COMMISSION DECISION

of 1 September 2010

on criteria and methodological standards on good environmental status of marine waters

(notified under document C(2010) 5956)

(Text with EEA relevance)

(2010/477/EU)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to the 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) [1], and in particular, Article 9(3) thereof,

Whereas:

(1) The criteria for the achievement of good environmental status are the starting point for the development of coherent approaches in the preparatory stages of marine strategies, including the determination of characteristics of good environmental status and the establishment of a comprehensive set of environmental targets, to be developed in a coherent and coordinated manner in the framework of the requirement of regional cooperation.

(2) The Commission has consulted all interested parties, including regional sea conventions, in particular on the scientific and technical assessment prepared by the Task Groups set up by the Joint Research Centre and the International Council on the Exploration of the Seas to support the development of criteria and methodological standards.

(3) One major finding of such scientific and technical work is that there is a substantial need to develop additional scientific understanding for assessing good environmental status in a coherent and holistic manner to support the ecosystem-based approach to management. An improved scientific knowledge needs to be developed, in particular through the Communication 'A European Strategy for Marine and Maritime Research. A coherent European Research Area framework in support of a sustainable use of oceans and seas' [2], in the framework of the Communication 'Europe 2020 A strategy for smart, sustainable and inclusive growth' [3] and in coherence with other Union legislation and policies. It is also appropriate to integrate later on in the process the forthcoming experience to be developed at national and regional level in the implementation of the preparatory stages of the marine strategies listed in Article 5(2)(a) of Directive 2008/56/EC.

(4) It is therefore appropriate that the Commission revises this Decision in the framework of Article 25(3) of Directive 2008/56/EC. In addition to revising criteria, the further development of methodological standards is required, in close coordination with the establishment of monitoring programmes. This revision should be carried out as soon as possible after the completion of the assessment required in Article 12 of Directive 2008/56/EC, in time to support a successful update of marine strategies that are due by 2018 pursuant to Article 17 of that Directive, as a further contribution to adaptive management. This is coherent with the fact that the determination of good environmental status may have to be adapted over time, taking into account the dynamic nature of marine ecosystems, their natural variability, and the fact that the pressures and impacts on them may vary with the evolution of different patterns of human activity and the impact of climate change.

(5) The criteria for good environmental status build on existing obligations and developments in the context of applicable Union legislation, including 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 [4], which applies to coastal waters, as well as Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora [5], Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds [6], and a number of instruments developed in the framework of the common fisheries policy, taking also into account, where appropriate, the information and knowledge gathered and approaches developed in the framework of regional conventions. As this Decision contributes to the further development of the concept of good environmental status of marine waters, it supports in relation to marine ecosystems the process to revise the biodiversity strategy of the European Union beyond 2010 and the Biodiversity Action Plan.

[1] OJ L 164, 25.6.2008, p. 19.
[2] COM(2008) 534 final.
[3] COM(2010) 2020 final.
[4] OJ L 327, 22.12.2000, p. 1.
[5] OJ L 206, 22.7.1992, p. 7.
[6] OJ L 20, 26.1.2010, p. 7.

(6) Directive 2008/56/EC, which is the environmental pillar of the Integrated Maritime Policy, requires the application of the ecosystem approach to the management of human activities, covering all sectors having an impact on the marine environment. The Green Paper on the Reform of the Common Fisheries Policy [1] states that the latter must be set up to provide the right instruments to support this ecosystem approach.

(7) The measures provided for in this Decision are in accordance with the opinion of the Committee established by Article 25(1) of Directive 2008/56/EC,

HAS ADOPTED THIS DECISION:

Article 1

Criteria to be used by the Member States to assess the extent to which good environmental status is being achieved, accompanied with references to applicable methodological standards where available, are set out in the Annex.

Article 2

This Decision is addressed to the Member States.

Done at Brussels, 1 September 2010.

For the Commission
Janez POTOČNIK
Member of the Commission

[1] COM(2009) 163 final, p. 19.

ANNEX

CRITERIA AND METHODOLOGICAL STANDARDS FOR GOOD ENVIRONMENTAL STATUS

PART A

General conditions of application of the criteria for good environmental status

1. The criteria for assessing the extent to which good environmental status is being achieved are specified and numbered in Part B in relation to each of the eleven descriptors of good environmental status set out in Annex I to Directive 2008/56/EC. The criteria are accompanied by a list of related indicators to make such criteria operational and allow subsequent progress. In Part B, criteria are accompanied with references to applicable methodological standards where available. For a number of such criteria and related indicators, the need for further development and additional information is identified, to be further addressed in the process for the revision of this Decision [1]. This Part specifies the general conditions of application of such criteria and related indicators.

2. For most criteria, the assessment and methodologies required need to take into account and, where appropriate, be based on those applicable under existing Community legislation, in particular Directive 2000/60/EC, Directive 2008/105/EC of the European Parliament and of the Council [2], Directive 92/43/EEC, Directive 2009/147/EC and other relevant Union legislation (including under the common fisheries policy, e.g. Council Regulation (EC) No 199/2008 [3]), taking also into account reports of the Task Groups set up by the Joint Research Centre and the International Council on the Exploration of the Seas [4] and, where relevant, the information and knowledge gathered and the approaches developed in the framework of regional sea conventions.

3. Good environmental status requires that all relevant human activities are carried out in coherence with the requirement of protecting and preserving the marine environment and the concept of sustainable use of marine goods and services by present and future generations referred to in Article 1 of Directive 2008/56/EC. The application of criteria for good environmental status needs to be carried out keeping in mind the need to target assessment and monitoring and to prioritise action in relation to the importance of impacts and threats to marine ecosystems and its components. However, it is important that assessment considers the main cumulative and synergetic effects of impacts on the marine ecosystem, as mentioned in Article 8(1)(b)(ii) of Directive 2008/56/EC.

4. In a number of cases, and in particular taking into account the relation between information needs and the geographical scope of the marine waters concerned, it can be appropriate to apply as a first step some selected criteria and related indicators for an overall screening of the environmental state at a broader scale and only then identify instances and specific areas where, having regard to the importance of impacts and threats in view of the environmental characteristics and/or human pressures, a finer assessment is necessary, involving all relevant indicators related to criteria.

5. The temporal and spatial scale of impacts varies considerably depending on the type of pressure and the sensitivity of the ecosystem components affected. Because of their intrinsic characteristics, some criteria and indicators may require applying various timescales for capturing a range of different processes. When the assessment needs to start at a relatively small spatial scale to be ecologically meaningful (for instance because pressures are localised), it could be necessary to scale up assessments at broader scales, such as at the levels of subdivisions, sub-regions and regions.

6. A combined assessment of the scale, distribution and intensity of the pressures and the extent, vulnerability and resilience of the different ecosystem components including where possible their mapping, allows the identification of areas where marine ecosystems have or may have been adversely affected. It is also a useful basis to assess the scale of the actual or potential impacts marine ecosystems. This approach, which takes into account risk-based considerations, also supports the selection of the most appropriate indicators related to the criteria for assessment of progress towards good environmental status. It also facilitates the development of specific tools that can support an ecosystem-based approach to the management of human activities required to achieve good environmental status through the identification of the sources of pressures and impacts, including their cumulative and synergetic effects. Such tools include spatial protection measures and measures in the list in Annex VI to Directive 2008/56/EC, notably spatial and temporal distribution controls, such as maritime spatial planning.

7. There is a diversity of environmental conditions at sea and of human activities having an impact on it. In particular, diversity exists between regions and even within marine regions, sub-regions and subdivisions. For this reason, the applicability of specific indicators related to the criteria may require considering whether they are ecologically relevant to each situation being assessed.

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[1] See recitals 3 and 4.
[2] OJ L 348, 24.12.2008, p. 84.
[3] OJ L 60, 5.3.2008, p. 1.
[4] See recital 2.

8. Member States need to consider each of the criteria and related indicators listed in this Annex in order to identify those which are to be used to determine good environmental status. On the basis of the initial assessment, when a Member State considers that it is not appropriate to use one or more of the criteria, it needs to provide the Commission with a justification in the framework of the notification made pursuant to Article 9(2) of Directive 2008/56/EC, when relevant in relation to consistency and comparison between regions and sub-regions. In this context, Member States are subject to the obligation of regional cooperation laid down in Articles 5 and 6 of Directive 2008/56/EC, and in particular to the requirement to ensure that the different elements of the marine strategies are coherent and coordinated across the marine region or sub-region concerned.

9. It is important that the application of the criteria takes into account the results of the initial assessment, required under Article 8 and Annex III to Directive 2008/56/EC, and that they are not carried out in isolation. The initial assessment is the main process for identifying the essential features and characteristics as well as the predominant pressures and impacts on the marine environment, subject to its regular updates and to monitoring programmes. This first assessment needs to be finalised by the date specified in Article 5(2) of Directive 2008/56/EC on the basis of the indicative lists of elements contained in Annex III to that Directive and taking account of existing data where available. Consideration needs to be given to the fact that some criteria and related indicators are acknowledged as being still under development during this initial period.

10. Progress towards good environmental status is taking place in the context of continuous broader changes in the marine environment. Climate change is already having an impact on the marine environment, including on ecosystem processes and functions. In developing their respective marine strategies, Member States need to specify, where appropriate, any evidence of climate change impacts. Adaptive management on the basis of the ecosystem-based approach includes the regular update of the determination of good environmental status.

PART B

Criteria for good environmental status relevant to the descriptors of Annex I to Directive 2008/56/EC

Descriptor 1: Biological diversity is maintained. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climate conditions.

Assessment is required at several ecological levels: ecosystems, habitats (including their associated communities, in the sense of biotopes) and species, which are reflected in the structure of this section, taking into account point 2 of Part A. For certain aspects of this descriptor, additional scientific and technical support is required ([5]). To address the broad scope of the descriptor, it is necessary, having regard to Annex III to Directive 2008/56/EC, to prioritise among biodiversity features at the level of species, habitats and ecosystems. This enables the identification of those biodiversity features and those areas where impacts and threats arise and also supports the identification of appropriate indicators among the selected criteria, adequate to the areas and the features concerned ([6]). The obligation of regional cooperation contained in Articles 5 and 6 of Directive 2008/56/EC is directly relevant to the process of selection of biodiversity features within regions, sub-regions and subdivisions, including for the establishment, where appropriate, of reference conditions pursuant to Annex IV to Directive 2008/56/EC. Modelling using a geographic information system platform may provide a useful basis for mapping a range of biodiversity features and human activities and their pressures, provided that any errors involved are properly assessed and described when applying the results. This type of data is a prerequisite for ecosystem-based management of human activities and for developing related spatial tools ([7]).

Species level

For each region, sub-region or subdivision, taking into account the different species and communities (e.g. for phytoplankton and zooplankton) contained in the indicative list in Table 1 of Annex III to Directive 2008/56/EC, it is necessary to draw up a set of relevant species and functional groups, having regard to point 2 of Part A. The three criteria for the assessment of any species are species distribution, population size and population condition. As to the later, there are cases where it also entails an understanding of population health and inter- and intra-specific relationships. It is also necessary to assess separately subspecies and populations where the initial assessment, or new information available, identifies impacts and potential threats to the status of some of them. The assessment of species also requires an integrated understanding of the distribution, extent and condition of their habitats, coherent with the requirements laid down in Directive 92/43/EEC ([8]) and Directive 2009/147/EC, to make sure that there is a sufficiently large habitat to maintain its population, taking into consideration any threat of deterioration or loss of such habitats. In relation to biodiversity at the level of species, the three criteria for assessing progress towards good environmental status, as well as the indicators related respectively to them, are the following:

([5]) See recitals 3 and 4.
([6]) See points 3 to 6 in Part A.
([7]) See point 6 in Part A.
([8]) 'Assessment, monitoring and reporting of conservation status — Preparing the 2001-2007 report under Article 17 of the Habitats Directive', 15 March 2005, accepted in the Habitats Committee on 20 April 2005.

1.1. Species distribution

— Distributional range (1.1.1)

— Distributional pattern within the latter, where appropriate (1.1.2)

— Area covered by the species (for sessile/benthic species) (1.1.3)

1.2. Population size

— Population abundance and/or biomass, as appropriate (1.2.1)

1.3. Population condition

— Population demographic characteristics (e.g. body size or age class structure, sex ratio, fecundity rates, survival/mortality rates) (1.3.1)

— Population genetic structure, where appropriate (1.3.2).

Habitat level

For the purpose of Directive 2008/56/EC, the term habitat addresses both the abiotic characteristics and the associated biological community, treating both elements together in the sense of the term biotope. A set of habitat types needs to be drawn up for each region, sub-region or subdivision, taking into account the different habitats contained in the indicative list in Table 1 of Annex III and having regard to the instruments mentioned in point 2 of Part A. Such instruments also refer to a number of habitat complexes (which means assessing, where appropriate, the composition, extent and relative proportions of habitats within such complexes) and to functional habitats (such as spawning, breeding and feeding areas and migration routes). Additional efforts for a coherent classification of marine habitats, supported by adequate mapping, are essential for assessment at habitat level, taking also into account variations along the gradient of distance from the coast and depth (e.g. coastal, shelf and deep sea). The three criteria for the assessment of habitats are their distribution, extent and condition (for the latter, in particular the condition of typical species and communities), accompanied with the indicators related respectively to them. The assessment of habitat condition requires an integrated understanding of the status of associated communities and species, coherent with the requirements laid down in Directive 92/43/EEC ([9]) and Directive 2009/147/EC, including where appropriate an assessment of their functional traits.

1.4. Habitat distribution

— Distributional range (1.4.1)

— Distributional pattern (1.4.2)

1.5. Habitat extent

— Habitat area (1.5.1)

— Habitat volume, where relevant (1.5.2)

1.6. Habitat condition

— Condition of the typical species and communities (1.6.1)

— Relative abundance and/or biomass, as appropriate (1.6.2)

— Physical, hydrological and chemical conditions (1.6.3).

Ecosystem level

1.7. Ecosystem structure

— Composition and relative proportions of ecosystem components (habitats and species) (1.7.1).

In addition, the interactions between the structural components of the ecosystem are fundamental for assessing ecosystem processes and functions for the purpose of the overall determination of good environmental status, having regard, inter alia, to Articles 1, 3(5) and 9(1) of Directive 2008/56/EC. Other functional aspects addressed through other descriptors of good environmental status (such as descriptors 4 and 6), as well as connectivity and resilience considerations, are also important for addressing ecosystem processes and functions.

([9]) See footnote 8.

Descriptor 2: Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystem.

The identification and assessment of pathways and vectors of spreading of non-indigenous species as a result of human activities is a prerequisite to prevent that such species introduced as a result of human activities reach levels that adversely affect the ecosystems and to mitigate any impacts. The initial assessment has to take into account that some introductions due to human activities are already regulated at Union level ([10]) to assess and minimise their possible impact on aquatic ecosystems and that some non-indigenous species have commonly been used in aquaculture for a long time and are already subject to specific permit treatment within the existing Regulations ([11]). There is still only limited knowledge about the effects of the non-indigenous species on the environment. Additional scientific and technical development is required for developing potentially useful indicators ([12]), especially of impacts of invasive non-indigenous species (such as bio-pollution indexes), which remain the main concern for achieving good environmental status. The priority in relation to assessment and monitoring ([13]) relates to state characterisation, which is a prerequisite for assessment of the magnitude of impacts but does not determine in itself the achievement of good environmental status for this descriptor.

2.1. Abundance and state characterisation of non-indigenous species, in particular invasive species

— Trends in abundance, temporal occurrence and spatial distribution in the wild of non-indigenous species, particularly invasive non-indigenous species, notably in risk areas, in relation to the main vectors and pathways of spreading of such species (2.1.1)

2.2. Environmental impact of invasive non-indigenous species

— Ratio between invasive non-indigenous species and native species in some well studied taxonomic groups (e.g. fish, macroalgae, molluscs) that may provide a measure of change in species composition (e.g. further to the displacement of native species) (2.2.1)

— Impacts of non-indigenous invasive species at the level of species, habitats and ecosystem, where feasible (2.2.2).

Descriptor 3: Populations of all commercially exploited fish and shellfish are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock.

This section applies for all the stocks covered by Regulation (EC) No 199/2008 (within the geographical scope of Directive 2008/56/EC) and similar obligations under the common fisheries policy. For these and for other stocks, its application depends on the data available (taking the data collection provisions of Regulation (EC) No 199/2008 into account), which will determine the most appropriate indicators to be used. For this descriptor, the three criteria for assessing progress towards good environmental status, as well as the indicators related respectively to them, are the following.

3.1. Level of pressure of the fishing activity

Primary indicator. The primary indicator for the level of pressure of the fishing activity is the following:

— Fishing mortality (F) (3.1.1).

Achieving or maintaining good environmental status requires that F values are equal to or lower than F_{MSY}, the level capable of producing Maximum Sustainable Yield (MSY). This means that in mixed fisheries and where ecosystem interactions are important, long term management plans may result in exploiting some stocks more lightly than at F_{MSY} levels in order not to prejudice the exploitation at F_{MSY} of other species ([14]).

F is estimated from appropriate analytical assessments based on the analysis of catch (to be taken as all removals from the stock, including discards and unaccounted catch) at age or at length and ancillary information. Where the knowledge of the population dynamics of the stock do not allow to carry out simulations, scientific judgement of F values associated to the yield-per-recruit curve (Y/R), combined with other information on the historical performance of the fishery or on the population dynamics of similar stocks, can be used.

([10]) Council Regulation (EC) No 708/2007 of 11 June 2007 concerning use of alien and locally absent species in aquaculture (OJ L 168, 28.6.2007, p. 1).
([11]) See Annex IV to Regulation (EC) No 708/2007.
([12]) See recitals 3 and 4.
([13]) See point 9 in Part A.
([14]) Communication 'Implementing sustainability in EU fisheries through maximum sustainable yield' (COM(2006) 360 final).

Secondary indicators (if analytical assessments yielding values for F are not available):

— Ratio between catch and biomass index (hereinafter 'catch/biomass ratio') (3.1.2).

The value for the indicator that reflects F_{MSY} needs to be determined by scientific judgement following analysis of the observed historical trends of the indicator combined with other information on the historical performance of the fishery. Where stock production-based assessments are available, the catch/biomass ratio yielding MSY can be taken as indicative reference.

Alternatively to the catch/biomass ratio, secondary indicators may be developed on the basis of any other appropriate proxy for fishing mortality, adequately justified.

3.2. Reproductive capacity of the stock

Primary indicator. The primary indicator for the reproductive capacity of the stock is the following:

— Spawning Stock Biomass (SSB) (3.2.1).

This is estimated from appropriate analytical assessments based on the analysis of catch at age or at length and ancillary information.

Where an analytical assessment allows the estimation of SSB, the reference value reflecting full reproductive capacity is SSB_{MSY}, i.e. the spawning stock biomass that would achieve MSY under a fishing mortality equal to F_{MSY}. Any observed SSB value equal to or greater than SSB_{MSY} is considered to meet this criterion.

Further research is needed to address the fact that a SSB corresponding to MSY may not be achieved for all stocks simultaneously due to possible interactions between them.

Where simulation models do not allow the estimation of a reliable value for SSB_{MSY}, then the reference to be used for the purpose of this criterion is SSB_{pa}, which is the minimum SSB value for which there is a high probability that the stock is able to replenish itself under the prevailing exploitation conditions.

Secondary indicators (if analytical assessments yielding values for SSB are not available):

— Biomass indices (3.2.2).

It can be used if such indices can be obtained for the fraction of the population that is sexually mature. In such cases, such indices need to be used when scientific judgement is able to determine, through detailed analysis of the historical trends of the indicator combined with other information on the historical performance of the fishery, that there is a high probability that the stock will be able to replenish itself under the prevailing exploitation conditions.

3.3. Population age and size distribution

Primary indicators. Healthy stocks are characterised by high proportion of old, large individuals. Indicators based on the relative abundance of large fish include:

— Proportion of fish larger than the mean size of first sexual maturation (3.3.1)

— Mean maximum length across all species found in research vessel surveys (3.3.2)

— 95 % percentile of the fish length distribution observed in research vessel surveys (3.3.3).

Secondary indicator:

— Size at first sexual maturation, which may reflect the extent of undesirable genetic effects of exploitation (3.3.4).

For the two sets of indicators (proportion of old fish and size at first sexual maturation), expert judgement is required for determining whether there is a high probability that the intrinsic genetic diversity of the stock will not be undermined. The expert judgement needs to be made following an analysis of the time series available for the indicator, together with any other information on the biology of the species.

Descriptor 4: All elements of the marine food webs, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long-term abundance of the species and the retention of their full reproductive capacity.

This descriptor concerns important functional aspects such as energy flows and the structure of food webs (size and abundance). Additional scientific and technical support is required, at this stage, for the further development of criteria and potentially useful indicators to address the relationships within the food web ([15]).

4.1. Productivity (production per unit biomass) of key species or trophic groups

To address energy flows in food webs, adequate indicators need to be developed further to assess the performance of the main predator-prey processes, reflecting the long-term viability of components in the part of the food web that they inhabit, based on the experience in some sub-regions in selecting appropriate species (e.g. mammals, seabirds).

— Performance of key predator species using their production per unit biomass (productivity) (4.1.1).

4.2. Proportion of selected species at the top of food webs

To address the structure of food webs, size and abundance of components, there is a need to assess the proportion of selected species at the top of food webs. Indicators need to be further developed, based on the experience in some sub-regions. For large fish, data are available from fish monitoring surveys.

— Large fish (by weight) (4.2.1).

4.3. Abundance/distribution of key trophic groups/species

— Abundance trends of functionally important selected groups/species (4.3.1).

It is necessary to identify changes in population status potentially affecting food web structure. Detailed indicators need to be further specified, taking account of their importance to the food webs, on the basis of suitable groups/species in a region, sub-region or subdivision, including where appropriate:

— groups with fast turnover rates (e.g. phytoplankton, zooplankton, jellyfish, bivalve molluscs, short-living pelagic fish) that will respond quickly to ecosystem change and are useful as early warning indicators,

— groups/species that are targeted by human activities or that are indirectly affected by them (in particular, by-catch and discards),

— habitat-defining groups/species,

— groups/species at the top of the food web,

— long-distance anadromous and catadromous migrating species,

— groups/species that are tightly linked to specific groups/species at another trophic level.

Descriptor 5: Human-induced eutrophication is minimised, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algal blooms and oxygen deficiency in bottom waters.

The assessment of eutrophication in marine waters needs to take into account the assessment for coastal and transitional waters under Directive 2000/60/EC (Annex V, 1.2.3 and 1.2.4) and related guidance ([16]), in a way which ensures comparability, taking also into consideration the information and knowledge gathered and approaches developed in the framework of regional sea conventions. Based on a screening procedure as part of the initial assessment, risk-based considerations may be taken into account to assess eutrophication in an efficient manner ([17]). The assessment needs to combine information on nutrient levels and on a range of those primary effects and of secondary effects which are ecologically relevant ([18]), taking into account relevant temporal scales. Considering that the concentration of nutrients is related to nutrient loads from rivers in the catchment area, cooperation with landlocked Member States using established cooperation structures in accordance with the third subparagraph of Article 6(2) of Directive 2008/56/EC is particularly relevant.

([15]) See recitals 3 and 4.
([16]) *Guidance Document on the Eutrophication Assessment in the Context of European Water Policies, Document No 23*. European Commission (2009). See http://circa.europa.eu/Public/irc/env/wfd/library
([17]) See points 3 to 6 in Part A.
([18]) See point 7 in Part A.

5.1. Nutrients levels

— Nutrients concentration in the water column (5.1.1)

— Nutrient ratios (silica, nitrogen and phosphorus), where appropriate (5.1.2)

5.2. Direct effects of nutrient enrichment

— Chlorophyll concentration in the water column (5.2.1)

— Water transparency related to increase in suspended algae, where relevant (5.2.2)

— Abundance of opportunistic macroalgae (5.2.3)

— Species shift in floristic composition such as diatom to flagellate ratio, benthic to pelagic shifts, as well as bloom events of nuisance/toxic algal blooms (e.g. cyanobacteria) caused by human activities (5.2.4)

5.3. Indirect effects of nutrient enrichment

— Abundance of perennial seaweeds and seagrasses (e.g. fucoids, eelgrass and Neptune grass) adversely impacted by decrease in water transparency (5.3.1)

— Dissolved oxygen, i.e. changes due to increased organic matter decomposition and size of the area concerned (5.3.2).

Descriptor 6: Sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected.

The objective is that human pressures on the seabed do not hinder the ecosystem components to retain their natural diversity, productivity and dynamic ecological processes, having regard to ecosystem resilience. The scale of assessment for this descriptor may be particularly challenging because of the patchy nature of the features of some benthic ecosystems and of several human pressures. Assessment and monitoring needs to be carried out further to an initial screening of impacts and threats to biodiversity features and human pressures, as well as an integration of assessment results from smaller to broader scales, covering where appropriate a subdivision, sub-region or region ([19]).

6.1. Physical damage, having regard to substrate characteristics

The main concern for management purposes is the magnitude of impacts of human activities on seafloor substrates structuring the benthic habitats. Among the substrate types, biogenic substrates, which are the most sensitive to physical disturbance, provide a range of functions that support benthic habitats and communities.

— Type, abundance, biomass and areal extent of relevant biogenic substrate (6.1.1)

— Extent of the seabed significantly affected by human activities for the different substrate types (6.1.2).

6.2. Condition of benthic community

The characteristics of the benthic community such as species composition, size composition and functional traits provide an important indication of the potential of the ecosystem to function well. Information on the structure and dynamics of communities is obtained, as appropriate, by measuring species diversity, productivity (abundance or biomass), tolerant or sensitive taxa and taxocene dominance and size composition of a community, reflected by the proportion of small and large individuals.

— Presence of particularly sensitive and/or tolerant species (6.2.1)

— Multi-metric indexes assessing benthic community condition and functionality, such as species diversity and richness, proportion of opportunistic to sensitive species (6.2.2)

— Proportion of biomass or number of individuals in the macrobenthos above some specified length/size (6.2.3)

— Parameters describing the characteristics (shape, slope and intercept) of the size spectrum of the benthic community (6.2.4).

Descriptor 7: Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems.

([19]) See points 3 to 6 in Part A.

Permanent alterations of the hydrographical conditions by human activities may consist for instance of changes in the tidal regime, sediment and freshwater transport, current or wave action, leading to modifications of the physical and chemicals characteristics set out in Table 1 of Annex III to Directive 2008/56/EC. Such changes may be particularly relevant whenever they have the potential to affect marine ecosystems at a broader scale and their assessment may provide an early warning of possible impacts on the ecosystem. For coastal waters, Directive 2000/60/EC sets hydro-morphological objectives that need to be addressed through measures in the context of river basin management plans. A case by case approach is necessary to assess the impact of activities. Tools such as environmental impact assessment, strategic environmental assessment and maritime spatial planning may contribute to evaluate and assess the extent and the cumulative aspects of impacts from such activities. It is however important to ensure that any such tools provide for adequate elements to assess potential impacts on the marine environment, including transboundary considerations.

7.1. Spatial characterisation of permanent alterations

— Extent of area affected by permanent alterations (7.1.1)

7.2. Impact of permanent hydrographical changes

— Spatial extent of habitats affected by the permanent alteration (7.2.1)

— Changes in habitats, in particular the functions provided (e.g. spawning, breeding and feeding areas and migration routes of fish, birds and mammals), due to altered hydrographical conditions (7.2.2).

Descriptor 8: Concentrations of contaminants are at levels not giving rise to pollution effects.

The concentration of contaminants in the marine environment and their effects need to be assessed taking into account the impacts and threats to the ecosystem ([20]). Relevant provisions of Directive 2000/60/EC in territorial and/or coastal waters have to be taken into consideration to ensure proper coordination of the implementation of the two legal frameworks, having also regard to the information and knowledge gathered and approaches developed in regional sea conventions. The Member States have to consider the substances or groups of substances, where relevant for the marine environment, that:

(i) exceed the relevant Environmental Quality Standards set out pursuant to Article 2(35) and Annex V to Directive 2000/60/EC in coastal or territorial waters adjacent to the marine region or sub-region, be it in water, sediment and biota; and/or

(ii) are listed as priority substances in Annex X to Directive 2000/60/EC and further regulated in Directive 2008/105/EC, which are discharged into the concerned marine region, sub-region or subdivision; and/or

(iii) are contaminants and their total releases (including losses, discharges or emissions) may entail significant risks to the marine environment from past and present pollution in the marine region, sub-region or subdivision concerned, including as a consequence of acute pollution events following incidents involving for instance hazardous and noxious substances.

Progress towards good environmental status will depend on whether pollution is progressively being phased out, i.e. the presence of contaminants in the marine environment and their biological effects are kept within acceptable limits, so as to ensure that there are no significant impacts on or risk to the marine environment.

8.1. Concentration of contaminants

— Concentration of the contaminants mentioned above, measured in the relevant matrix (such as biota, sediment and water) in a way that ensures comparability with the assessments under Directive 2000/60/EC (8.1.1)

8.2. Effects of contaminants

— Levels of pollution effects on the ecosystem components concerned, having regard to the selected biological processes and taxonomic groups where a cause/effect relationship has been established and needs to be monitored (8.2.1)

— 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 (8.2.2).

Descriptor 9: Contaminants in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards.

([20]) See points 3 and 4 in Part A.

In the different regions or sub-regions, Member States need to monitor in edible tissues (muscle, liver, roe, flesh, soft parts as appropriate) of fish, crustaceans, molluscs and echinoderms, as well as seaweed, caught or harvested in the wild, the possible presence of substances for which maximum levels are established at European, regional, or national level for products destined to human consumption.

9.1. Levels, number and frequency of contaminants

— Actual levels of contaminants that have been detected and number of contaminants which have exceeded maximum regulatory levels (9.1.1)

— Frequency of regulatory levels being exceeded (9.1.2).

Descriptor 10: Properties and quantities of marine litter do not cause harm to the coastal and marine environment.

The distribution of litter is highly variable, which needs to be taken into consideration for monitoring programmes. It is necessary to identify the activity to which it is linked including, where possible, its origin. There is still a need for further development of several indicators, notably those relating to biological impacts and to micro-particles, as well as for the enhanced assessment of their potential toxicity ([21]).

10.1. Characteristics of litter in the marine and coastal environment

— Trends in the amount of litter washed ashore and/or deposited on coastlines, including analysis of its composition, spatial distribution and, where possible, source (10.1.1)

— Trends in the amount of litter in the water column (including floating at the surface) and deposited on the sea-floor, including analysis of its composition, spatial distribution and, where possible, source (10.1.2)

— Trends in the amount, distribution and, where possible, composition of micro-particles (in particular micro-plastics) (10.1.3)

10.2. Impacts of litter on marine life

— Trends in the amount and composition of litter ingested by marine animals (e.g. stomach analysis) (10.2.1).

This indicator needs to be developed further, based on the experience in some sub-regions (e.g. North Sea), to be adapted in other regions.

Descriptor 11: Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment.

Together with underwater noise, which is highlighted throughout Directive 2008/56/EC, other forms of energy input have the potential to impact on components of marine ecosystems, such as thermal energy, electromagnetic fields and light. Additional scientific and technical progress is still required to support the further development of criteria related to this descriptor ([22]), including in relation to impacts of introduction of energy on marine life, relevant noise and frequency levels (which may need to be adapted, where appropriate, subject to the requirement of regional cooperation). At the current stage, the main orientations for the measurement of underwater noise have been identified as a first priority in relation to assessment and monitoring ([23]), subject to further development, including in relation to mapping. Anthropogenic sounds may be of short duration (e.g. impulsive such as from seismic surveys and piling for wind farms and platforms, as well as explosions) or be long lasting (e.g. continuous such as dredging, shipping and energy installations) affecting organisms in different ways. Most commercial activities entailing high level noise levels affecting relatively broad areas are executed under regulated conditions subject to a license. This creates the opportunity for coordinating coherent requirements for measuring such loud impulsive sounds.

11.1. Distribution in time and place of loud, low and mid frequency impulsive sounds

— Proportion of days and their distribution within a calendar year over areas of a determined surface, as well as their spatial distribution, in which anthropogenic sound sources exceed levels that are likely to entail significant impact on marine animals measured as Sound Exposure Level (in dB re $1\mu Pa^2.s$) or as peak sound pressure level (in dB re $1\mu Pa_{peak}$) at one metre, measured over the frequency band 10 Hz to 10 kHz (11.1.1)

11.2. Continuous low frequency sound

— Trends in the ambient noise level within the 1/3 octave bands 63 and 125 Hz (centre frequency) (re 1μPa RMS; average noise level in these octave bands over a year) measured by observation stations and/or with the use of models if appropriate (11.2.1).

([21]) See recitals 3 and 4.
([22]) See recitals 3 and 4.
([23]) See point 9 in Part A.