Wax		
		Total Nº Items	**Total Weight**

esence of industrial pellets?

YES ☐ NO ☐

esence of oil tars?

YES ☐ NO ☐

ditional Comments: _____

Annex X

MED POL lead/executed Programme of Work 2020-2021 on Land-Based Pollution Core Theme including pollution-related aspects of the Governance Theme, SCP/RAC lead/executed activities on Lan-Based Pollution Core Theme

Introduction

1. In line with the Mid-Term Strategy (MTS) of the Mediterranean Action Plan (MAP) of the United Nations Environment Programme (UN Environment) for 2016-2021 (Decision IG.22/1), and as a follow-on to the 2018-2019 Programme of Work (PoW), MED POL prepared a proposed Programme of Work for the biennium 2020-2021. The proposed activities envisage a substantive contribution of the MED POL Programme to two core themes of the Mid-Term Strategy (MTS) 2016-2021, namely, Governance and Land and Sea-Based Pollution.

2. While developing this proposal, MED POL took into consideration the fact that 2020-2021 is the last biennium of the current MTS cycle; and hence the need to achieve full delivery of the MTS for the Land-Based Pollution theme and its Governance-related aspects by 2021; the need to ensure synergies and complementarity with other major initiatives, in particular the priority areas of focus of UNEA-4 tackling environmental challenges through innovative solutions; GEO-6 (marine environment) and Ocean Strategy; the UfM Horizon 2020 Initiative; the implementation of EU MSFD, the global and regional work on marine litter, as well as projects activities currently under implementation and future proposed programmes to be financed with regards to management and disposal of POPs and Mercury; as well as the marine litter-related activities under the Bilateral Agreement with IMELS.

3. This proposal is presented in a tabular form showing the clear linkages of activities and their deliverable with the MTS outputs. The last column of the table describes the current status for ongoing activities and provides, as need be necessary, background information on the rationale behind the proposed activities.

4. To measure the progress and results of activities' implementation, a set of Indicators and corresponding Targets are proposed. Five indicators under the Land and Sea-based Pollution are proposed as follows:

2020-2021 Indicators	**2020-2021 Targets**
1. Number of marine pollution prevention and control regulatory instruments and policies updated or developed	Seven (7) regional regulatory instruments/ policies developed/updated
2. Number of new and updated guidelines and other implementation instruments streamlining SCP tools for key sectors and areas of consumption and production	Six (6) new/updated guidelines and other implementation instruments developed/updated
3. Number of countries submitting reports on annual pollution loads and pollution monitoring data for agreed pollutants	21 Contracting Parties
4. (a) Number of projects identified and or prepared to eliminate pollution hot spots and respond to marine pollution (b) Quantities of obsolete chemicals and marine litter disposed in environmentally sound manner/reduced in selected areas	(a) At least 7 pilot projects on marine pollution (b) 600 tons of PCBs disposed in environmentally sound manner in selected areas; on the ground preparation for disposal in the next biennium of 1400 tons of PCBs and 30 tons of mercury in environmentally sound manner in selected areas; decreasing trend in reducing beach litter towards achieving the target of reduction of 20% by 2024 in pilot areas.
5. Number of businesses, entrepreneurs, financial agents and civil society organizations capacitated to promote SCP solutions alternative to POPs and toxic chemicals, and marine litter reduction.	At least 100 trainees.

5. With regards to the Governance overarching theme, some of the key activities include:

a) Undertaking actions defined in 2023 MED QSR road map related to IMAP Cluster on Pollution and Marine Litter toward an integrated assessment of GES;
b) Contributing to strengthening Science Policy Interface in the Mediterranean with regards to IMAP implementation;
c) Upgrading, maintaining and integrating the IMAP (Pilot) Compatible Info System and NBB Information System to support online data submission related to pollution and marine litter monitoring; and
d) Updating the Mediterranean Node on Marine Litter with online webinars and online lectures on marine litter management and monitoring.
e) Strengthening the synergies with global and regional conventions and programmes

6. With regards to Pollution core theme, some of the key activities include:

a) Updating the annexes of the pollution-related LBS, Hazardous Waste (Izmir) Protocol and sharing best practices on Dumping Protocol Guidelines implementation;
b) Updating NBB Guidelines to address diffuse sources and riverine inputs to transitional waters;
c) Developing/updating the Regional Plans for Municipal Wastewater Treatment, Sewage Sludge Management and Marine Litter Management;
d) Supporting streamlining NAP measures in the national regulatory systems;
e) Undertaking the midterm evaluation of updated NAPs
f) Strengthening PRTR implementation and ensuring efficient NBB/PRTR reporting;
g) Reinforcing generation and reporting of new quality assured national monitoring data to IMAP (Pilot) Compatible Info System;
h) Updating thematic assessment products related to pollution and marine litter cluster of IMAP from land-based and sea-based sources of pollution;
i) Undertaking training to support countries in the implementation of IMAP;
j) Designing pilot projects in several Mediterranean Countries on PCB removal, Mercury and site decontamination.

7. The full proposal of the MED POL Programme of Work is included in the present document for review and feedback by the MED POL Focal Points Meeting in view of its finalization for formal submission to the MAP Focal Points Meeting in September 2019, as contribution to the MAP Programme of Work 2020-2021.

8. The proposed PoW includes activities led/executed by MED POL, and the activities led/executed by SCP/RAC to which MED POL is going to provide its contribution.

THEME 1. GOVERNANCE						
Main Activities	**Means of implementation**	**Lead: CU or Component**	**Other: CU and/or Components**	**Partners**	**Expected Deliverables**	**Remarks (link with the current PoW, legal basis for activity/deliverable)**
1.1. Contracting Parties supported in the implementation of the Barcelona Convention, its Protocols, Regional Strategies and Action Plans.						
1.1.2. Effective legal, policy, and logistic support provided to MAP decision-making process including advisory bodies meetings						
3. Organize the MED POL Focal Point meeting	In house expertise, working documents in 2 languages, Information documents, conference services, venue, travel arrangements for one delegate per CP.	MED POL,	CU	MAP Components Focal Points, MAP Partners	a) MEDPOL FP Meeting successfully convened; b) Technical aspects of the implementation of the Pollution Related Protocols reviewed; c) Progress on the implementation of MED POL-led activities of the PoW 2020-2021 reviewed; d) Technical and policy documents reviewed for further review by higher MAP bodies, including draft decisions, policy papers, assessment products etc.; e) Proposed MED POL PoW 2022-2023 activities reviewed for further submission to MAP Focal Points meeting.	Article 14 of the Dumping Protocol; Article 14 of the LBS Protocol; Article 15 of the Hazardous Wastes Protocol; Governance paper (Decision IG 17/5); Mandates of the Components of MAP (Decision IG.19/5); Governance decision (Decision IG.23/3).
1.1.3. Strengthen interlinkages between Core and Cross-cutting themes and facilitate Coordination at national level across the relevant sectors.						
1. Streamline in relevant national policies the updated MAP strategies and ecosystem approach-based GES targets (MSSD, SCP AP, Regional Strategy on pollution prevention from ships, ICZM Action Plan,	In-house expertise, consultations and meetings	CU, MED POL,	All MAP Components	CPs	Main findings and recommendations from the review of LBS NAPs, ICZM national Strategies, Sea-based pollution NAPs, Biodiversity NAPs, assessing the level of integration and GES mainstreaming, reviewed MED POL FP meeting in 2019.	This is an ongoing activity of the 2018-2019 biennium. The intention is to share for review by the Thematic/Components Focal Points Meetings and other MAP bodies findings and recommendations of this work aiming at strengthening synergies at national level of different policies of the CPs for the purposes of the MAP - Barcelona Convention implementation. The findings of this work will be analyzed against the Common Regional Framework (CRF) for ICZM.

THEME 1. GOVERNANCE						
Main Activities	**Means of implementation**	**Lead: CU or Component**	**Other: CU and/or Components**	**Partners**	**Expected Deliverables**	**Remarks (link with the current PoW, legal basis for activity/deliverable)**
Offshore AP, RSFCCA).						
1.1.4. Funding opportunities for regional and national priorities identified, donors/partners informed and engaged, through the implementation of the updated Resource Mobilization Strategy (RMS), and Contracting Parties assisted in mobilizing resources.						
2. Ensure timely and coordinated execution and progress review of MAP Projects with external funding under MED POL execution.	In-house expertise, consultancy, project posts establishment.	CU, MED POL	All MAP Components	GEF, UNIDO, UN Economy Division, UNESCO IHP, EU, EIB, EBRD, IUCN, WWF Mediterranean, GWP Med.	**a) Child Project 1.1 of the MedProgramme: IMAP/ MedMPA:** IMAP component only implemented. **b) GEF Adriatic:** Support to Albania and Montenegro **c)** - P **d) Two new full-fledged Project Proposals prepared and submitted on IMAP implementation including Pollution and Marine Litter**	
1.3. Strengthening participation, engagement, synergies and complementarities among global and regional institutions						
1.3.1. Regional cooperation activities promoting dialogue and active engagement of global and regional organizations and partners, including on SAP BIO, Marine Litter, SCP, ICZM, MSP and Climate Change (e.g. regional conference, donor meetings).						
2. Undertake periodic reviews of bilateral cooperation with partner organisations to enhance synergies and impact on the ground on areas of common interest.	In-house expertise, consultancies, document preparations, back-to-back or separate meetings.	MED POL	MAP Components/ CU	LC/LP, BRSC, FAO/GFCM, ACCOBAMS, Regional Seas Conventions and Action Plans, EEA,	a) New areas further defined (e.g. IMAP pollution and litter cluster, Marine Litter, plastic and microplastic, noise, ,); b) New areas of cooperation identified and added to existing bilateral cooperation agendas (e.g. dumping of munitions); c) Collaboration with FAO/GFCM further strengthened on Marine Litter and aquaculture.	

THEME 1. GOVERNANCE						
Main Activities	**Means of implementation**	**Lead: CU or Component**	**Other: CU and/or Components**	**Partners**	**Expected Deliverables**	**Remarks (link with the current PoW, legal basis for activity/deliverable)**
3. Co-organize with co-Chairs the UfM H2020 Review and Monitoring and Capacity Building Sub Groups annual meetings.	In-house expertise; working meetings.	CU, MED POL	SCP/RAC, Plan Bleu, INFO/RAC	UfM, EU, EEA, IFIs including EIB, EBRD, etc.	a) The UfM H2020 Review and Monitoring and Capacity Building Sub Groups annual meetings successfully delivered; b) Strengthened cooperation with EEA, EIB and UfM in the framework of H2020; c) Work Programme of the three H2020 Components followed up in a continuous manner and their synergies with UN Environment/ MAP-MED POL activities enhanced, joint activities developed and implemented as appropriate.	The extension of this Initiative beyond 2020 is under discussion. A dedicated online group of willing member states and partner organizations has been formed to discuss and draft a preliminary proposal on a future H2030 Initiative.
4. Coordinate with key partners in supporting the implementation of the Regional Plan on Marine Litter; Strengthen and expand the Regional Collaboration Platform for Marine Liter in the Mediterranean established in September 2016; Enhance collaboration with European Regional Seas on marine litter and	In-house expertise, coordination, consultancy, meetings	MED POL	CU, SCP/RAC, REMPEC, SPA/RAC	Collaboration Platform Partners, UfM H2020 Initiative, Regional Seas Programmes and Conventions, GPML, RFMOs	a) One communication campaign on prevention actions to fight against Marine Litter jointly organised by the members of the Regional Collaboration Platform for Marine Litter; b) Mediterranean Node updated as follows: - Marine litter-related webinars are made available to the Mediterranean community though the Mediterranean Node; - Reports, projects and experts rosters uploaded; c) Visibility on work undertaken on marine litter in the Mediterranean enhanced and shared at global level; d) Work undertaken at regional level, including by RFMOs further coordinated and links with global instruments strengthened (including G7 and G20 Action Plans)	In-house expertise, coordination, consultancy, meetings

THEME 1. GOVERNANCE						
Main Activities	**Means of implementation**	**Lead: CU or Component**	**Other: CU and/or Components**	**Partners**	**Expected Deliverables**	**Remarks (link with the current PoW, legal basis for activity/deliverable)**
other issues of common concern.						
1.3.2. Participation in relevant existing or new international initiatives and dialogue (e.g. ABNJ, MPAs, Offshore, Sustainable Development) to highlight the Mediterranean regional specificities and increase synergies						
1. Promote BC, its Protocols and the MSSD 2016-2025 with a particular focus on pollution control and prevention; enhance collaboration with International organisation and European Regional Seas on marine litter and other issues of common interest.	Prepare side events, communication and visibility materials, in-house coordination and expertise, Meetings follow up/participation, position papers, formal submission. consultancies, coordination exchanges and meetings, implementation agreement(s) In house work	CU MED POL,	All MAP Components	EUSAIR, EU MSFD, EU GFCM, ACCOBAMS	a) The role and visibility of the MED POL work in international fora and new partnerships created; b) Contribution related to pollution control provided to UNEA, UNEP Regional Seas; c) Information on MAP work on the implementation of the BC and its Protocols shared with the Governing Bodies of the London Dumping Protocol, CBD, BRS Conventions, and UN BBNJ meetings; d) Collaboration with OSPAR, HELCOM and Black Sea Commissions strengthened on aspects related to MED POL work and synergies with other Regional Seas Programmes established	
1.4. Knowledge and understanding of the state of the Mediterranean Sea and coast enhanced through mandated assessments for informed policy-making.						

THEME 1. GOVERNANCE						
Main Activities	**Means of implementation**	**Lead: CU or Component**	**Other: CU and/or Components**	**Partners**	**Expected Deliverables**	**Remarks (link with the current PoW, legal basis for activity/deliverable)**
1.4.1. Periodic assessments based on DPSIR approach and published addressing inter alia status quality of marine and coastal environment, interaction between environment and development as well as scenarios and prospective development analysis in the long run. These assessments include climate change-related vulnerabilities and risks on the marine and coastal zone in their analysis, as well as knowledge gaps on marine pollution, ecosystem services, coastal degradation, cumulative impacts and impacts of consumption and production.						
1. Undertake actions defined in 2023 MED QSR road map related to IMAP Cluster on Pollution toward integrated assessment of GES.	In-house expertise, consultancy, working meetings of expert teams and MAP components	CU/ MED POL	All MAP Components, IMAP Task Force	CPs, MAP Partners, GEF	a) IMAP Guidance Factsheets on Pollution and Marine Litter are regularly updated for review in CorMon meetings on Pollution and Marine Litter; b) Methodological concept to assess the interrelation of pressures/impacts/status of marine environment, in line with the approaches provided within analysis of IMAP cross-cutting issues for Pollution Cluster is developed and proposed; c) Methodological concept to support better integration of thematic assessment products related to IMAP Common Indicators (Pollution and Marine Litter) i.e. integration between Ecological Objectives (at national, sub-regional and regional scale) is agreed and tested; d) Steering Committee for the process of Transboundary Diagnostic Analysis (TDA) 2015 preparation is established; e) Main elements for the new TDA defined.	a, b, c) In line with Decision IG.22/7 related to IMAP and 2023 MED QSR Roadmap, strengthening of monitoring and assessment tools is essential for better understanding of interlinkages between activities/ drivers, pressures and impacts, for assessing the state of marine environment as well as for identification of adequate responses and attainment of a DPSIR-based GES assessment of the 2023 MED QSR. d, e) Under the new GEF MED Programme, it is planned to start an update of the TDA.
1.4.4. Interface between science and policy-making strengthened through enhanced cooperation with global and regional scientific institutions, knowledge sharing platforms, dialogues, exchange of good practices and publications.						

THEME 1. GOVERNANCE						
Main Activities	**Means of implementation**	**Lead: CU or Component**	**Other: CU and/or Components**	**Partners**	**Expected Deliverables**	**Remarks (link with the current PoW, legal basis for activity/deliverable)**
2. Contribute to strengthen Science Policy Interface in the Mediterranean with regards to IMAP implementation and for feeding the knowledge gap to promote effective measures to achieve GES.	In-house expertise, implementing partner, and consultations at MAP meetings	MED POL	All MAP Components	CPs and MAP partners	a) Participation as appropriate in working groups, projects steering committees, advocacy groups, scientific panels, and involvement in academic institutions actively pursued with the aim of enhancing the role of MED POL work and for exchanging information and data needed to support/ promote the activities undertaken by MAP/MED POL, and to streamline MED POL priorities as appropriate to the work of the Mediterranean scientific community	MED POL has always been actively involved in projects' steering committees and working groups advocating various aspects related to protection of the Mediterranean marine environment.
1.5. MAP knowledge and MAP information system enhanced and accessible for policy- making, increased awareness and understanding.						
1.5.1. Info/MAP platform and platform for the implementation of IMAP fully operative and further developed, connected to MAP components' information systems and other relevant regional knowledge platforms, to facilitate access to knowledge for managers and decision-makers, as well as stakeholders and the general public.						

THEME 1. GOVERNANCE						
Main Activities	**Means of implementation**	**Lead: CU or Component**	**Other: CU and/or Components**	**Partners**	**Expected Deliverables**	**Remarks (link with the current PoW, legal basis for activity/deliverable)**
5. Maintain, upgrade and implement MAP Components' databases and data platforms.	In-house coordination and expertise, service contract, consultancy	INFO/RAC, MED POL	CU, SPA/RAC, PAP/RAC,	CPs	a) IMAP (pilot) Info System fully operational for all IMAP Pollution and Marine Litter Common Indicators (mid-2022) enabling the CPs to report on their respective monitoring data in 2020, 2021 (and 2022); d) Historical MED POL monitoring database is successfully migrated to IMAP Info System; e) Quality Assurance and Quality Control schemes are in place for Polution and Litter cluster of IMAP Common Indicators included in the IMAP Pilot Info System; f) Data protocols for interlinkages between BCRS, NBB/PRTR Infosystem, IMAP, MarineNode, InfoMAPNode prepared and tested.	All deliverables derive from the QSR 2023 Road Map prepared by the Secretariat for the Pollution and Marine Litter Cluster.
1.6. Raised awareness and outreach.						
1.6.1. The UNEP/MAP communication strategy updated and implemented.						
1. Implement the operational Communication Strategy.	In-house expertise, consultancy, service contracts, travel	MED POL,	CU, INFO/RAC and other Components	EEA	Key findings of the Second report on the Implementation of H2020 finalised and disseminated	2016-2017: Draft of the H2020 indicators factsheets on Waste Water, Waste and ML and Industrial emissions; 2018-2019: H2020 indicators factsheets on Waste Water, Waste and ML and Industrial emissions finalized, draft of the H2020 Assessment report in synergy with SoED; 2020-2021: Publication of the H2020 Assessment report and dissemination of its findings.

THEME 2. LAND & SEA BASED POLLUTION						
Main Activities	**Means of implementation**	**Lead: CU or Component**	**Other: CU and/or Components**	**Partners**	**Expected Deliverables**	**Remarks (link with the current PoW, legal basis for activity/deliverable)**
2.1. Strengthening regional implementation of the obligations under the Barcelona Convention and 4 pollution -related Protocols, and of programmes of measures in existing relevant Regional Strategies and Action Plans.						
2.1.1. Targeted measures of the regional plans/strategies facilitated and implemented.						
1. Assess the implementation of the existing Regional Plans/Measures developed under Article 15 of the LBS Protocol, including socio-economic analysis.	In-house expertise, consultancies, regional meeting(s), implementing partner(s)	MED POL	SCP/RAC	CPs, UFM H2020, SEIS Project	a) Reports submitted by the Contracting Parties for the biennium 2018-2019 for existing Regional Plans' implementation reviewed; b) Final evaluation of implementation of targeted measures (with a timetable by 2021) prepared for the Regional Plans of Mercury, POPs and BOD5; c) Best practices on the implementation of the Regional Plans and other common measures shared at regional level and gaps and priorities for further technical support and capacity building identified.	The Regional Plans for Mercury, POPs and BOD include a number of legally binding measures to be completed prior to 2021. For these targeted measures, socio economic aspects of implementation will be subject to final evaluation for review by MED POL Focal Points Meeting in 2021.
2. Promote the use of relevant instruments and incentives to prevent/ reduce plastic pollution including the generation of single-use plastic bags and microplastics; abandoned, lost, discarded fishing gear (ALDFG); marine litter	In-house expertise, consultancies, regional meeting(s), implementing partner(s)	MED POL	SCP/RAC	UN Environment Economy Division, SWITCH MED, FAO, GFCM, Marlice, ACCOBAMS, WWF/MEDPO	a) Best practices identified and shared with the CPs at regional level; b) Technical capacities of CPs enhanced to facilitate implementation of legally binding measures of the Regional Plan on Marine Litter Management in the Mediterranean; c) Gaps and priorities for technical support and capacity building identified;	Guidelines have been prepared in the 2018-2019 biennium for various aspects for management of marine litter such as fishing for litter, adopt a beach, etc. This activity aims to build on outcomes achieved in the 2018-2019 biennium in order to further promote the reduction of generation of marine litter and solid waste.

THEME 2. LAND & SEA BASED POLLUTION						
Main Activities	**Means of implementation**	**Lead: CU or Component**	**Other: CU and/or Components**	**Partners**	**Expected Deliverables**	**Remarks (link with the current PoW, legal basis for activity/deliverable)**
generated from aquaculture activities; marine litter from ships; and e-waste.						
3. Promote reduction of municipal wastewater from small agglomerations using nature-based solutions; and prevention of sewage sludge and storm water-related waste from entering into the marine environment using BAT/BEP, and in particular Waste to Energy Technologies (W-ET).	In-house expertise, regional meeting(s), implementing partner(s)	MED POL	SCP/RAC, Plan Bleu	UFM H2020, GEF	a) Best practices identified and shared with the CPs at regional level; b) Technical capacities of CPs enhanced to facilitate implementation of legally binding measures of the Regional Plan on the reduction of BOD5 from urban waste water; c) Main elements of strategies and plans elaborated.	Nature-based-solutions for treatment of wastewater; prevention of sewage sludge and storm water; minimization of riverine waste; waste-to-energy technologies are topics which were raised in Expert Groups Meetings held in 2018 for developing the new Regional Plans.
2.2 Development or update of new/existing action plans, programmes and measures, common standards and criteria, guidelines.						
2.2.1 Guidelines, decision-support tools, common standards and criteria provided for in the Protocols and the Regional Plans, developed and/or updated for key priority substances or sectors.						

THEME 2. LAND & SEA BASED POLLUTION						
Main Activities	**Means of implementation**	**Lead: CU or Component**	**Other: CU and/or Components**	**Partners**	**Expected Deliverables**	**Remarks (link with the current PoW, legal basis for activity/deliverable)**
1. Update the Annexes of the pollution-related Protocols.	In-house expertise, implementing partner(s)	MED POL	SCP/RAC	BRSC, IMO	a) Working group(s) established by COP21 and Annexes to LBS and Dumping Protocols updated as appropriate; b) [Annexes to the HW Protocol updated in line with ongoing efforts to update the annexes of the Basel Convention, as appropriate][63]	During the 2016-2017 biennium, a comparative analysis has been prepared on the need for updating the annexes of all pollution-related Protocols of the Barcelona Convention. The MED POL Focal points Meeting in 2019 will discuss the updated report and pending its review, discussions will be made whether to request a mandate for updating these annexes by COP22.
2. Develop/ update technical Guidelines addressing diffuse sources, placement of artificial reefs and plastic pollution.	In-house expertise, consultancy, implementing partner(s)	MED POL	Info/RAC, Plan Bleu	EU REACH Regulation, Minamata Convention, EU Water Framework Directive, E-PRTR	a) NBB Guidelines updated addressing: - Diffuse sources of pollution; - Aquaculture sectors and riverine inputs for transitional waters; - The gap between PRTR and NBB reporting	NBB Guidelines address land-based point sources of pollution. As diffuse sources contribute significantly to pollution, there is a need to include them in the updated guidelines.
			SPA/RAC	IMO, London Convention and London Protocol, GFCM	b) Updated report on Artificial Reefs prepared for submission to the meetings of MED POL FPs, ECAP Coordination Group, MAP FPs and COP 22	Pending meeting discussions by the Thematic Focal Points on Biodiversity in 2019 and outcome of COP 21.
2.2.2 Regional programmes of measures identified and negotiated for pollutants/ categories (sectors) showing increasing trends, including the revision of existing regional plans and areas of consumption and production.						
1. Develop the Regional Plan for Municipal	In-house expertise, consultancies, regional meeting(s)	MED POL	SCP RAC, Plan Bleu	UfM, H2020 Initiative, MAP Partners	Regional Plans developed/upgraded for submission to the meetings of MED POL FPs, ECAP Coordination Group, MAP	Pending discussions by the Regional Meeting of Experts on the six Pollution Reduction Regional Plans in May 2019,

[63] For the consideration of the MAP FPs Meeting

THEME 2. LAND & SEA BASED POLLUTION						
Main Activities	**Means of implementation**	**Lead: CU or Component**	**Other: CU and/or Components**	**Partners**	**Expected Deliverables**	**Remarks (link with the current PoW, legal basis for activity/deliverable)**
Wastewater Treatment. 2. Develop the Regional Plan for Sewage Sludge Management. 3. Upgrade Marine Litter Regional Plan/or develop new technical annexes to incorporate new elements including microplastics and emerging pollutants as appropriate.					FPs and COP 22: a) Regional Plan on Municipal Wastewater Treatment; b) Regional Plan (new) on Sewage Sludge Management; c) Regional Plan on Marine Litter upgraded, or technical annexes prepared and incorporated within the existing Regional Plan.	and Recommendations of the MED POL Focal points meeting in 2019 with regards to the appropriate course of action for developing/upgrading the existing Regional Plans or development of new technical annexes. Their development will be in line with ICZM Common Regional Framework, expected to be adopted by COP 21.
2.3 Strengthening and implementation of marine pollution prevention and control legislation and policies at national level, including through enforcement and Integration into sectorial processes.						
2.3.1 Adopted NAPs (Art. 15, LBS Protocol) implemented and targeted outputs timely delivered.						
1. Support streamlining NAP measures in the national	In-house expertise, consultancies, national and regional	MED POL	SCP/RAC	CPs, IMPEL, UfM-H2020, BRSC	a) Templates providing key aspects for national regulations prepared to promote use of BAT/BEP, and standards/GES for different contaminants/pollutants of	a) Promoting use of BAT/BEP to enhance marine pollution prevention and control is key to achieving the outputs of NAPs. Existing legal frameworks should be

THEME 2. LAND & SEA BASED POLLUTION						
Main Activities	**Means of implementation**	**Lead: CU or Component**	**Other: CU and/or Components**	**Partners**	**Expected Deliverables**	**Remarks (link with the current PoW, legal basis for activity/deliverable)**
regulatory systems and their implementation.	meeting(s), implementing partner(s).				national and/or regional priority in key industrial sectors including legislation on reporting by industries of pollution releases (PRTR) and risks from accidents; b) Best practices shared and information exchanged with regards to Permitting and Inspection based on the most recent MAP technical guidelines, as well as regarding the prevention and management of risks on the marine and coastal environment from industrial accidents; c) Report on midterm NAP evaluation submitted to the MED POL Focal Points meeting and other MAP bodies as appropriate;	strengthened in this regard. Sharing of experiences for permitting and inspection would enhance the awareness of Countries on the need to strengthen their national regulations. Examples captured from pilot projects currently underway for example of best practices for reporting on hazardous wastes in Albania, Bosnia & Herzegovina and Montenegro should be disseminated to other countries in the region. b) During the current biennium, work has been undertaken to develop PRTR guideline and PRTR regulation template. c) Mandate given by COP 19 Decision IG 22/11 on "Implementation of Updated National Action Plans (NAPs), Containing Measures and Timetables for their Implementation," (Athens, Greece, February 2016).
2.4 Marine Pollution Monitoring and assessment.						
2.4.1: National pollution and litter monitoring programmes updated to include the relevant pollution and litter IMAP indicators, implemented and supported by data quality assurance and control						
1. Continue supporting updated national monitoring programmes on marine litter,	In-house expertise, consultancies, implementing partner(s), regional meeting(s), CorMon meetings	MED POL	CU, IMAP Task Force	IAEA, EU MSFD, National MED POL designated laboratories, relevant	a) Scientific and expert support provided to apply integration and aggregation rules for monitoring and reporting of national monitoring data with the view of achieving regular reporting by the CPs on the state of implementation of the	As provided by 2023 MED QSR Road map, the achievements, lessons learned, and challenges faced during the current initial phase of IMAP implementation at national level, call for strengthened and coordinated implementation of national

THEME 2. LAND & SEA BASED POLLUTION						
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contaminants and eutrophication in line with IMAP, the LBS Protocol and the Regional Plan on Marine Litter.	on pollution and marine litter			scientific institutions ACCOBAMS, INDICIT	national IMAPs, and for providing a minimum of 3 sets of data on IMAP Common Indicators (EO5, EO9, EO10, EO11) in 2019/2020 and 2021/2022; b) Implementation of marine pollution national monitoring programmes supported by undertaking specific joint biodiversity and pollution monitoring programmes in MPAs and in high pressure areas, including provision of related quality of data, as well as respective national reporting using the IMAP Pilot Info System.	IMAP based monitoring programmes; improved good laboratory practices in national MED POL laboratories for monitoring contaminants/ pollutants in biota and sediment (QA/QC issues); harmonization and standardization of the monitoring protocols and assessment methods; as well as further development of the risk-based approaches, analytical testing and assessment methodologies, assessment criteria for integrated chemical and biological assessment methods.
2. Consolidate data dictionaries and data standards for all IMAP Common Indicators related to Pollution and apply data quality control schemes.	In-house expertise, consultancies, implementing partner(s), regional meeting(s), CorMon meeting on pollution	MED POL	CU, IMAP Task Force	EMODnet, EU MSFD, TG DATA	a) Data dictionaries and data standards finalized content-wise for all IMAP Common Indicators, including for IMAP Common Indicators 18, 19 and 20; b) Interoperability with national data templates ensured; c) Data Quality Assurance and Quality Control schemes developed and implemented, both at the level of IMAP (Pilot) Compatible Info System and national controls of monitored and reported data, in line with the Data Sharing Policy and the schemes prepared for IMAP Common Indicators 13, 14 and 17 in the IMAP Pilot Info System. All the deliverables above will be submitted for review to respective CorMon meetings on pollution and marine litter.	a) IMAP Common Indicators 13, 14 and 17 are included in the IMAP Pilot Info System, while IMAP Common Indicators 18, 19 and 20 are not included. b) Deliverables related to herein presented data standards and data dictionaries are interrelated with activity 1.5.1.1. c) Data sharing policy is expected to be provided to overall guide QA/QC activities.

THEME 2. LAND & SEA BASED POLLUTION						
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3. Undertake harmonized and coordinated quality assurance programmes (contaminants, marine litter and eutrophication) at regional/ sub-regional and national levels.	In-house expertise, consultancies, implementing partner(s), regional meeting(s), CorMon meetings on pollution and marine litter	MED POL	CU, IMAP Task Force	IAEA/ NAEL/ MESL, Quasimeme, Alessandria University, National MED POL Designated Laboratories, relevant Scientific Institutions.	National MED POL/ IMAP laboratories supported to apply good laboratory practices for monitoring contaminants in biota and sediment, eutrophication (nutrients and chlorophyll-a) in sea water, and marine litter monitoring, including proficiency tests (PT) and QA/QC protocols.	Ongoing core activity of MED POL as part of its mandate under IMAP Pollution and Marine Litter cluster, as well as article 12 of the Barcelona Convention, article 8 of the LBS Protocol and articles 11, 12 of the Regional Plan on Marine Litter Management in the Mediterranean.
4. Harmonize and standardize the monitoring and assessment methods of pollution and marine litter in line with IMAP.	In-house expertise consultancies, implementing partner(s), regional meeting(s), CorMon meetings on pollution and marine litter	MED POL	CU, IMAP Task Force	EU MSFD WG GES, TGML, TG DATA, relevant scientific institutions	a) Protocols for applying good laboratory practices prepared; b) Monitoring Protocols (6 maximum) related to Pollution (eutrophication and contaminants),Marine Litter, and sampling and analysis of microplastic in WWTP developed/updated and agreed; c) Scales of monitoring and scales of assessment products agreed and updated; assessment criteria/thresholds/baseline values proposed; and reporting format adjusted to agreed scales of monitoring and scales of assessment products. All the deliverables above will be submitted for review to respective CorMon meetings on pollution and marine litter.	a, b) Protocols for applying good laboratory practices should be prepared in line with the Monitoring Protocols prepared for IMAP Common Indicators related to Pollution. c) Scales of monitoring and scales of assessment products should be agreed based on approaches provided within analysis of IMAP cross-cutting issues.
2.4.2: Inventories of pollutant loads (NBB, PRTR from land-based sources, and from offshore and shipping) regularly updated, reported and assessed.						

THEME 2. LAND & SEA BASED POLLUTION						
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1. Ensure efficient NBB/PRTR reporting and provide support to up to 10 CPs including quality assurance control of data.	In-house expertise, consultancies	MED POL	Info/RAC	CPs, UfM H2020	a) NBB 2018-2019 reporting cycle analyzed at national, sub-regional and regional river basin levels to contribute to NAP implementation evaluation; b) Reporting gaps assessed and needs for technical support identified.	During 2018-2019 biennium, an update of inventories of pollutant loads (NBB from land-based sources) is in progress. The NBB is updated every 5 years.
2.4.3: Marine pollution assessment tools (in depth thematic assessment, maps and indicator factsheets) developed and updated for key pollutants and sectors within EcAp.						
1. Update thematic assessment products related to pollution and marine litter cluster of IMAP, including prevailing industrial sectors and priority pollutants/sectors addressed by the Regional Plans; and sea-based sources of pollution.	In-house expertise, consultancies, implementing partner(s), regional meeting(s)	MED POL	Plan Bleu, Info-RAC	EEA	a) Updated assessment factsheets prepared with new data originating from IMAP implementation; b) Updated assessment factsheets for NAP/ H2020 initiative/ LBS Protocol implementation prepared; c) Assessment of status and impacts of agriculture nutrients, contaminant, aquaculture, and state of play of urban storm water on the marine environment prepared using to the extent possible existing information; d) Assessment of implementation of Regional Plans by mainstreaming NBB/PRTR monitoring data on the regional/sub-regional levels prepared, using to the extent possible existing information; e) Assessment of the top single use marine litter items in the Mediterranean and their contribution on microplastic generation and leakage into the marine	MED 2023 QSR Roadmap. c, d, e) Pending discussions for the approval of the thematic assessment products, pollution monitoring will be undertaken through field surveys organized for biodiversity, NIS, pollution and marine litter Common Indicators, in and outside MPAs. f) Mapping of fisheries and aquaculture contribution to marine litter is pending the new GEF MedProgramme.

THEME 2. LAND & SEA BASED POLLUTION						
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					environment prepared, using to the extent possible existing information; f) Assessment and mapping of fisheries and aquaculture contribution to marine litter generation in the Mediterranean. All the deliverables above will be submitted to CorMon meetings on pollution and marine litter.	
2.5 Enhanced capacity at regional, sub- regional and national levels including technical assistance and capacity building.						
2.5.1 Training programmes and workshops in areas such as pollution monitoring, pollutant inventories, policy implementation, common technical guidelines, authorization and inspections bodies, compliance with national legislation.						
1. Support countries in the implementation of IMAP with a particular focus on scale of assessment, offshore monitoring, integration of indicators towards GES and joint monitoring.	In-house expertise, consultancies, implementing partner(s), meeting(s), training workshop(s)	MED POL	CU, IMAP Task Force	EU MSFD-WG GES, TGML, ACCOBAMS	a) Technical assistance provided and capacities built to support IMAP implementation (including Pollution, Marine Litter and Noise Clusters) in line with national needs, with a particular focus on aggregation and integration of monitoring data and assessment products, monitoring and assessment scales, offshore monitoring, integration of indicators towards GES, and joint monitoring; b) Sub-regional/regional workshops and trainings related to Pollution and Marine Litter Cluster of IMAP organized in areas of common capacity needs and knowledge gaps (minimum 2 per sub-region).	Further to countries visits and based on expressed needs by countries, there is a need to develop additional training programmes and workshops related to pollution monitoring.

THEME 2. LAND & SEA BASED POLLUTION						
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2. Share best practices on Dumping Protocol Guidelines implementation at regional/ sub-regional/ national levels.	In-house expertise, consultancies, implementing partner(s), regional meeting(s)	MED POL	REMPEC, SPA/RAC	IMO, London Convention and London Protocol	a) Best practices identified and shared with the CPs in regional meeting; b) Detailed information provided on country work on the implementation of the Dumping Protocol and its Guidelines; c) Synergies maximized with IMO London Protocol work; d) Priority for capacity building and technical assistance to CPs identified.	Under the Dumping Protocol, Guidelines have been adopted by the Contracting Parties on dumping of wastes/matter listed in the article 4 par.2, namely: - Updated Guidelines on Management of Dredged Materials (COP 20 Decision IG.23/12); - Guidelines for the placement at sea of matter for purpose other than the mere disposal (construction of artificial reefs) (COP 14, Decision IG. 16/8); - Guidelines for the dumping of inert, uncontaminated geological materials (CO 14, Decision IG. 16/9); - Guidelines for the management of fish waste or organic materials resulting from the processing of fish and other marine organisms (COP 12); - Guidelines, on dumping of platforms and other man-made structures at sea (COP 13).
2.5.2 Pilot projects implemented on marine litter, POPs, mercury, and illicit discharges reduced, including through SCP solutions for alternatives to POPs and toxic chemicals and the reduction of upstream sources of marine litter for businesses, entrepreneurs, financial institutions and civil society.						
1. Expand the pilots on FfL and Adopt a Beach and other marine litter removal/reduction and prevention	In-house expertise, consultancies, implementing partner(s), meeting(s)	MED POL	SPA/RAC	CPs, GFCM, Members of the Regional Cooperation Platform on Marine Litter in	a) Small-scale projects to apply the provisions of the FAO guidelines regarding reduction of amounts of ALDFG and “Fishing-for-litter” guidelines are implemented in 7 Mediterranean countries; b) Marine litter reduction targets	Article 9 of the Regional Plan on Marine Litter Management in the Mediterranean.

THEME 2. LAND & SEA BASED POLLUTION						
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(SCP) pilot projects (particularly focused on plastics and microplastics).				the Mediterranean	approved by COP 19 achieved at pilot project sites; c) FAO guidelines applied to reduce ALDFG;	
2. Launch pilot projects on PCB and new POPs reduction and prevention and site decontamination based on updated NAP hotspots/ sensitive areas.	In-house expertise, consultancies, implementing partner(s), meeting(s)	CU, MED POL	SCP/RAC	CPs, GEF, BRSC, UN Environment (including Chemicals Branch), Economy Division	a) Pilot project designed and initiated; b) Disposal of approximately 600 tons of PCBs and PCB wastes from Algeria and Lebanon completed; c) Detailed inventories of PCBs stocks principally in Albania and Algeria developed;	Project submitted to GEF in 2019 and expected for execution in mid-2020. Pilot projects to be implemented as part of the new GEF MED Programme are in Albania, Algeria, Bosnia and Herzegovina, Egypt, Lebanon, Morocco, Montenegro, Tunisia and Turkey.
3.Launch pilot projects on mercury reduction and prevention and site decontamination based on updated NAP hotspots/ sensitive areas.	In-house expertise, consultancies, implementing partner(s), meeting(s)	CU, MED POL	SCP/RAC	CPs, GEF, BRSC, UN Environment (including Chemicals Branch), Economy Division, Minamata Convention, WHO	a) Preparatory work undertaken to dispose 30 tons of mercury by 2022 in an environmentally sound manner; b) Detailed inventories of mercury developed;	Project submitted to GEF in 2019 and expected for execution in mid-2020. Pilot projects to be implemented as part of the new GEF MED Programme are in Albania, Algeria, Bosnia and Herzegovina, Egypt, Lebanon, Morocco, Montenegro, Tunisia and Turkey.
2.5.3: Marine pollution prevention and control measures and assessments integrated in ICZM Protocol implementation projects, CAMPs and related Strategic Environment Impact Assessments						
1. Contribute to new CAMPs to consider litter and pollution	In-house expertise, consultancies, national	MED POL	PAP/RAC		a) MED POL related actions with regards to monitoring and assessment implemented within planned CAMPs;	Delivery of integrated and aggregated assessment products is contingent on PAP/RAC implementing CAMPs in selected countries.

THEME 2. LAND & SEA BASED POLLUTION						
Main Activities	**Means of implementation**	**Lead: CU or Component**	**Other: CU and/or Components**	**Partners**	**Expected Deliverables**	**Remarks (link with the current PoW, legal basis for activity/deliverable)**
prevention and reduction measures (including offshore activities).	workshop(s), meeting(s)				b) Assessment findings based on IMAP integrated within transboundary CAMPs.	

PROPOSED ACTIVITIES OF SCP/RAC WITH MED POL CONTRIBUTION ON THEME 2. LAND & SEA BASED POLLUTION						
Main Activities	**Means of implementation**	**Lead: CU or Component**	**Other: CU and/or Components**	**Partners**	**Expected Deliverables**	**Remarks (link with the current PoW, legal basis for activity/deliverable)**
2.1. Strengthening regional implementation of the obligations under the Barcelona Convention and 4 pollution -related Protocols, and of programmes of measures in existing relevant Regional Strategies and Action Plans.						
2.1.1. Targeted measures of the regional plans/strategies facilitated and implemented.						
2. Promote the use of relevant instruments and incentives to prevent/ reduce plastic pollution including the generation of single-use plastic bags and microplastics; abandoned, lost, discarded fishing gear (ALDFG); marine litter generated from aquaculture activities; marine litter from ships; and e-waste.	In-house expertise, consultancies, regional/sub regional workshop(s)/ meeting(s)	SCP/RAC	MED POL	UN Environment Economy Division, SWITCH MED, FAO, GFCM	d) Best practices shared at regional level on new emerging measures, i.e. related to plastic pollution, EPR schemes for plastic packaging, to facilitate the implementation of the Regional Plan on Marine Litter Management; e) Gaps and priorities for technical support and capacity building identified;	Follow-up activity 2.1.1.2 of the 2018/2019 PoW. Implementation article 9 ML Regional Plan. Specific theme to be decided in coordination with the countries.
	In-house expertise, consultancy	REMPEC	MED POL	CPs, IMO, EBRD	f) Technical support provided to CPs, which so request, to implement the IMO Action Plan to address marine plastic litter from ships and the related provisions of the Regional Plan on Marine Litter Management in the Mediterranean, where appropriate.	SO 5,6 &9- Regional Strategy for Prevention of and Response to Marine Pollution from Ships (2016-2021), Capitalisation of the related activities implemented within the framework of the "Marine Litter-Med" project and IMELS. Co-funding from IMO ITCP.

PROPOSED ACTIVITIES OF SCP/RAC WITH MED POL CONTRIBUTION ON THEME 2. LAND & SEA BASED POLLUTION						
Main Activities	**Means of implementation**	**Lead: CU or Component**	**Other: CU and/or Components**	**Partners**	**Expected Deliverables**	**Remarks (link with the current PoW, legal basis for activity/deliverable)**
4. Promote the use of relevant instruments for the identification and implementation of alternatives to POPs and mercury at the regional, and sub-regional level.	In-house expertise, consultancies, regional/sub regional workshop(s)	SCP/RAC	MED POL	GEF, UN Environment Chemicals Branch, BRSC Secretariat	a) Experiences and best practices on strategies for the prevention of new POPs shared with CPs at regional level, to facilitate the implementation of Regional Plans on POPs; b) Gaps and priorities for technical support and capacity building identified.	New activity that will be based on the experience of the countries targeted by the MedProgramme (Child project 1.11) and that will aim to share it with other contracting parties not involved in the project. Implementation of the Regional Plan on POPs (Decisions IG. 19/8, IG.19/9, IG. 20/8.3).
2.3 Strengthening and implementation of marine pollution prevention and control legislation and policies at national level, including through enforcement and Integration into sectorial processes.						
2.3.1 Adopted NAPs (Art. 15, LBS Protocol) implemented and targeted outputs timely delivered.						
1. Support streamlining NAP measures in the national regulatory systems and their implementation.	In-house expertise, consultancies, national meeting(s)	SCP/RAC	MED POL	CPs	d) At least 3 countries supported for the development of further regulation for the reduction of single-use plastic production and use, including EPR schemes;	Follow-up activity 2.3.1.2 of the 2018/2019 PoW. Implementation of article 9 of the Regional Plan on Marine Litter Management.
				CPs, GEF, UN Environment Economy Division, BRSC, WHO	e) At least 3 countries supported to draft regulation to restrict the import and use of PFOS and PFOA containing products, SCCP and SCCP containing products, HBCD containing products (Lebanon, Morocco and Tunisia).	Implementation of the Regional Plan on POPs and SCP Regional Action Plan. Funded by the MedProgramme (GEF-Child project 1.1.).

PROPOSED ACTIVITIES OF SCP/RAC WITH MED POL CONTRIBUTION ON THEME 2. LAND & SEA BASED POLLUTION						
Main Activities	**Means of implementation**	**Lead: CU or Component**	**Other: CU and/or Components**	**Partners**	**Expected Deliverables**	**Remarks (link with the current PoW, legal basis for activity/deliverable)**
2.3.3 SCP Regional Action Plan (pollution- related activities) mainstreamed into and implemented through NAPs and national processes, such as SCP National Action Plans and NSSDs.						
1. Support the establishment of regulatory and economic measures related to the implementation of SCP/circular economy.	In-house expertise, consultancies, national meeting(s)	SCP/RAC	MED POL, Plan Bleu	UN Environment Economy Division	Circular economy measures in key sectors of the SCP Regional Action Plan, in particular in the food and agriculture sector with a specific focus on the role of biowaste, developed in 2 countries.	Follow-up activity 2.3.3.1 of the 2018/2019 PoW Follow-up pilot of the activities with the food and agriculture sector developed during 2018/2019 Implementation of the SCP Regional Action Plan (operational objectives 1.1, 1.2 and 1.3).
2.5 Enhanced capacity at regional, sub- regional and national levels including technical assistance and capacity building.						
2.5.1 Training programmes and workshops in areas such as pollution monitoring, pollutant inventories, policy implementation, common technical guidelines, authorization and inspections bodies, compliance with national legislation.						
3. Develop training programmes around key SCP and circular economy themes.	In-house expertise, consultancies, national training(s)	SCP/RAC	MED POL, Plan Bleu	UN Environment Economy Division, UNIDO	At least 5 capacity building activities developed to enhance knowledge on SCP/circular economy (including on the extension of the life span of products).	Implementation of the Regional SCP Action Plan. Specific themes to be developed in coordination with the countries.
2.5.2 Pilot projects implemented on marine litter, POPs, mercury, and illicit discharges reduced, including through SCP solutions for alternatives to POPs and toxic chemicals and the reduction of upstream sources of marine litter for businesses, entrepreneurs, financial institutions and civil society.						
1. Expand the pilots on FfL and Adopt a Beach and other marine litter removal/reduction and prevention (SCP) pilot projects (particularly focused on plastics and microplastics).	In-house expertise, consultancies, implementing partner(s), meeting(s)	SCP/RAC	MED POL	CPs, UN Environment Economy Division, BeMed Club	d) 2 pilot activities developed, supporting the further development of innovative circular economy solutions to plastic pollution.	Follow-up activity 2.5.2.4 of the 2018/2019 PoW Implementation of the SCP Regional Action Plan (operational objectives 2.1 and 2.3).

PROPOSED ACTIVITIES OF SCP/RAC WITH MED POL CONTRIBUTION ON THEME 2. LAND & SEA BASED POLLUTION						
Main Activities	**Means of implementation**	**Lead: CU or Component**	**Other: CU and/or Components**	**Partners**	**Expected Deliverables**	**Remarks (link with the current PoW, legal basis for activity/deliverable)**
2. Launch pilot projects on PCB and new POPs reduction and prevention and site decontamination based on updated NAP hotspots/ sensitive areas.	In-house expertise, consultancies, technical assistance, national meeting(s)	SCP/RAC	CU, MED POL	CPs, GEF, BRSC, UN Environment (including Chemicals Branch), Economy Division	d) Sampling and analysis of fire-fighting foams, soil and groundwater for PFOS/PFOA on fire incident sites, EPS XPS pellets being used by the companies and of SCCP and MCCP imported for PVC production used by companies prepared in 3 countries (Lebanon, Morocco and Tunisia) e) Pilot Demonstrations, substitution of PFOS foams and of HBCD in pellet of EPS XPS by environmentally sound alternatives done in 3 countries; f) Capacities on “New POPs management" enhanced in 3 countries.	Follow-up activity 2.5.2.5 of the 2018/2019 PoW Implementation of the POPs Regional Plan and SCP Regional Action Plan (operational objective 2.1). Activity be funded by GEF (Med Programme - Child project 1.1).
3.Launch pilot projects on mercury reduction and prevention and site decontamination based on updated NAP hotspots/ sensitive areas.	In-house expertise, consultancies, technical assistance, national meeting(s)	SCP/RAC	CU, MED POL		c) Audits-inventory in public hospitals realised in 2 countries (Tunisia and Lebanon); d) Capacities on mercury management enhanced in 2 countries; e) Substitution of mercury containing medical devices in particular thermometers by Environmentally Sound Alternatives done in 2 countries.	Follow-up activity 2.5.2.5 of the 2018/2019 PoW Implementation of the POPs Regional Plan and SCP Regional Action Plan (operational objective 2.1). Activity be funded by GEF (Med Programme - Child project 1.1).
2.7 Identifying and tackling new and emerging issues, as appropriate.						

PROPOSED ACTIVITIES OF SCP/RAC WITH MED POL CONTRIBUTION ON THEME 2. LAND & SEA BASED POLLUTION						
Main Activities	**Means of implementation**	**Lead: CU or Component**	**Other: CU and/or Components**	**Partners**	**Expected Deliverables**	**Remarks (link with the current PoW, legal basis for activity/deliverable)**
2.7.1 Reviews/policy briefs developed and submitted to Contracting Parties on emerging pollutants, ocean acidification, climate change and linkages with relevant global processes.						
1. Review toxic chemicals of concern used for the plastic production.	In-house expertise, consultancies	SCP/RAC	MED POL	BRSC, IMO	1. review brief on the toxic chemicals, used in plastics, and that are of concern for the implementation of a circular economy in the Mediterranean produced.	Implementation of Article 9 of the ML Regional Plan and SCP Regional Action Plan. New activity linked with the activities of SCP/RAC as regional center of the Stockholm Convention.
3. Review solutions to fight against plastic pollution.	In-house expertise, consultancies	SCP/RAC	Plan Bleu, MED POL, CU	CSIC, zero waste network, ICLEI	3 policy papers prepared on the innovative solutions to plastic pollution.	Follow-up of activity 2.2.1.5 of the 2018/2019 PoW. Capitalisation of the results/findings of projects/activities developed during 2018/2019. 3 possible themes. Analysis based on the results of the activities supported through the Cooperation Agreement with IMELS, on the use of bioplastics, and the consideration of single-use plastics in GPP.