

INDICATORS



Good environmental status (GES) is at the core of the MSFD. Criteria for assessing Descriptors of GES, include a list of indicators. Click [here](#) for more information.

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WHAT

Indicators and setting targets

The Marine Strategy Framework Directive applies the Ecosystem Approach (EA) to the management of human activities to achieve good environmental status by 2020 at the latest, and covers all sectors having an impact on the marine environment.

Management task

Indicators of the natural and social systems to support Ecosystem-Based Management

What is the relationship between indicators, targets and GES?

The goal of the MSFD is to achieve Good Environmental Status (GES) of EU marine waters by 2020. To interpret what GES means there are eleven descriptors which describe what the environment will look like when GES has been achieved.

Descriptor3: The population of commercial fish species is healthy.

In the Commission Decision

Criteria 1: the level of pressure of fishing activity

- Indicator: fishing mortality

Criteria 2: the reproductive capacity of the stock

- Indicator: spawning stock biomass

Criteria 3: the population age and size distribution

- Indicator: high proportion of old, large individuals

In practice

Fishing, and other human activities affecting populations of commercially exploited fish and shellfish, should not push these populations beyond their maximum sustainable yield, defined by the European Environment Agency as “the largest yield that can be obtained which does not deplete or damage natural resources irreparably and which leaves the environment in good order for future generations”.

Each descriptor has a set of criteria and associated indicators, which are distinctive technical features. Indicators provide a measure and/or indication of the status of a criteria that a Member State can use to make an assessment of the status of a Descriptor. This determines the characteristics of what GES means for their own marine waters and set targets accordingly. Click [here](#) to see an example and see the example for Descriptor 3 above.

Descriptors, and their criteria and indicators, build on existing obligations within EU legislation to achieve GES and manage human activities having an impact on the marine environment, integrating concepts of environmental protection and sustainable use.

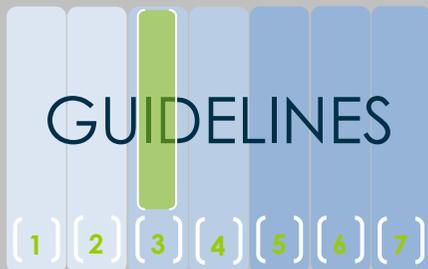


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EBM and the EA facilitate achieving GES, improving management and understanding of pressures and impacts from human activity to reduce undesirable impacts on the marine environment.

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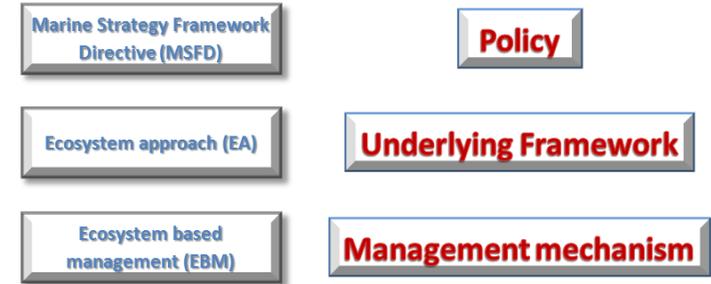
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What is ecosystem-based management?

The principal tool for achieving “Good Environmental Status” is the application of the ecosystem approach (EA) using Ecosystem based management (EBM).

EA is defined as “*An integrated resource planning and management approach that recognizes the connections between land, air and water and all living things, including people, their activities and institutions.*”

EBM is defined as ‘*a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way – the ecosystem approach.*’



EBM seeks to realise the following features of the EA:

- Management objectives as societal choice;
- Management decentralised and multi-sectoral;
- Appropriate temporal and spatial scale;
- Conservation of ecosystem function and resilience;
- Appropriate balance between conservation and use.
- Management within system limits;
- The outward vision (respect interconnectedness) and long-term vision (change is inevitable);
- Broad use of knowledge, scientific and traditional; and
- Incorporation of economic considerations (costs and benefits, removal of externalities).

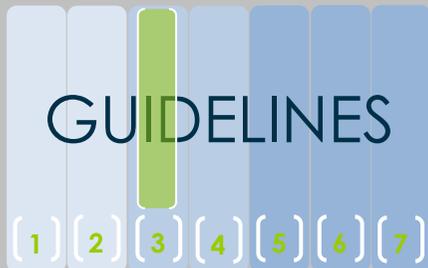
Ecosystem based management is the underlying approach to oversee the role of humans within ecosystems.

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To achieve GES the MSFD requires Member States to develop marine strategies that serve as an Action Plan applying the EA and using existing regional cooperation structures (OSPAR, HELCOM, Barcelona Convention).

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Towards Good Environmental Status

Good environmental status is where marine waters provide ecologically diverse and dynamic oceans and seas that are clean, healthy and productive.

Achieving GES using an ecosystem approach will ensure:

- Collective pressure of activities is kept within levels compatible with the capacity of marine ecosystems to respond to human-induced changes,
- Sustainable use of marine goods and services by present and future generations.
- Integration of environmental concerns into policies that impact the marine environment.

The MSFD requires Member States to develop environmental targets and associated indicators to achieve GES that are coordinated with other Member States where they share a marine region or sub-region. There are two options for GES – it is either achieved or not achieved. This is in common with elements of the WFD although other Directives can have more than two possible outcomes.

EU Directives	Assessment of environmental status				
MSFD	Good Environmental Status		GES not achieved		
Habitat Directive	Conservation status favourable		Inadequate	Bad	
WFD (ecological status)	High	Good	Moderate	Poor	Bad
WFD (chemical status)	Good chemical status		Good chemical status not achieved		
Pressures and impacts					

The possible outcomes and terminology of standards of MSFD and other relevant Directives shown in relation to increasing pressures and impacts and thus declining environmental quality (WFD = Water Framework Directive).

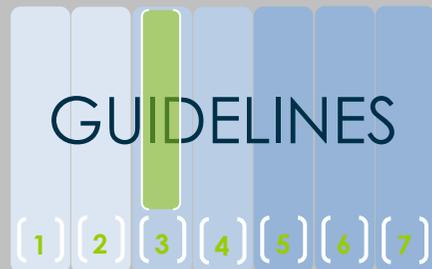
GES will mean that marine ecosystems will be in a condition to provide goods and services to support economic development and eco-innovation. This will better define the boundaries of sustainability.

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The EU has published a [Common Decision](#) on criteria and methodological standards on good environmental status of marine water that outlines eleven descriptors of GES and their determining criteria.

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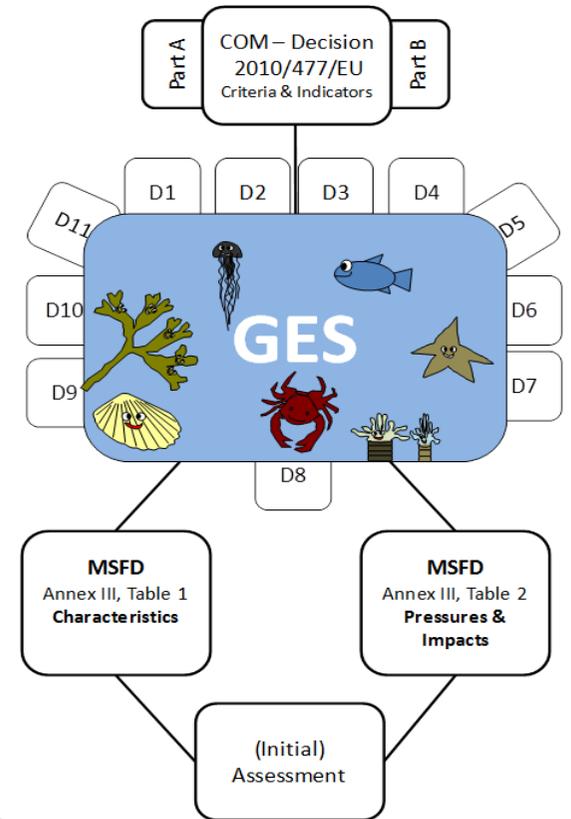
Components of Good Environmental Status

The MSFD requires Member States to determine the characteristics of GES, ('**what does GES look like**'), and develop environmental targets and associated indicators to guide progress towards achieving or maintaining GES .

Member states are required to make:

- An initial assessment of the marine environment (to include assessment of status, pressures, impacts, and socio-economic analysis).
- A characterisation of GES related to physical and chemical features, habitat types, biological features, and pressures and impacts related to physical loss or damage, contamination, nutrients, biological disturbance.
- A suite of appropriate environmental targets and associated indicators to achieve or maintain GES by 2020.

The eleven descriptors of GES can be divided into State and Pressure descriptors that relate to the DPSWR framework. This helps distinguish between those that characterise the **State** of the marine environment and those referring to **Pressures** that originate from human activities.



The components leading to Good Environmental Status standards (D = descriptor, GES = Good Environmental Status GEnS).

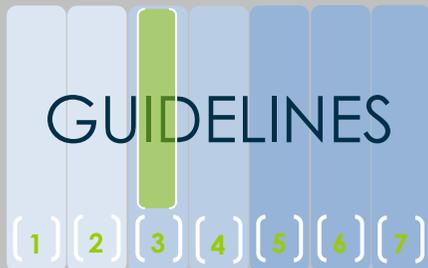
Good Environmental Status is described through the eleven descriptors, and the level of achievement of these descriptors determine whether GES is achieved or not.

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GES accepts that ecosystems are not pristine or untouched and that human activities exist, so attempts to set a level that does not “compromise” the capacity of ecosystems to respond to human pressures.

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GUIDELINES

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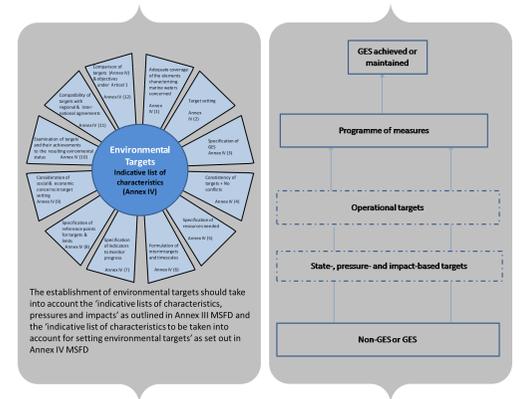
Establishing environmental targets and trade-offs for GES

The MSFD defines an environmental target as “**a qualitative or quantitative statement on the desired condition of the different components of, and pressures and impacts on, marine waters**”.

Targets are a means of articulating in a quantitative or qualitative manner the desired levels of, or necessary changes to, environmental pressures and impacts which would ultimately result in the achievement of GES. Annex IV MSFD provides an indicative list of characteristics to be taken into account for setting environmental targets. There are 4 types of target to achieve GES:

- I. **State-based targets** - describe the physical, chemical or biological condition of the environment (e.g. “at least 30% of fish (by weight) should be greater than 40 cm in length”).
- II. **Pressure-based targets** - describe desired or acceptable level of a particular pressure (e.g. “fishing mortality is at levels consistent with Maximum Sustainable Yield”).
- III. **Impact-based targets** – describe an acceptable level of impact on components of the marine environment arising from a particular pressure or range of pressures (e.g. “annual by-catch of harbour porpoises should be reduced to below 1.7% of the population estimate”).
- IV. **Operational targets** - describe the nature of management action (e.g. “to reduce by 2021 the input of nitrogen and phosphorus by x tonnes”).

Click on the two figures to view them in full size



The Figure (Right) illustrates the relationship between target types and their characteristics.

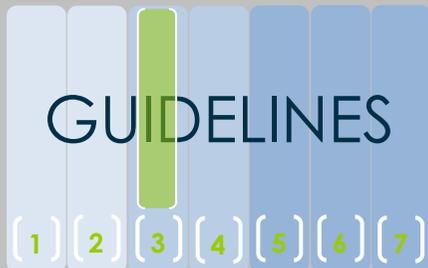
Targets can reflect GES itself or the changes necessary to the current state in order to achieve or maintain GES. Interim targets can be set to reflect barriers to achieving or maintaining GES.

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Indicators provide a measure to assess descriptors that help set targets to reach Good Environmental Status.

The eleven descriptors are not mutually independent and span a broad terrain ranging from anthropogenic pressures to direct state changes to ecosystem-wide state changes to effects on human welfare.

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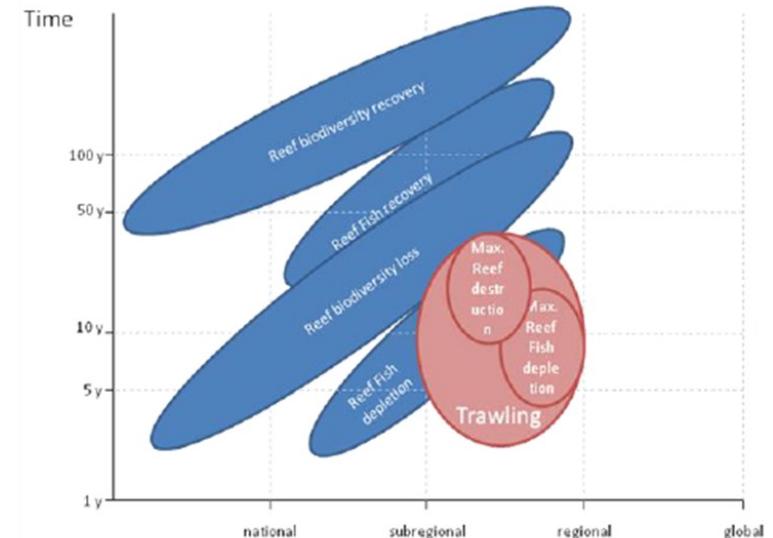
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GES and scale issues

The temporal and spatial scale of impacts varies considerably depending on the type of pressure and the sensitivity of the ecosystem components affected.

Good Environmental Status (GES) involves protecting the marine environment, preventing its deterioration and restoring it where practical, while using marine resources sustainably. This can be difficult where criteria and indicators cannot be applied at the same time or spatial scale because the processes and/or features they relate to differ. For example, for Descriptor 6 (Sea-floor integrity), criterion 6.1 Physical damage will cover the whole area under review, but the indicators will be 'patchy' and not cover the same scale as the criterion as they are not present across the whole area.

When processes of different scales interact, the long-range, long-term process will act as a boundary condition for the short-term, short-range process – this will be apparent when scales do not overlap on top of each other in a time-space plot.



Confrontation of ecological (Blue) and economic – trawling - (Red) scales.

The scale of criteria of pressures and descriptors are likely to mismatch leading to problems in determining GES and requiring new types of management interventions and measures.

Click on arrow below to go back to all guidelines

Descriptors of Good Environmental Status

State Descriptors that characterise marine biodiversity

D1 – 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.

D4 - 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.

D6 - 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.

Pressures descriptors that relate to human-induced pressures

D2 - Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystem.

D5 - 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.

D7 - Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems.

D8 - Concentrations of contaminants are at levels not giving rise to pollution effects.

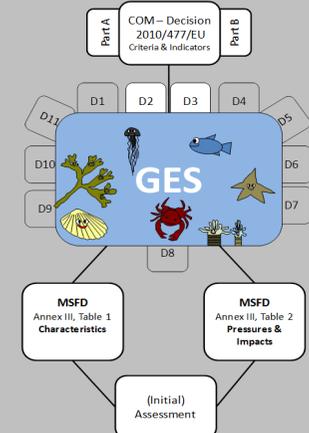
D9 - Contaminants in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards.

D10 - Properties and quantities of marine litter do not cause harm to the coastal and marine environment.

D11 - Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment.

One descriptor is both a state and pressure descriptor as it related to aspects such as the level of fishing activity (pressure) and population age, size distribution and biomass indices (state).

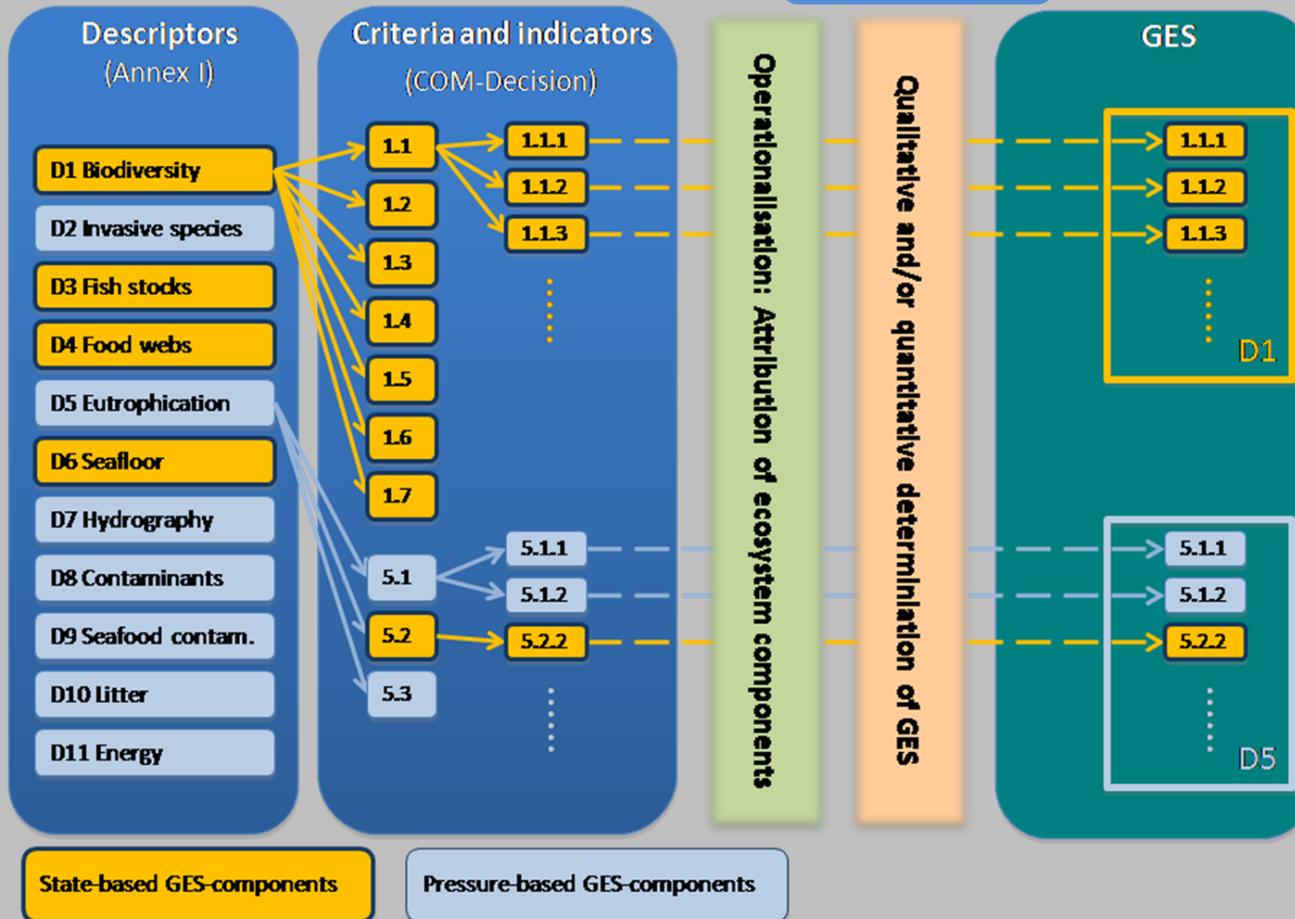
D3 - Populations of all commercially exploited fish and shellfish are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock.



The components leading to Good Environmental Status standards (D = descriptor, GES = Good Environmental Status GENs).

MORE ON NEXT PAGE

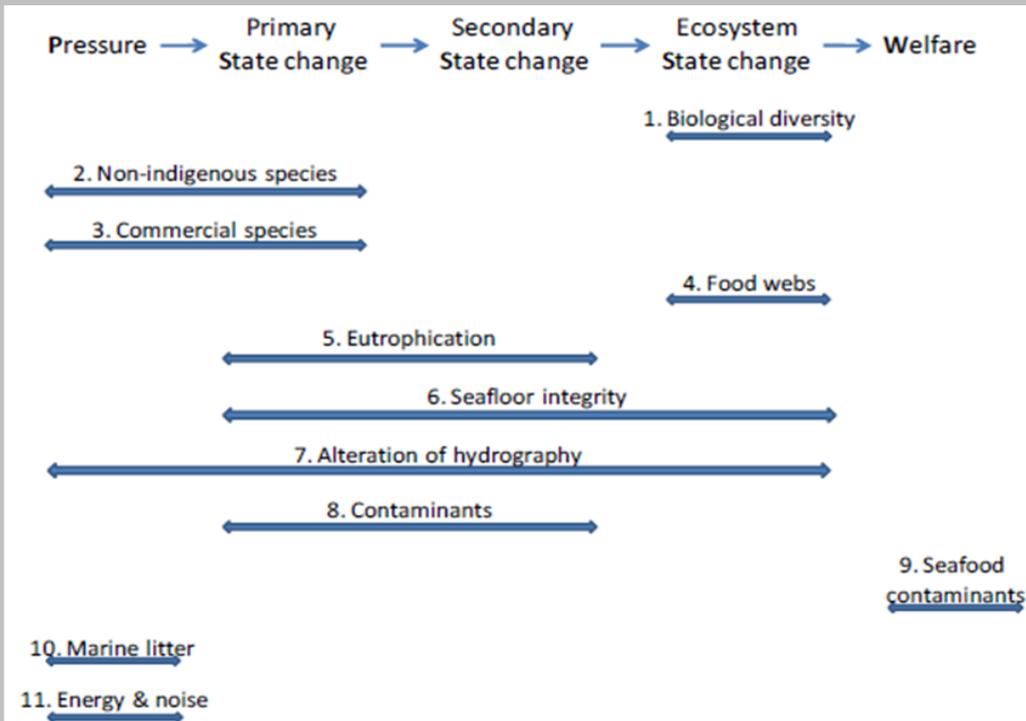
Descriptors of Good Environmental Status



Due to the diversity of the EU Seas, Member States may choose which Descriptors to apply, and within each descriptor which criteria and indicators to use. These decisions must be justified to the EU and not endanger consistency and comparison between regions and sub-regions.

Components for the determination of Good Environmental Status (GES) as defined in Art. 3(5) MSFD. Art. 9 MSFD reflects 11 Descriptors (Annex I), as well as 29 criteria and 56 indicators (as specified in COM Decision 2010/477/EU). In particular for the state-based Descriptors D1, D3, D4 and D6 (shown in orange), several assessments for each indicator might have to be developed as different ecosystem components have to be considered. Overall GES is then determined through qualitative and/or quantitative expression of a set of criteria and indicators. Pressure-based GES elements are shown in light blue.

Descriptors of Good Environmental Status



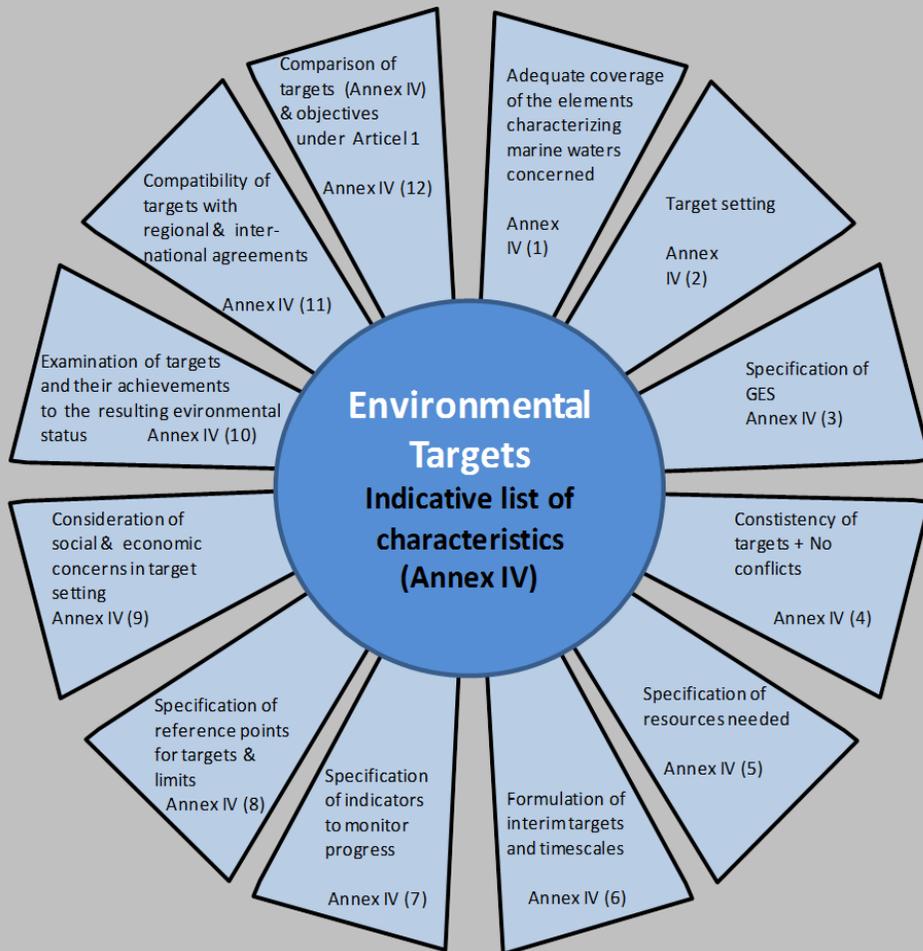
The MSFD descriptors, as developed in EC (2010), span different parts of the PSW within the DPSWR framework

Eutrophication's influence on physical conditions and on species compositions and abundances in both pelagic and benthic environments means that it can affect ecosystem states, such that the descriptor Eutrophication can affect the descriptor Food webs and has implications for Biological diversity. Other descriptors, for example Biological diversity and Food webs, affect each other and may be affected by other descriptors capturing the ecosystem-wide effects of multiple pressures on ecosystems. Seafloor integrity is also, in part, an aggregate descriptor, capturing the effects that any pressure might have on benthic environments and communities, although it is intended to focus on the direct effects of activities on the seafloor such as trawling and dredge spoil disposal.

The eleven descriptors map onto the DPSWR framework across PSW, with S subdivided into primary, secondary and ecosystem state change. Causality, dealing with various parts of the PSW chain within DPSWR (i.e. anthropocentric pressure to state changes to welfare), is addressed within some descriptors.

Eutrophication is a particular example, where sub-categories distinguish between primary and secondary symptoms. Other descriptors that address causality include:

- Contaminants, where one sub-category deals with concentrations and a second with effects;
- Non-indigenous species, where one category deals with abundance, distribution and spread, and a second with effects;
- Populations of commercial species addresses fishing mortality, then the reproductive capacity of the stock and populations' age and size distributions.



The establishment of environmental targets should take into account the 'indicative lists of characteristics, pressures and impacts' as outlined in Annex III MSFD and the 'indicative list of characteristics to be taken into account for setting environmental targets' as set out in Annex IV MSFD

