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DRAFT PROPOSED ECOLOGICAL OBJECTIVES, OPERATIONAL OBJECTIVES AND INDICATORS IN THE FRAMEWORK OF IMPLEMENTING THE ECOSYSTEM APPROACH BY UNEP/MAP

UNEP/MAP
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Introduction

1. Since the adoption of the roadmap for implementing ecosystem approach along with the vision and strategic goals in January 2008, the work of UNEP/MAP has evolved naturally to undertake a baseline assessment and identify the ecological objectives with consideration of associated operational objectives and indicators.

2. As a vital step in the Ecosystem Approach (EA) application, the ecological specific objectives to be attained through a comprehensive and integrated set of management activities, should reflect the ecosystem approach vision and goals articulated by consensus, as well as a basic understanding of ecosystem condition, values, pressures and impacts.

3. The second meeting of technical experts on the Application of the Ecosystem Approach held in Barcelona on 7-8 July 2010 indicated that the 11 European Union Marine Strategy Framework Directive descriptors should be used as the basis for developing Mediterranean Ecological Objectives, taking also into account the issues emerging from the finalized integrated Assessment Report, socio economic considerations, ICZM and cumulative impacts.

4. Harmonization of the two concurrent efforts under UNEP/MAP and EU MSFD is expected to increase efficiency and reduce any possible redundancies. Contracting Parties already collect good environmental information, much of which can be used to guide EA process. It is thus useful to also find ways to link the monitoring, research, and management done under the Barcelona Convention and its Protocols, within efforts of EU Member States under the respective EU legislation. There is in fact much opportunity to build on the monitoring and research (and management) already being undertaken by the Contracting Parties, as part of their obligations under the Barcelona Convention and its protocols.

I. Proposed ecological objectives

5. The Secretariat has proposed and tested a methodology that could be used to determine Ecological Objectives for the Mediterranean in harmony with the EU MSFD Descriptors but is tailored for the scale and circumstances of moving towards an ecosystem approach within the Mediterranean region. This methodology interprets each Descriptor and casts it as a Mediterranean-relevant Ecological Objective. In some cases Descriptors have been merged, amended, and added to reflect the priorities that have emerged in the Assessment report.

6. The Secretariat has also given thought to the possible first-order and other operational objectives, and their corresponding indicators, for each of these draft proposed Ecological Objectives. Consideration was given to the pertinence of the operational objective as it relates to the Ecological Objective, to the feasibility of collecting information across the region, and to the potential importance of the management response that could flow from the adoption of operational objectives and targets.

7. The set of Ecological Objectives proposed aims at enhanced harmonization and integration amongst all the above-mentioned processes. The draft proposed Ecological Objectives are meant to be illustrative, not proscriptive, and serve as a starting point for discussions among the Contracting Parties on how to move the EA process forward in a timely manner. The draft proposed options for EA Ecological Objectives is directly related to, but further adapts and enhances the EU MSFD descriptors, taking also into account the geographical scope of .the application of the Barcelona Convention and its Protocols..

8. The following draft Ecological Objectives are proposed for consideration throughout the Mediterranean in the initial launching of the EA process. It is important to note that no

prioritization is intended by the order in which these appear; it will be up to the Contracting Parties to finally determine priorities, as well as operational objectives, indicators, and targets.

1. *Biodiversity is maintained, or enhanced through restoration*
2. *Non-indigenous species do not cause adverse ecosystem impacts*
3. *Harvest of commercially exploited fish and shellfish are within sustainable limits*
4. *Marine food webs are not adversely affected by resource removal or indirect impacts*
5. *Eutrophication is minimized*
6. *Sea-floor integrity is maintained*
7. *Alteration of hydrographical conditions does not adversely affect marine ecosystems*
8. *The natural dynamics of coastlines are maintained and critical natural coastal land habitats are not degraded or lost by erosion, inundation, or urbanization, and restored where appropriate*
9. *Pollution by contaminants, through discharge, marine inputs, land-based sources, and noise, is minimized*
10. *Marine litter is minimized*

9. The transformation of the EU MSFD Descriptors into potential Ecological Objectives tailors considerations to the needs and realities of regionally harmonized marine management in the Mediterranean. The decisions to combine information under certain Ecological Objectives (for instance, contaminants in the marine environment and in seafood) are proposed as a way to streamline the monitoring burden while retaining information that is important to the Ecosystem Approach (and important to successfully meeting obligations under the EU MSFD). The inclusion of an additional consideration on coastline natural dynamics and intactness of critical coastal land habitats is proposed as a response to emphasis placed by Contracting Parties on regional determinations of the loss of coastal ecosystem services, and the importance of tracking climate change impacts on them. In part this emphasis reflects the unique position that Contracting Parties to the Barcelona Convention and its Protocols are in regarding their ability to truly adopt an ecosystem approach that spans freshwater, coastal lands, and the sea.

10. The inclusion of noise as part of the pollution objective is the result of the consideration that, as of now, no data are being currently systematically collected on noise and other energy inputs into the marine environment, so it is difficult to see how this could constitute a stand-alone priority Ecological Objective under the EA process. However, this impact which certainly has the potential to be substantial, particularly as it affects marine mammals, needs to be considered in the overall pollution impacts to ensure that the science around understanding and quantifying noise impacts and publicly available technology for monitoring noise improves to a level that allows the recommendation of management actions alongside with other pollution reduction measures.

11. Below follows a detailed discussion on the reasoning for the proposed ecological objectives including a first proposed set of operational objectives and indicators for initial consideration.

II. Proposed operational objectives and indicators per ecological objective

2.1 Biodiversity is maintained, or enhanced through restoration

Ecological Objective	*Operational Objectives*	*Possible Indicators*
Biological diversity is maintained or enhanced by restoration. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climate conditions.	**1.1 Species distribution is maintained and species are not lost or put at risk due to extinction or extirpation**	*1.1.1 Distributional range change*
		1.1.2 Area covered by the species (for sessile/benthic species)
	1.2 Population size and density of key species is maintained	*1.2.1 Population size*
		1.2.2 Population density
	1.3 Habitat distribution is monitored and key coastal and marine habitats are not being lost	*1.3.1 Potential /observed distribution of certain habitats listed under SPA protocol*
		1.3.2 Observed changes to distributional pattern, with threshold rates of loss

Rationale for Ecological Objective and First Order Operational Objectives

12. The purpose of this Ecological Objective is to evaluate whether species and habitat level biodiversity is being maintained, and if it is not, quantifying the rates of biodiversity loss. It should be noted that comprehensive biodiversity monitoring covers also the genetic level of biodiversity, however this is accorded a second order priority status in the ECAP process due to the complexity of monitoring at the scales of the ECAP.

13. The species used to assess biodiversity (1.1. and 1.2) will be an agreed-upon subset of those listed in Annex II of Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean (endangered or threatened species), covering the major taxonomic groups and the species listed as threatened species, by the GFCM list of priority species [1]. The distributional range of a species will be given as a geo-referenced polygon/s.

14. The information obtained from studying the distributional pattern of a species (1.1.2) should be supplemented by information on its population density (1.2.2) that has been added to the population size criterion (1.2). The density can be assessed by direct means (i.e. individual counts per surface/volume unit) or by indirect means (i.e. mammal density distribution models). Both size (1.2.1) and density (1.2.2) will be given by reference to the distributional range polygon/s.

15. With regard to habitats, a prioritization of habitat types should be done in order to have a realistic starting point. Amongst pelagic habitats upwelling areas, fronts and gyres need special attention and focus.

16. Regarding benthic habitats currently, sufficient information exists to make a prioritization amongst those mentioned in the RAC/SPA list of 27 benthic habitats and the priority habitats in areas beyond national jurisdiction following CBD decisions VIII/24 and

[1] http://www.gfcm.org/gfcm/topic/166221/en

VIII/21 paragraph 1[2]. These could include from shallow to deep: biocoenosis of infralittoral algae (facies with vermetids or trottoir), hard beds associated with photophilic algae, meadows of the sea grass *Posidonia oceanica*, hard beds associated with Coralligenous biocenosis and semi dark caves, biocoenosis of shelf-edge detritic bottoms (facies with *Leptometra phalangium*), biocoenosis of deep-sea corals, cold seeps and biocoenosis of bathyal muds (facies with Isidella elongata).

17. The habitat distribution (1.3) will be assessed by looking into the potential distributional range by using 2D/3D surrogate mapping techniques or observed distributional range by direct observation (1.3.1). The distributional pattern (1.3.2) needs to be assessed by direct observation as surrogate mapping does not render enough resolution for this purpose. Both indicators will be given, when available, as a georeferenced polygons.

18. Other operational objectives were also considered such as the regional or subregional population condition of most species, the habitat extent, and habitat condition and ecosystem structure. In the view of the Secretariat it is difficult to assess such criteria at this stage and therefore these should only be taken in account to assess the achievement of the biodiversity ecological objective when the state of the art for it has reached a minimum level. If the information on habitat distribution is given as above, the information on habitat extent can be derived directly from it and therefore becomes redundant. Information on habitat condition and ecosystem structure it is too difficult to be compiled with the overall degree of knowledge we have on Mediterranean habitats and ecosystems.

[2] CBD Technical Series No. 37

2.2 Non-indigenous species do not cause adverse ecosystem impacts

Ecological Objective	*Operational Objectives*	*Possible Indicators*
Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystem.	**2.1 Non-indigenous species introductions (i.e. ballast water, aquaculture, incidental release, lessepsian), are minimized**	*2.1.1. Spatial distribution, origin and population status (established vs. vagrant) of non-indigenous species, notably in risk areas*
		2.1.2 Abundance of introduced species, notably in risk areas
	2.2. Particularly invasive species already introduced are controlled, or their ecosystem impacts minimized	*2.2.1 Particularly invasive species distribution*

Rationale for Ecological Objective and First Order Operational Objectives

19. The purpose for this Ecological Objective is to evaluate non-indigenous species impacts. This Ecological Objective concentrates on introductions, recognizing that species composition is the result of ever-changing dynamics in species distribution (as, for example, thermophyllic species move northwards with ocean warming, or as speciation occurs).

20. For Ecological Objective 2, the list of priority (indicator) species introduced by human activities will be derived by consensus, based on information from the CIESM Atlas of Exotic Species in the Mediterranean, the DAISIE project (European Invasive Alien Species Gateway) a database tracking alien terrestrial and marine species in Europe and from GFCM..

21. The spatial distribution of introduced species (2.1.1) and particularly invasive species (2.2.1) will be reported as a georeferenced polygon/s. The abundance (2.1.2) will be given by reference to the distributional range polygon/s.

22. The degree of knowledge on the environmental impact of introduced species in the Mediterranean is limited at the moment and it would be difficult to assess for the species covered in operational objective 2.1. The knowledge gained on this field, especially regarding the economic impact (positive or negative) on fisheries and aquaculture could be integrated progressively.

2.3 Harvest of commercially exploited fish and shellfish are within sustainable limits

Ecological Objective	*Operational Objectives*	*Possible Indicators*
Populations of select commercially exploited fish and shellfish are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock.	**3.1 Level of pressure by known commercial fisheries is kept within sustainable limits**	*3.1.1 Total catch by fishery*
		3.1.2 Total effort by fishery
		3.1.3 Catch per unit effort (CPUE) by fishery
		3.1.4 Ratio between catch and biomass index (hereinafter catch/biomass ratio) for selected indicator species, at each trophic level
	3.2 Reproductive capacities of stocks is not exceeded	*3.2.1 Spawning Stock Biomass (SSB)*
		3.2.2 Age structure determination (where feasible)

Rationale for Ecological Objective and First Order Operational Objectives

23. The purpose of this Ecological Objective is to evaluate the extent to which key commercial fisheries are sustainable and keeping within maximum sustainable yield limits. Other aspects of fisheries impacts, such as impacts of fisheries, including directed take and by-catch, on food webs and ecosystem dynamics, as well as benthic impacts of destructive fishing methods, are dealt with by other Ecological Objectives (#4 and #6).

24. The choice of indicator species for collecting information for Ecological Objective 3 should be derived from fisheries targeting species listed in Annex III of Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean (species whose exploitation is regulated) and those species that the coastal states consider of most environmental or socioeconomic interest. Choice of indicators should cover all trophic levels, and if possible, functional groups, using if possible species listed in Annex III of SPA and/or the stocks covered under regulation (EC) No 199/2009 (within the geographical scope of Directive 2009/56/EC).

25. Advice on the prioritization/modification of the criteria and indicators should be sought from GFCM/FAO so it is coherent with their approach making it easier to obtain the data. The indicators will need to be defined as precisely as possible so it is clear what needs to be collected. Indicators should reflect effort, stock size and stock structure.

26. Other Operational Objectives were considered such as maintenance of size/age class distributions across all species, or fishing mortality rates do not exceed MSY in other commercial or artisanal fisheries, for instance. While these may be useful in furthering understanding of fisheries sustainability and impacts, basin-wide information is not available at this point in time. Additional objectives concerning food webs could be phased in as the EA process advances and as more comprehensive understanding of fisheries pressures and impacts is gained across the region.

2.4 Marine food webs are not adversely affected by resource removal or indirect anthropogenic impacts

Ecological Objective	*Operational Objectives*	*Possible Indicators*
Food web dynamics are not significantly altered by resource extraction or environmental changes	**4.1 Marine Trophic Index suggests ecosystem dynamics across all trophic levels is maintained**	*4.1.1 Biomass estimates of each functional group, allowing derivation of Marine Trophic Index (MTI).*
	4.2 Proportion of key species for keeping equilibrium of food webs is the closest to expected pristine status, with apex predator populations and baseline distributions maintained	*4.2.1 Stock assessment of tunas, swordfish (ICCAT), and key elasmobranches, and cetaceans using spawning biomass metrics where appropriate and possible*
		4.2.2 Jelly fish bloom quantification
	4.3 Environmental changes affecting pelagic productivity are monitored and pressures caused by anthropogenic drivers are evaluated against baseline changes	*4.3.1 Changes in nutrients, chlorophyll a, or primary productivity offshore*
		4.3.2 Changes in thermocline, including seasonal timing and depth
		4.3.3 Sea surface temperature changes and response of primary producers

Rationale for Ecological Objective and First Order Operational Objectives

27. The purpose of this Ecological Objective is to track the extent to which resource removal and human-induced environmental changes are affecting food web structure and dynamics. This is in recognition of the interconnected nature of marine ecosystems, the potentially devastating impacts of cascading effects, and the need to steer management in an ecosystem-based direction in order to safeguard important ecosystem services.

28. The choice of operational objectives reflects the ability to use ecosystem science to guide monitoring of food web-wide changes at the scales required for the ECAP process. Monitoring will have to be coupled to modeling (Marine Trophic Index linked to EcoPath or EcoSim modeling, for example) in order to derive useful information for this important but highly complex set of ecosystem parameters.

29. The metrics and resolution of data contributed towards the indicators will be agreed beforehand.

30. Other Operational Objectives were considered such as population abundances maintained across predominant species at each trophic level, or biodiversity indices suggest no significant changes to species diversity within any trophic level. However, in the Secretariat's view these objectives should to be taken up at a later time as the capacity to track these parameters is increased. Productivity estimates for major functional or taxonomic groups can be currently derived using modeling, but monitoring for this is extremely data-intensive.

2.5 Eutrophication is minimized

Ecological Objective	*Operational Objectives*	*Possible Indicators*
Human-induced eutrophication is minimized, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algal blooms and oxygen deficiency in bottom waters.	**5.1 Nutrients levels in the marine environment are kept within baseline levels**	*5.1.1 Concentration of key nutrients in the water column*
		5.1.2 Nutrient ratios (silica, nitrogen and phosphorus), where appropriate
	5.2 Direct effects of nutrient over-enrichment are minimized	*5.2.1 Chlorophyll concentration in the water column*
		5.2.2 Water transparency
		5.2.3 Number of and location of major events of nuisance/toxic algal blooms (e.g. cyanobacteria) caused by human activities
	5.3 Indirect effects of nutrient over-enrichment are minimized	*5.3.1 Dissolved oxygen near the bottom, i.e. changes due to increased organic matter decomposition and size of the area concerned*

Rationale for Ecological Objective and First Order Operational Objectives

31. The purpose of this Ecological Objective is to ensure that eutrophication does not continue to increase, especially in areas where natural levels of nutrients are relatively low. Adverse impacts of nutrient over-enrichment, including fish kills and the spread of hypoxic or anoxic conditions, are avoided by a tracking and early warning system. In addition, Harmful Algal Blooms are tracked, and the conditions that predispose environments to these blooms are monitored.

32. The areas in which the information on the indicators should be collected will be determined by the states taking into account previous knowledge on the incidence of eutrophication events. The proposed indicators are in line with UNEP/MAP MEDPOL monitoring programme.

2.6 Sea-floor integrity is maintained

Ecological Objective	*Operational Objectives*	*Possible Indicators*
Sea-floor integrity is maintained to the maximum practicable, especially in priority benthic habitats ((e.g. coastal lagoons and marshes, seagrass meadows, coralligenous communities, sea mounts, submarine canyons and slopes, deepwater coral and hydrothermal vents)	**6.1 Extent of benthic disturbance overall is kept within acceptable limits**	*6.1.1 Distribution of bottom trawling effort, dredging activities, seabed mining*
		6.1.2 Extent of those benthic habitats recorded as significantly affected by above activities.
	6.2 Extent and impact of benthic disturbance in priority benthic habitats is minimized	*6.2.1 Footprint of impact by dredging, trawling, installations, mining in key benthic habitats*
		6.2.2 Determination of biodiversity-specific impacts (e.g. destruction of coralligenous communities)

Rationale for Ecological Objective and First Order Operational Objectives

33. The purpose of this ecological objective is to address the direct and indirect impacts of activities that impact the seafloor and its benthic processes. These activities include bottom trawl fisheries, dredging for navigation, seabed mining (minerals, sand), submarine cable laying, energy installations and related pipelines (including but not limited to oil rigs and wind turbines), and marine constructions such as groins and jetties. It is understood that some of these impacts are permanent, while others are periodic – clearly the periodic disturbances will be harder to track and quantify. In addition, there may be reasons that information on the location of certain types of installations (especially those relating to maritime security and national defence, or those related to energy exploration) will be difficult to obtain.

34. The first priority operational objectives would centre on two sets of parameters: 1) understanding the footprints of these activities in space and time, and 2) assessing the impacts of these bottom disturbances on an agreed-to list of priority habitats. These priority benthic habitats will be the same than referred to in Ecological Objective 1 on biodiversity.

35. Habitats not considered in the initial assessment could be added at a later stage to complete a more comprehensive substrate map for the Mediterranean Basin that would constitute robust baseline, against which the changes in location and timing of bottom-disturbing activities could be compared. Future monitoring could focus on 2nd priority indicators providing further insight on the dynamics and health of benthic habitats.

36. Information on indicator 6.1.1 and 6.1.2 will be provided as a series of polygons by activity/installation type and habitat type.

2.7 Alteration of hydrographical conditions does not adversely affect marine ecosystems

Ecological Objective	*Operational Objectives*	*Possible Indicators*
Alteration of hydrographical conditions does not adversely affect marine ecosystems.	**7.1 Permanent alterations such as seawall and groin construction, port and marina development (where applicable), marine installations (i.e. submarine cables, pipelines, oil rigs, wind turbines, etc), and other seafloor anchored structures are monitored and minimized**	*7.1.1. Impact on the circulation caused by the presence of the structures*
		7.1.2 Location and extent of the habitats impacted directly by the alterations and/or the circulation changes induced by them: footprints of impacting structures
	7.2 Spatial characterization of circulation alterations due to changes in freshwater flow from watersheds and brine input from desalinization plants are periodically undertaken	*7.2.1. Trends in fresh water volume delivered to salt marshes, lagoons, estuaries, and deltas especially Natura 2000 and RAMSAR sites and desalinization brines in the coastal zone*
		7.2.2. Location and extent of the habitats impacted by changes in the circulation and salinity induced by the alterations

Rationale for Ecological Objective and First Order Operational Objectives

37. The purpose of this ecological objective is to understand the effect that human activity at sea, on the coast, and in watersheds has on the physical environment of the Mediterranean. The focus here is on activities that imply occupation of the seafloor/coast line with structures and the impact on water flows that in turn affects productivity and diversity of marine ecosystems.

38. Information on fresh water input for the northern shore of the Mediterranean will be derived from what European countries are already monitoring under the relevant EU legislation and directives.

39. The criteria and indicators in Ecological Objective 7 have been organized in order to reflect the effect of physical obstruction/modification of water flows in the marine environment (operational objective 7.1) and to reflect the effect of alterations due to modifications on the inflow of fresh water/brines due to watershed regulation and input from desalinization plants (operational objective 7.2).

2.8 The natural dynamics of coastlines are maintained[BS1] and critical natural coastal land habitats are not degraded or lost through erosion, inundation, or urbanization, and restored where appropriate

Ecological Objective	*Operational Objectives*	*Possible Indicators*
Coastlines and coastal lands are stable and in good condition, with a minimum of erosion and/or alteration of sedimentary dynamics.	**8.1 Spatial characterization of coastline and coastal lands is understood**	*8.1.1. Arial extent of coastal erosion and coastline instability*
		8.1.2 Changes in sediment dispersion dynamics along the coastline
	8.2 Impact of permanent hydrographical changes is minimized	*8.2.1 Trends in sediment delivery, especially in major deltaic systems*
		8.2.2 Extent of area affected by coastal erosion due to sediment supply alterations
	8.3 Loss of natural coastal land habitats (dune systems, marshes, etc.) by urbanization, concretization, increase in non-porous surfaces, etc. is minimized or reversed through adaptation measures that restore ecosystem services	*8.3.1 Distribution of natural coastal land habitats at risk of being lost*
		8.3.2 Patterns of urbanization/concretization
		8.3.3 Location and scope of adaptation and restoration measures

Rationale for Ecological Objective and First Order Operational Objectives

40. The purpose of this Ecological Objective is to understand the effect that human activity in the watersheds, on the coast, and at sea has on the sedimentary environment of the Mediterranean. The focus here is on activities that impact sediment delivery and transportation which in turn affect shoreline natural sedimentary dynamics (rates of erosion).

41. Information on sediment input from riverine sources will be derived from what countries are to monitor under the Barcelona Convention and its Protocols and relevant EU legislation. There is already a strong link of the proposed operational objectives and indicators with ICZM Protocol requirements.

42. Concerning coastal erosion, there are of course other forces at play that affect coastline natural dynamics, including climate change-induced sea level rise, intensity and periodicity of storms, changes to inland areas (urbanization, concretization, amount of non-porous surfaces, etc.), and removal of sands, including from seabeds, for beach replenishment, or soils for mining. Except for the latter, these drivers of erosion cannot be addressed with an ecosystem approach to management, however they must be monitored because they are the backdrop against which more directly human-induced changes are occurring, and because climate change impacts also affect the human response – i.e. the extent to which investment

in adaptation and restoration will be made. Cross-integration with information on habitat distribution (under Ecological Objective #1) will enable countries to use this Ecological Objective to craft appropriate management responses to hydrographical pressures.

2.9 Pollution by contaminants, through discharge, marine inputs, land-based sources, and noise, is minimized

Ecological Objective	*Operational Objectives*	*Possible Indicators*
Concentrations of contaminants and noise are at levels not undermining human health or the delivery of ecosystem services.	**9.1 Concentration of priority contaminants is below environmental target levels identified on the basis of ecotoxicological data and does not increase**	*9.1.1 Concentration of key harmful contaminants in biota, sediment or water*
	9.2 Effects of chronically released contaminants are minimized	*9.2.1. Pollution effects of key contaminants being monitored by countries on ecosystem components where a cause and effect relationship has been established*
	9.3 Magnitude and impact of acute pollution events is tracked and risk factors minimized	*9.3.1 Occurrence, origin (where possible), extent of significant acute pollution events (e.g. slicks from oil and oil products) and their impact on biota physically affected by this pollution*
	9.4 Levels of known harmful contaminants in major types of seafood does not exceed established standards	*9.4.1. Actual levels of contaminants that have been detected and number of contaminants which have exceeded maximum regulatory levels in commonly consumed seafood*
		9.4.2. Frequency that levels of contaminants are exceeded
	9.5. Water quality in bathing waters and other recreational areas is maintained	*9.5.1 Fecal streptococci concentrations within established standards*
		9.5.2. Occurrence of Harmful Algal Blooms within bathing and recreational areas
	8.6 Energy inputs into the marine environment, especially noise from shipping and use of sonar, is assessed and minimized in sensitive areas	*9.6.1 Information on shipping- and seismic exploration-related noise pollution is collated and mapped*
		9.6.2 Coincidence of high noise producing activities and particularly sensitive areas is monitored

Rationale for Ecological Objective and First Order Operational Objectives

43. This Ecological Objective allows us to understand the effects of key contaminants on ecosystem functioning and on human health. In the EU MSFD, the contaminants affecting biota and the contaminants affecting human health are treated separately (though the substances being looked at are one and the same, for the most part). However, in the initial phase of the EA setting of Ecological Objectives, it was thought that by combining these issues around contamination, but proposing different criteria for their monitoring, countries could derive useful information for managing both chronic and acute pollution.

44. The subset of contaminants that constitute priority contaminants has already been agreed by Contracting Parties, and MEDPOL is maintaining databases based on national reporting for all or some subset of these pollutants. Monitoring data should be interpreted against the objective described in the operational objective 9.1 through a series of environmental target levels, expressed as concentrations of chemical contaminants. Examples of suitable target levels include the Environmental Quality Standards (EQSs) derived under the WFD 2000/60/EC and the Environmental Assessment Criteria (EACs) as defined within OSPAR for water, sediment and biota.

45. Biological effects (9.2) should be assessed against environmental target levels of response that are indicative of significant harm to the organism concerned

46. To derive meaningful information on contaminants in seafood in order to support regulatory or management interventions, a list of seafood commonly consumed throughout the region must be established. Considerations include the availability of these types of seafood for port sampling and/or market sampling, and the representation of different functional groups (and thus different pathways for ingestion of contaminants and different levels of bioaccumulation.

47. Energy inputs into the marine environment are addressed separately in the EU MSFD Descriptors. However it was considered that at this point in time, given the state of science regarding noise impacts on ecology, as well as the difficulty in obtaining information on certain sources of noise generating activity (e.g. military, proprietary information held by energy companies using seismic exploration), the initial phasing in of the Ecosystem Approach could consider noise pollution as an specific operational objective under a broader pollution Ecological Objective. Of particular concern is the generation of noise-producing activities such as shipping, military use of sonar, and use of air guns and seismic arrays in energy exploration, in sensitive areas, such as those supporting high concentrations of marine mammals.

2.10 Marine litter is minimized

Ecological Objective	*Operational Objectives*	*Possible Indicators*
Marine and coastal litter does not adversely affect biodiversity and ecosystem services.	**10.1 Characteristics of litter in the marine and coastal environment is analyzed and all litter is minimized**	*10.1.1 Trends in the amount of litter washed ashore and/or deposited on coastlines, including analysis of its composition, spatial distribution and, where possible, source*
	10.2 Impacts of litter on marine life is controlled to the maximum extent practicable	*10.2.1 Trends in the amount of litter ingested or entangling the limbs of marine animals mammals, birds and turtles recorded by stranding networks*

Rationale for Ecological Objective and First Order Operational Objectives

48. This ecological objective focuses on the impact of degraded waters, with the main focus initially being on marine litter at bathing beaches and other recreational areas. Many countries are already collecting information on the nature of and magnitude of marine litter, and studies have been done on impact of various kinds of litter on ecosystems and biodiversity. Litter also affects beach and recreational area quality. Many major recreational areas and beaches are being monitored for this sort of contamination, and information on beach closures is readily available. Within UNEP/MAP a draft strategy on litter is under finalisation.

49. The ability to monitoring marine environments for micro-plastics, or to be able to systematic evaluate the ecosystem impacts of litter (especially out at sea) is very limited at this point in time, especially at the scale that the EA process requires. As the science matures and as technology advances to the point to providing effective and efficient means of tracking these parameters and effects, additional operational objectives and indicators could be adopted.