

Assessment and definition of good environmental status

Executive Summary



Initial assessment

SECOND CYCLE
2018-2024



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GOBIERNO
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INTRODUCTION



1. Introduction

1.1. Marine Strategy Framework Directive (MSFD):

Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishes a framework for Community action in the field of marine environmental policy. Namely, the Marine Strategy Framework Directive (hereinafter referred to as the MSFD), which calls on Member States to take the necessary measures to achieve or maintain a good environmental status for the marine environment.

The main objectives of this directive are:

- Protect and preserve the marine environment, prevent its deterioration or, where practicable, restore marine ecosystems in areas where they have been adversely affected.
- Prevent and reduce inputs in the marine environment, with a view to phasing out pollution, so as to ensure that there are no significant impacts on or risks to marine biodiversity, marine ecosystems, human health or legitimate uses of the sea

In order to achieve these objectives, each Member State shall develop a Marine Strategy for each of its marine waters, which must be updated every six years. The MSFD was amended in 2017 by Directive (EU) 2017/845, which is reflected in the indicative lists of elements to be taken into consideration when developing the Marine Strategies (MS). Furthermore, Decision (EU) 2017/848 sets out the methodological criteria for Good Environmental Status (GES) and its proper monitoring and assessment.

Law 41/2010, of 29 December, on the Protection of the Marine Environment, transposes the MSFD in Spain, in addition to regulating other aspects of Spanish marine waters, such as the Network of Marine Protected Areas. Article 22 of the Law (dedicated to coordination and cooperation) establishes the need for the creation of the Interministerial Commission for Marine Strategies (CIEM) to coordinate the drafting, application and monitoring of marine environmental planning. This law zoned the Spanish marine environment into 5 marine subdivisions or demarcations: North Atlantic MD, South Atlantic MD, Strait and Alboran MD, Levantine-Balearic MD and Canary Islands MD.

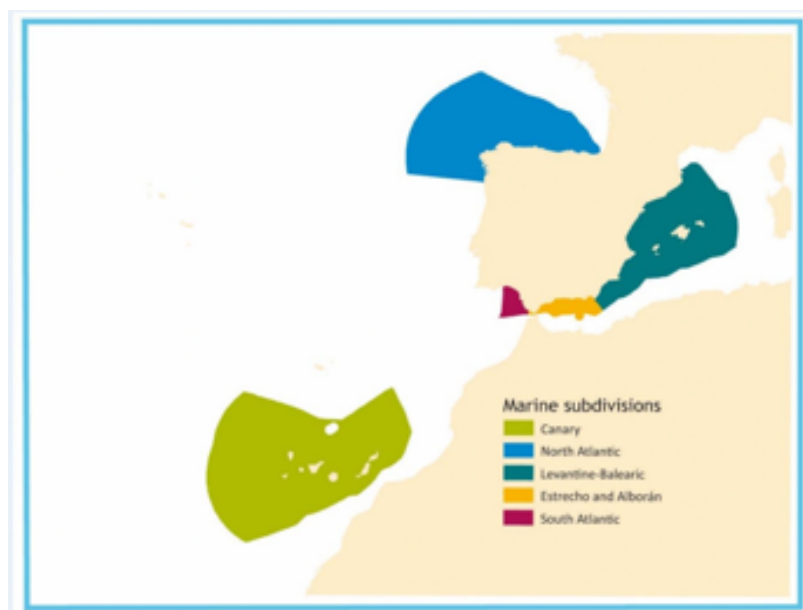


Figure 1. Map of marine demarcations established by Law 41/2010



The approach to marine strategies is based on the general objectives set out in Law 41/2010:

- A) Protecting and preserving the marine environment
- B) Preventing and reducing inputs into the marine environment
- C) Ensure that activities and uses in the marine environment are compatible with the preservation of its biodiversity.

Law 41/2010 has been complemented by two royal decrees:

- Royal Decree 1365/2018, of November 2nd, approving the marine strategies, through which the programmes of measures of the first cycle are endorsed.
- Royal Decree 79/2019, of February 22nd, which defines the compatibility criteria with marine strategies of the actions subject to its scope of application, as well as the procedure for issuing the compatibility report with marine strategies, in application of article 3.3 of Law 41/2010.

1.2. Ecosystem approach:

In the context of marine strategies, the ecosystem-based approach related to the management of human activities is a tool for achieving a balance between the pressure exerted by human activities and the conservation of the marine environment. This is essential to achieve, or maintain, good environmental status (GES) and the sustainable use of marine goods and services by current and future generations. To ensure this approach, the different phases of the Marine Strategies are developed around the 11 Qualitative Descriptors set out in Annex III, which cover the different natural elements of the marine environment, and their pressures.

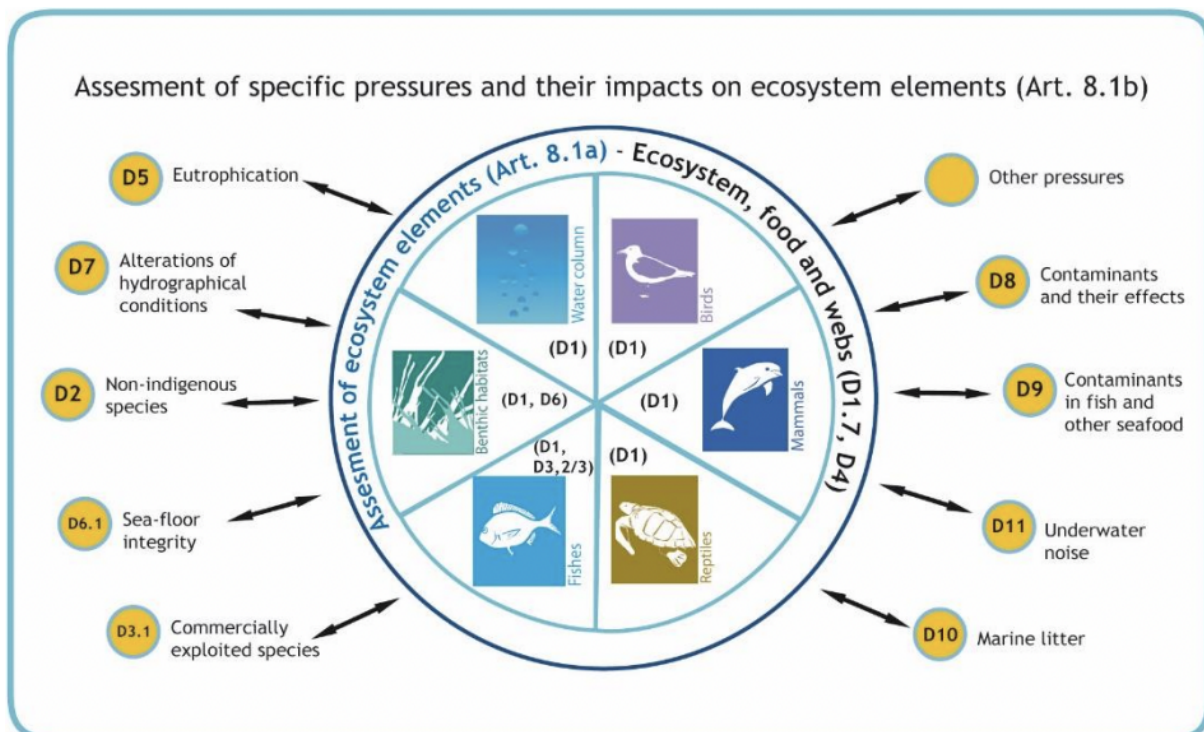


Figure 2. Good Environmental Status Descriptors



1.3. The 5 phases of marine strategies. Application in Spain

The marine strategies consist of 5 consecutive phases that are closely interrelated:

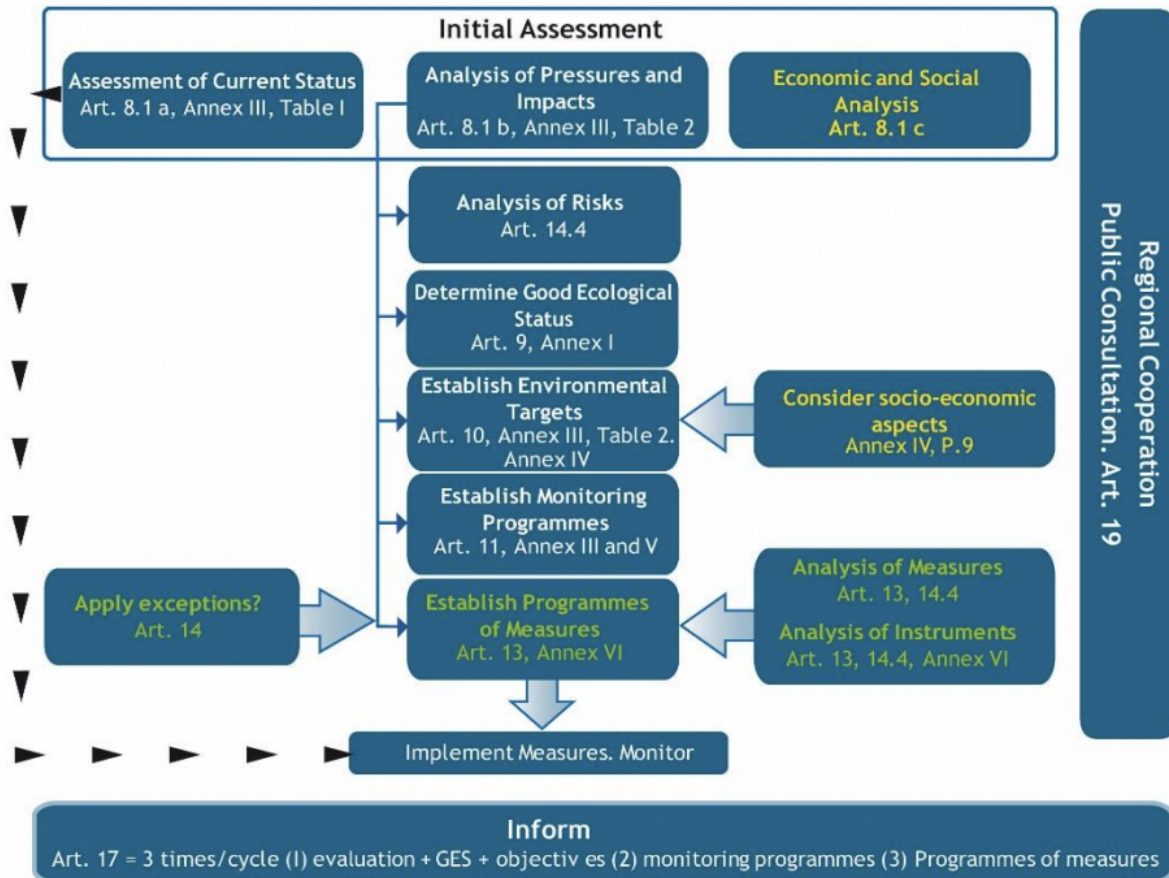


Figure 3. Outline of the Marine Strategy development process.

1. Initial assessment of the environmental status of the waters concerned and the environmental impact of human activities (Article 8 DMEM). This assessment should take into account existing data, if available, and include the following elements:
 - o An analysis of essential features and characteristics and the current environmental status of these waters, based on the list of characteristics in Table 1 (Annex III of the EMDD as amended by Directive 2017/845/EU).
 - o An analysis of the main pressures and impacts affecting the environmental status of waters based on the list of pressures and impacts (Table 2, Annex III of the MSFD, as amended by Directive 2017/845) and referring to qualitative and quantitative elements of the different pressures and discernible trends.
 - o An economic and social analysis of water use and the cost of deterioration of the marine environment.
2. Definition of Good Environmental Status (GES): Each Member State must determine for each marine region or sub-region concerned, a set of characteristics defining GES for the 11 descriptors (Article 9, Annex I). Decision 2017/848/EU details the criteria applicable to the GES to determine the degree of achievement of GES. These criteria are technical characteristics used to further define the 11 MSFD descriptors and specifications of threshold values and lists of elements.



3. Each Marine Strategy should include a set of objectives (Article 10 MSFD, Annex III and IV), which guide the process towards the achievement of GES in the marine environment, consistent with the results of the Initial Assessment and the definitions of GES.
4. Monitoring programmes (Article 11, Annex III and V): in order to continuously assess the environmental status of their marine waters and their progress towards achieving the GES, Member States should develop a set of monitoring programmes.
5. Programmes of measures: Development of a programme of measures aimed at achieving or maintaining the GES, based on the initial assessment and pursuing the previously defined environmental objectives. The programme of measures (according to Article 13 MSFD) is the final stage of the Marine Strategy cycle, and its design is derived from the other elements of the Marine Strategy.

The documents for all phases of the first and second cycle are available at the following link:

First cycle: https://www.miteco.gob.es/es/costas/temas/proteccion-medio-marino/estrategias-marinas/eemm_terciclo.aspx

Second cycle: https://www.miteco.gob.es/es/costas/temas/proteccion-medio-marino/estrategias-marinas/eemm_2dociclo_fases123.aspx

1.4. European, Regional and National Coordination

To implement the MSFD in an orderly and coherent manner and facilitate some of the Member States work, the European Commission has established a Common Implementation Strategy (CIS) organised as follows:



Figura 4. Estructura de la CIS.



Working groups to ensure the integrity of CIS deontology:

1. Working Group on Programmes of Measures and Economic & Social Analysis (WG-POMESA)
2. Working Group on Data, Information and Knowledge Exchange (WG-DIKE)

Relationship with other European policies:

The ecosystem-based approach of the MSFD means that a wide range of European and international policies are integrated into its framework in a cross-cutting manner, of which the following can be highlighted:

1. Maritime Spatial Planning Directive
2. Water Framework Directive. Hydrological Planning (process detailed in Annex VI).
3. Common Fisheries Policy.
4. Biodiversity Conservation and Protected Areas. Habitats Directive 92/43/EEC. Birds Directive 147/2009/EC
5. Waste. Directive (EU) 2019/904 on reducing the impact of plastics.

Regional coordination:

In order for coordination at the regional level to be effective, existing institutional structures, in particular the regional marine conventions, should be used whenever feasible and appropriate. Spain is a contracting party to two of them:

- OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic
- Barcelona Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean Sea

National coordination:

As there are different competences assigned to both national and autonomous communities administrations, inter-administrative coordination is essential to ensure that the efforts invested in the management of the marine environment are optimised.

Therefore, 41/2010 Law has established two official groups to ensure coordination at national level: the Interministerial Commission for Marine Strategies and the Strategy Monitoring Committees, in addition to bilateral meetings at a more technical level, on line queries and direct contact with managers of the different administrations.

1. Interministerial Commission for Marine Strategies and Marine Strategy Monitoring Committees
2. Bilateral meetings with Autonomous Regional Administrations and with departments of the national administration and other organizations.
3. Public participation. Marine Strategies Seminars.



**UPDATING ESSENTIAL
FEATURES AND
CHARACTERISTICS**



2. Updating essential features and characteristics

2.1. Physical-chemical and biological characteristics

Since 2012, it has not been possible to analyse in detail in each subdivision, possible changes in the general physical-chemical and biological characteristics of the marine environment to the point of being able to update these aspects. For this reason, this cycle refers to the documents of the previous cycle, which set out these issues in detail for each marine subdivision. However, for each marine subdivision, a brief summary has been included in document "Part I. General Framework" of the prevailing post-2012 physical-chemical conditions, drawn from specific reports, mostly in the context of international structures coordinating ocean observations.

The baseline information comes from routine sampling involving hydrography by various national agencies, including the regular monitoring programmes carried out by the IEO.

There are several regional alliances:

1. Global Ocean Observing System (GOOS)
 - a. the Atlantic Arc region (IBIROOS)
 - b. Mediterranean (MedGOOS)
2. International Argo Programme (thermohaline)
3. EU Copernicus
4. International Council for the Exploration of the Sea (ICES)
5. CLIVAR (Climate Variability and Predictability) International Committee.

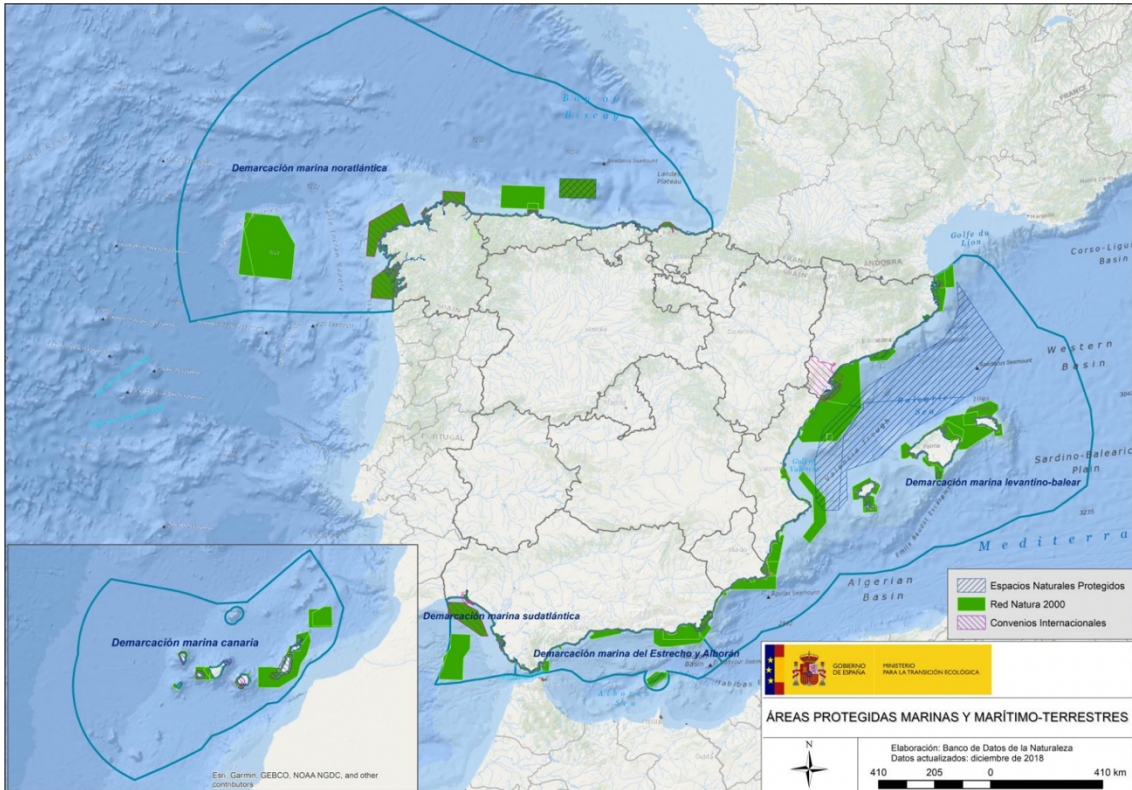
The analysis of available environmental information to assess the normal or abnormal state of the environmental conditions of the marine environment as a whole should be a basic aspect for the development of marine strategies, since changes in the physical-chemical conditions of the environment affect any biological indicator. It follows that climate change should be considered as a cross-cutting factor in marine strategies. Consequently, the monitoring programmes that are being put in place include the monitoring of environmental conditions, the conclusions of which will be integrated into an analysis of the effect of climate change.

Further information on the impact of climate change on our marine regions can be found in the report "[Climate Change in the Spanish Marine Environment: Impacts, vulnerability and adaptation](#)" by the Spanish Climate Change Office (Kersting, 2016). Additionally, it has been completed by an analysis of change factors related to climate change in the [framework of the Spanish Coastal Climate Change Adaptation Strategy](#).

2.2. Protected natural areas

Marine and maritime-terrestrial protected areas that can be checked on the MITECO Geoportal:

- Protected Natural Spaces
- Natura 2000 Network sites
- Areas protected by international instruments: OSPAR areas, ZEPIM (Barcelona Convention), Ramsar sites, Biosphere Reserves.



(Figure 5. Map of Marine and Marine-Terrestrial Protected Areas (Nature Databank))

An update of the characteristics of each marine subdivision can be found in [documents I. "General Framework"](#) of each marine strategy



PRESSURES AND IMPACTS



3. Pressures and impacts (main pressures by subdivision, or in general)

3.1. Context

As the MSFD is based on the DPSIR (Driving forces, pressures, state, impact, response) approach, the Directive states that Member States should analyse the main impacts and pressures influencing the environmental state of the marine environment. This analysis is to be complemented primarily by considering the pressures and trends listed in Table 2 of Annex III. Secondly, cumulative and synergistic impacts should be taken into account, and finally, the examination of relevant assessments prepared under relevant legislation is advisable.

An analysis of the main pressures was completed in the first cycle and can be found in the [first cycle EEMM Framework Document](#). Annex III of the MSFD has been amended under Directive 2017/845, and consequently Table 2 has been divided into two parts: one focusing on pressures, and the other on activities. Consequently, Table 2 of Annex I to Law 41/2010 on the protection of the marine environment (which is equivalent to Table 2 of Annex III of the MSFD) has been amended according by Royal Decree 957/2018.

3.2. Update of the analysis of pressures and impacts

Anthropogenic pressures have been categorised in the Directive as: Biological, Physical or Substances, Waste and Energy (Table 2a; Royal Decree 957/2018). In the case of biological pressures, it has been considered that they were already addressed through the assessment of the pressure descriptors and have not been specifically analysed in this cycle.

The indicators used for each subdivision are detailed in documents II. "[Analysis of pressures and impacts](#)" and its annexes "[Pressure sheets](#)" of each marine strategy.



In this cycle, an analysis of the following pressures has been carried out: (where the data collected, reported or processed has allowed it):

Table 1. Anthropogenic pressures on the marine environment of particular relevance for the purposes of Article 8(3)(a) and (b) and Articles 9, 10 and 11			
Theme	Pressure (note 1)	Possible parameters	Relevant qualitative descriptors referred to in Annex II (notes 2 and 3)
Physical	Physical disturbances of the seabed (temporary or reversible)		(6); (7)
	Physical losses (due to permanent change of substrate or seabed morphology and removal of substrate from the seabed)		
Substances, waste and energy	Nutrient input: diffuse sources, point sources, atmospheric deposition		(5)
	Organic matter input: diffuse and point sources		
	Contribution of other substances (e.g. synthetic substances, non-synthetic substances, radionuclides): diffuse sources, point sources, atmospheric deposition, major events		(8); (9)
	Litter input (solid waste, including micro-litter)		(10)
	Anthropogenic sound input (impulsive, continuous)		(11)
	Input of other energy sources (including electromagnetic fields, light and heat)		
	Water supply: point sources (e.g. brine)		



A characterisation study of the following human activities has also been completed, which can be consulted in documents III. "[Economic and Social Analysis](#)" and its annexes "[Activity by activity sheet](#)" of each marine strategy:

Table 2. Human uses and activities in the marine environment or that affect of special importance for the purposes of article 8.3. b) and c) (only activities marked with an asterisk * are relevant for the purposes of article 8.3 c) and articles 10 and 13)

Theme	Activity
Physical restructuring of rivers, the coastline or the seabed (management of water)	Coastal defense and flood protection*
	Offshore infrastructure (except those intended for the exploitation of oil, gas or renewable energy)*
	Restructuring of seabed morphology, including dredging and deposition of materials*
Extraction of non-living resources	Mineral extraction (rock, metal minerals, gravel, sand, shells)*
	Oil and gas extraction, including infrastructure*.
	Salt extraction
	Water abstraction*
Production of energy	Renewable energy generation (wind, waves, tidal), including infrastructure*.
	Electricity and communications transport (cables)*.
Extraction of living resources	Fishing and shellfish gathering (commercial, recreational) *
	Fish and seafood processing*.
	Harvesting of marine plants*.
	Hunting and gathering for other purposes*.
Cultivation of living resources	Marine aquaculture, including infrastructure*.
Transport	Transport infrastructure
	Maritime transport*.
Urban and industrial uses	Waste treatment and disposal*.



Table 2. Human uses and activities in the marine environment or that affect of special importance for the purposes of article 8.3. b) and c) (only activities marked with an asterisk * are relevant for the purposes of article 8.3 c) and articles 10 and 13)

Theme	Activity
Tourism and leisures	Tourism and leisure infrastructures*
	Tourism and leisure activities*
Security/Defense	Military operations (excluding what is stated in article 2, section 4)
Education and research	Research, monitoring and education activities*



SOCIO-ECONOMIC ANALYSIS



4. Socio-economic analysis

In 2016, the EU blue economy generated a gross added value of 174.2 billion euro and employed a total of 3.5 million people. These figures represent an increase of 9.7% and 2%, respectively, compared to 2009 (European Commission, 2018).

The Directive establishes (Article 1.3) that, in developing their Marine Strategies, Member States must apply an ecosystem-based approach to assess the status of the marine area. Article 8.1 requires Member States to carry out "an economic and social analysis of the use of those waters and the costs of degradation of the marine environment", and "an analysis of the main pressures and impacts, including human activity, affecting the environmental status of their waters".

4.1. Use of the marine environment

Methodology:

There are two main approaches by which the assessment of the use of the marine environment is carried out:

1. Marine water accounts approach

Step 1: Identify and describe the region of interest (documents III of each marine subdivision: population, employment and human activities)

Step 2: Identify and describe the economic sectors that use marine waters (human activities table 2a and 2b).

Step 3: Identify and, if possible, quantify the economic benefits derived from the way in which the economy uses marine waters in terms of production value, added value and employment.

Step 4: Identify and if possible, quantify the generated impacts from these activities.

Figure 6. Steps in the marine water accounts approach



Results:

The following tables show the analysis of the contribution of human activities to job creation and the generation of gross added and production value in our country.

The national figures for electricity transport and aggregate extraction have also been included, as it has not been possible to disaggregate these national data at marine subdivision level. The economic contribution of this activity can be seen in the section corresponding to this activity.

Table 3. Employment by subdivision (number of jobs)

Demarcation	2009	2010	2011	2012	2013	2014	2015	2016
North Atlantic	82.400	84.679	81.362	78.611	78.282	79.094	77.667	78.187
South Atlantic	29.906	30.154	29.426	28.730	28.234	28.607	28.083	28.915
Canary Islands	50.075	50.060	49.600	48.750	48.705	49.612	49.882	51.772
Strait and Alboran	67.959	69.122	67.954	66.689	66.558	68.179	65.698	67.063
Levantine-balearic	173.895	174.513	171.949	169.153	171.417	174.290	173.055	179.435
Total per subdivision	404.235	408.528	400.291	391.933	393.196	399.782	394.385	405.372
Mineral extraction	4.466	4.325	3.838	3.479	3.111	2.993	3.052	3.121
Electricity transport and communications	557	558	595	543	545	551	514	532
Total	409.258	413.411	404.724	395.955	396.852	403.326	397.951	409.025



Table 4. Gross added value by subdivision (millions of euro)

Demarcation	2009	2010	2011	2012	2013	2014	2015	2016
North Atlantic	3.206,9	3.311,5	3.529,5	3.450,9	3.387,5	3.758,8	3.931,2	4.178,7
South Atlantic	1.395,0	1.392,8	1.472,7	1.446,6	13.893,0	1.570,4	1.647,5	1.714,5
Canary Islands	2.357,0	2.454,0	2.616,0	2.529,0	2.552,0	2.745,0	3.023,0	3.173,0
Strait and Alboran	3.661,1	3.869,9	4.144,5	3.992,5	4.012,0	4.311,6	4.718,6	4.883,8
Levantine-Balearic	8.187,4	8.638,3	9.129,4	8.887,4	8.852,0	9.576,1	10.321,9	10.831,1
Total per DM	18.807,4	19.666,5	20.892,1	20.306,4	32.696,5	21.961,9	23.642,2	24.781,1
Mineral extraction	185,5	177,8	193,6	192,4	148,2	137,1	141,1	127,6
Electricity transport and communications	340,4	295,4	411,9	405,9	469,0	487,2	438,3	370,4
Total	19.333	20.140	21.498	20.905	33.314	22.586	24.222	25.279

Table 5. Production value by subdivision (millions of Euro)

Demarcation	2009	2010	2011	2012	2013	2014	2015	2016
North Atlantic	7.179,4	7.412,2	7.571,0	7.371,6	7.138,5	7.355,9	7.898,2	8.248,0
South Atlantic	3.368,6	3.390,1	3.296,2	3.188,9	3.022,8	3.081,6	3.393,7	3.474,2
Canary Islands	4.714,0	4.882,0	4.999,0	4.899,0	4.801,0	4.958,0	5.541,0	5.901,0
Strait and Alboran	7.112,5	7.519,5	7.655,5	7.477,6	7.250,6	7.451,4	8.320,0	8.802,3
Levantine-Balearic	17.222,9	18.032,3	18.483,1	18.212,8	17.743,7	18.221,4	19.963,2	21.214,5
Total per DM	39.597,4	41.236,1	42.004,8	41.149,9	39.956,6	41.068,3	45.116,1	47.640,0
Mineral extraction	562,4	555,9	549,0	529,0	433,1	419,6	455,9	415,8
Electricity transport and communications	410,9	356,5	497,1	489,8	566,0	588,0	528,9	447,0
Total	40.570,7	42.148,5	43.050,9	42.168,7	40.955,7	42.075,9	46.100,9	48.502,8



2. Ecosystem services approach

Step 1: Identify ecosystem services of the different ecosystems in each marine areas along with state (Art. 8.1(a) MSFD) and pressures and impacts analysis (Art. 8.1(b) MSFD).

Step 2: Identify and, when possible, quantify, the economic value derived from ecosystem services using valuation methods that allow to estimate indirect and non-use value of ecosystem services.

Step 3: Identify drivers and pressures that affect ecosystem services.

Figure 7. Steps in the ecosystem services approach.

Results:

For the identification and estimation of the ecosystem services value, we have used the report of “Fundación Biodiversidad” (2014), which contains values of ecosystem services in monetary units that generally represent marginal values for a certain ecosystem service provided by a certain ecosystem.

In the context of the second cycle of marine strategies, the maximum and minimum monetary values of the typologies of the relevant ecosystem services (provisioning, regulating and cultural) provided by the Spanish marine ecosystem as collected in “Fundación Biodiversidad” (2014) have been taken into account. These have been adjusted to 2017 prices using the Spanish consumer price index for 2012 and 2017.



Table 6. Economic value of ecosystem services and benefit by district.

Ecosystem service	€/ha/year (2018)	Value of demarcation (Millions of €/year)					
		NOR	CAN	ESAL	NOR	LEBA	TOTAL
Supply services							
Raw materials	1,7	59	82	5	3	39	188
Food	660,4	23.234	32.382	2.020	1.006	15.346	73.988
Regulatory services							0
Biological control	16,5	581	810	51	25	384	1.850
Water purification/ purification	716,2	25.198	35.119	2.191	1.091	16.643	80.242
Regulation of disturbances	7,5	265	369	23	11	175	844
natural							
Soil fertility	23,1	812	1.132	71	35	536	2.586
Water regulation	29,2	1.029	1.434	89	45	679	3.276
Climate regulation	63,2	2.223	3.098	193	96	1.468	7.079
Air quality	210,6	7.411	10.328	644	321	4.895	23.599
Erosion control	37,1	1.303	1.817	113	56	861	4.151
Cultural services							0
Religious enjoyment	1,9	67	94	6	3	44	214
Aesthetic enjoyment of landscapes	3,2	114	158	10	5	75	362
Spiritual enjoyment	4,4	154	215	13	7	102	491
Recreational activities and ecotourism	137	4.818	6.716	419	209	3.183	15.344
Environmental education	3,5	118	165	10	5	78	376
Scientific knowledge	7,5	264	368	23	11	175	841
Total		67.650	94.286	5.883	2.929	44.684	215.431



4.2. Trend Scenarios

Methodology:

The European Commission defines (MSFD Guidance Document, 2018) the Business as Usual (BAU) or Trend Scenario as one that describes the future environmental, social, economic and legislative evolution of the marine environment over a given period of time in the absence of implementation of the policies to be assessed. In the first cycle this scenario was defined as one in which the MSFD had not yet been implemented.

For the second cycle onwards it should already be defined assuming full implementation of the Programme of Measures of the first cycle, but no changes to it in the future. The Trend Scenarios allow to anticipate what the future trends might be and help to design corrective measures to achieve GES. According to the guidance, the Trend Scenarios should include 5 elements:

1. A projection of how the uses of marine waters could change over time
2. A projection of how pressures on marine waters will evolve over the period considered.
3. What changes could occur in the state of the marine environment as a result of changes in pressures, over the period considered.
4. Relevant legislation, as well as other measures and voluntary agreements (at international, European, regional and national level) that may influence the evolution of pressures on the marine environment over time.
5. Assessment of possible irreversible effects on the marine environment caused by changing uses of marine waters and the impact of exogenous environmental trends, such as climate change.

In the context of the second cycle of the Marine Strategies, the evolution of the marine environment has been projected for the period 2016-2024. It is important to note that the availability of data on uses, pressures and states directly influences whether the results of the Trend Scenarios are reliable or not.



Table 7. Shows the projected 2024 Trend Scenarios taking into account the evolution of human activities in the period (2011-2016) and the policies that could condition this evolution.
 GVA= gross added value, PV= production value.

Human activity	GVA	VP
Coastal defence and flood protection	-	-
Offshore infrastructures (except for oil, gas or RES-E)	Coastal defence and flood protection	Coastal defence and flood protection
Restructuring of seabed morphology, including dredging and deposition of materials	Offshore infrastructures (except for oil, gas or RES-E)	Offshore infrastructures (except for oil, gas or RES-E)
Mineral extraction	Restructuring of seabed morphology, including dredging and deposition of materials	Restructuring of seabed morphology, including dredging and deposition of materials
Oil and gas extraction, including infrastructure	Mineral extraction	Mineral extraction
Salt extraction	Oil and gas extraction, including infrastructure	Oil and gas extraction, including infrastructure
Water abstraction	Salt extraction	Salt extraction
Renewable energy generation, including infrastructure	Water abstraction	Water abstraction
Electricity transport and communications	Renewable energy generation, including infrastructure	Renewable energy generation, including infrastructure
Fishing and seashell gathering (professional, recreational)	Electricity transport and communications	Electricity transport and communications
Fish and seafood processing	Fishing and seashell gathering (professional, recreational)	Fishing and seashell gathering (professional, recreational)



Harvesting of marine plants	Fish and seafood processing	Fish and seafood processing
Hunting and gathering for other purposes	Harvesting of marine plants	Harvesting of marine plants
Marine aquaculture, including infrastructure	Hunting and gathering for other purposes	Hunting and gathering for other purposes
Transport infrastructure	Marine aquaculture, including infrastructure	Marine aquaculture, including infrastructure
Maritime transport	Transport infrastructure	Transport infrastructure
Waste treatment and disposal	Maritime transport	Maritime transport
Tourism and leisure infrastructure	Waste treatment and disposal	Waste treatment and disposal
Tourism and leisure activities	Tourism and leisure infrastructure	Tourism and leisure infrastructure
Military operations	-	-
Research, monitoring and education activities	-	-

4.3. Cost of environmental degradation

Methodology

The analysis of the cost of environmental degradation is useful for the subsequent estimation of costs and benefits of measures (Art. 13 MSFD) and the argumentation of possible exemptions (Art. 14 MSFD). For the purpose of the proper calculation of the cost of degradation, the MSFD proposes three approaches of analysis:

1. Ecosystem services approach
2. This approach starts by establishing the GES definition and assessing the environmental state in a baseline scenario. This analysis allows the difference between the two states to be compared.
3. Thematic focus
4. The second approach requires defining environmental issues and a baseline condition in order to proceed to describe the difference between the baseline situation and the current environmental state.



5. Cost-based approach
6. This approach requires identifying relevant legislation and policies, estimating their costs and assessing the proportion of each that can be attributed to the protection of the marine environment.

In the first cycle, Spain carried out the analysis of the cost of deterioration with the cost-based approach and the same has been done again for the second cycle. In addition, the first steps have been taken in the application of the ecosystem approach, which is expected to be used in the near future. Costs have been estimated on the basis of public budgets for marine environmental protection.



Figure 8. Steps in the cost-based approach to estimating the cost of deterioration of the marine environment.

To improve the consistency of the result, a time series covering the years 2009 - 2016 has been taken. In the National Administration, 7 budgetary programmes have been identified with items earmarked for the protection of the marine environment.

The following table summarises the National administration budgets for the 7 programmes related to the marine environment. A decrease of 55% of expenditure between 2009 and 2009 can be observed, and additionally, the average reduction in the second cycle with respect to the first cycle of the strategies has been 58%.



Table 8. Expenditure budgets of the National Administration 2009-2016 related to the management and protection of the marine environment (millions of Euro)

Programmes	2009	2010	2011	2012	2013	2014	2015	2016
415A Protection of fisheries resources and sustainable development	52	48	29	20	14	15	18	18
415B Improvement of fisheries structures and markets	152	125	93	59	48	46	52	53
454M Maritime traffic regulation and safety	63	62	57	-	48	44	43	41
456A Water quality	576	461	282	199	135	149	243	206
456D Coastal action	301	281	162	105	75	66	90	92
456M Actions for the prevention of pollution and climate change	167	121	102	53	49	42	55	51
467E Oceanographic and fisheries research	66	61	60	58	57	60	61	65
TOTAL	1.377	1.159	785	494	426	422	562	526

Source: Statistics 2008-2017. Consolidated State Budget Law 2017

The budget allocations partially related to the protection of the marine environment are shown below.

Table 9. Expenditure budgets of the National Administration 2009-2016 partially allocated to the management and protection of the marine environment (millions of euro)

Programmes	2009	2010	2011	2012	2013	2014	2015	2016
411M Directorate and General Services of Agriculture, Fisheries and Food	8	4	0	-	-	-	-	-
416A Anticipating risks in agricultural and fisheries production	288	291	281	253	205	205	204	216
4510 Directorate and General Services of Agriculture, Fisheries, Food and Environment	246	225	192	178	148	142	143	141
TOTAL	542	520	473	431	353	347	347	357

Source: Statistics 2008-2017. Consolidated State Budget Law 2017



Although the ecosystem services approach has not been used in the second cycle to calculate the cost of marine environmental degradation, the administrative, methodical, and epistemological organisation has begun to be worked out in order to implement this analytical approach in the near future. The steps developed for this ecosystem approach are detailed in the figure below:

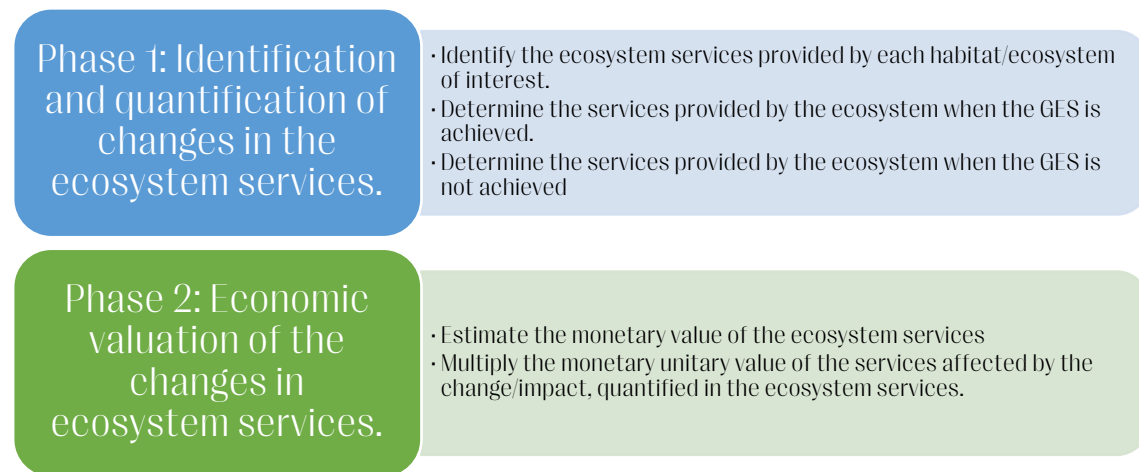


Figure 9. Phases in estimating the cost of ecosystem degradation.

The methods developed and used for the socio-economic analysis can be found in detail in the [General Framework Document](#).

The results by activity and subdivision are described in documents III. "[Economic and Social Analysis](#)" and its annexes "[Activity by activity sheet](#)" of each marine strategy.



**RESULTS BY GES
DESCRIPTION**



5. Results by GES description

Directive 2017/845 amends Annex III of the MSFD and establishes an outline of the structure, functions and processes of marine ecosystems, related to Article 8 (initial assessment), 9 (definition of GES) and 11 (monitoring programmes). The scheme that has been transposed by RD 957/2018 as Annex I of Law 41/2010 is shown in the following table:

Table 10. Structure, functions and processes of marine ecosystems of particular importance for the purposes of Articles 8(1)(a), 9 and 11.

Theme	Ecosystem elements	Possible parameters and characteristics (note 1)	Relevant qualitative descriptors covered in Annex II (footnotes 2 and 3)
Species	Species groups of seabirds, marine mammals, marine reptiles, fish and cephalopods in the marine region or subregion	Spatial and temporal variation of each species or population: <ul style="list-style-type: none"> - distribution, abundance and/or biomass - size, age and gender structure - fertility, survival and mortality/injury rates - behaviour, including displacement and migration - habitat of the species (extent, suitability) - Specific group composition 	(1); (3)
Habitats	Broad types of water column habitats (pelagic) and seabed (benthic) or other habitat types, including their associated biological communities throughout the marine region or sub-region	For each habitat type: <ul style="list-style-type: none"> - distribution and extent of habitats (and, where appropriate, volume) - species composition, abundance and/or biomass (spatial and temporal variation) - species size and age structure (if applicable) 	(1); (6)



Theme	Ecosystem elements	Possible parameters and characteristics (note 1)	Relevant qualitative descriptors contemplated in Annex II (notes 2 and 3)
		<ul style="list-style-type: none"> - physical, hydrological and chemical characteristics - In addition, in the case of pelagic habitats: - chlorophyll a concentration - frequency and spatial extent of plankton blooms 	
Ecosystems, including food webs	Structure, functions and processes of the ecosystems included: <ul style="list-style-type: none"> - physical and hydrological characteristics - -chemical characteristics - biological characteristics - functions and processes 	Spatial and temporal variation of: <ul style="list-style-type: none"> - temperature and ice - hydrology (wave and current regimes, upwelling, mixing, residence time, freshwater input, sea level) - bathymetry - turbidity (silt/sediment loads), transparency, sound - seabed substrate and morphology - salinity, nutrients (N, P), organic carbon, dissolved gases (pCO₂, O₂), and pH - relationships between habitats and species of seabirds, mammals, reptiles, fish and cephalopods - pelagic-benthic community structure - productivity 	(1); (4)

5.1. Pressure descriptors

Of the 11 descriptors, those that correspond to the assessment of the effect of pressures are: D2, D3, D5, D7, D8, D9, D10 and D11. The specific methodologies for establishing the assessment criteria for D2, D3, D5, D7, D8, D9, D10 and D11 can be found in the [Initial Assessment framework document and GES](#). [The specific results for each descriptor can be found in documents IV " Assessment of the State of the Environment " and IV " Assessment of the State of the Environment " and annexes "Assessment sheets and GES" for each marine demarcation.](#)

5.2. State descriptors

Of the 11 descriptors, those corresponding to the assessment of the state of the natural environment and natural resources are: D1, D4 and D6. The specific methodologies for the establishment of the assessment criteria for D1, D4 and D6 can be found in the [Initial Assessment framework document and the GES](#). The specific results for each descriptor can be found in documents IV " Assessment of the State of the Environment " and IV "Assessment of the State of the environment" for each marine demarcation.



5.3. Summary table

Table 1. Summary of the status of the different Descriptors for the respective Marine Subdivisions.
 Red= Does not achieve GES, Green= achieves GES, Grey= Undefined, Dash= Not assessed.

	DM NOR	DM SUD	DM LEBA	DM ESAL	DM CAN	
D1 - BIRDS						
<i>Bulweria bulwerii</i>	-	-	-	-		
<i>Calonectris borealis</i>		-	-	-		
<i>Calonectris diomedea</i>	-	-		-	-	
<i>Calonectris diomedea/borealis</i>	-		-		-	
<i>Hydrobates castro</i>	-	-	-	-		
<i>Hydrobates pelagicus</i>		-		-	-	
<i>Larus audouinii</i>	-	-			-	
<i>Pelagodroma marina</i>	-	-	-	-	M. Clara	Aleganza
<i>Phalacrocorax aristotelis</i>		-		-	-	
<i>Puffinus lherminieri</i>	-	-	-	-		
<i>Puffinus mauretanicus</i>					-	
<i>Rissa tridactyla</i>		-	-	-	-	
<i>Sterna hirundo</i>		-		-		



	DM NOR	DM SUD	DM LEBA	DM ESAL	DM CAN
<i>Sterna sandvicensis</i>	-	-		-	-
<i>Sternula albifrons</i>	-			-	-
<i>Uria aalge</i>		-	-	-	-
D1 - MAMMALS					
Misticetes				-	-
Small odontocete					-
Deep-water odontocete					-
<i>Balaenoptera edeni</i>	-	-	-	-	
<i>Balaenoptera physalus</i>				-	-
<i>Delphinus delphis</i>			-		-
<i>Globicephala macrorhynchus</i>	-	-	-	-	
<i>Globicephala melas</i>		-	-	Alboran Strait	-
<i>Grampus griseus</i>	-	-		-	-
<i>Orcinus orca</i>	-		-	-	-
<i>Phocoena phocoena</i>	-	-	-	-	-
<i>Physeter macrocephalus</i>	-	-		-	
<i>Stenella coeruleoalba</i>	-	-		-	-



	DM NOR		DM SUD	DM LEBA		DM ESAL	DM CAN
<i>Stenella frontalis</i>	-	-	-	-	-	-	
<i>Tursiops truncatus</i>	Costeros Galicia S	Platform N and NO		Coastal Peninsula	Balearic Islands		
<i>Ziphius cavirostris</i>			-	-			-
D1 - REPTILES							
<i>Caretta</i>							
<i>Chelonia mydas</i>	-	-	-	-	-	-	
<i>Dermochelys coriacea</i>				-	-	-	-
D1 - FISH							
D2 - INVASIVE ALIEN SPECIES			-				
D2C1			-				
D2C2	-	-	-	-	-	-	-
D2C3	-	-	-	-	-	-	-
D3 - COMMERCIALY EXPLOITED SPECIES							
D3C1							
D3C2							
D3C3							
<i>Engraulis encrasicolus</i>							-



	DM NOR		DM SUD	DM LEBA		DM ESAL	DM CAN
<i>Sardina pilchardus</i>	-		-	-		-	-
<i>Merluccius merluccius</i>	-		-	GSA6	GSA5	-	-
<i>Octopus vulgaris</i>	-	-	-	-	-	-	-
<i>Scomber colias</i>	-	-	-	-	-	-	-
<i>Mullus barbatus</i>	-	-	-	-		-	-
<i>Mullus surmuletus</i>	-	-	-	-		-	-
<i>Trachurus trachurus</i>	Vizcaya	Atlantic	-	-	-	-	-
<i>Trachurus mediterraneus</i>	-	-	-	-	-	-	-
<i>Parapenaeus longirostris</i>	-	-	-	GSA6	GSA5	-	-
<i>Aristeus antennatus</i>	-	-	-	GSA6	GSA5	-	-
<i>Sepia officinalis</i>	-	-	-	-	-	-	-
<i>Trisopterus minutus</i>	-	-	-	-	-	-	-
<i>Eledone cirrhosa</i>	-	-	-	-	-	-	-
<i>Xiphias gladius</i>	-	-	-	-		-	-
<i>Lophius piscatorius</i>	-		-	-	-	-	-
<i>Lophius budegassa</i>	-		-	-	-	-	-



	DM NOR	DM SUD	DM LEBA	DM ESAL	DM CAN
<i>Micromesistius poutassou</i>			-	-	-
<i>Nephrops norvegicus</i>	-		-	-	-
<i>Thunnus thynnus</i>	-	-			
<i>Thunnus alalunga</i>		-		-	
<i>Thunnus obesus</i>	-	-	-	-	
<i>Sardinella aurita</i>	-	-	-	-	-
<i>Sardina pilchardus</i>		-	-	-	-
<i>Scomber scombrus</i>			-	-	-
<i>Lepidorhombus boscii</i>		-	-	-	-
<i>Lepidorhombus whiffiagonis</i>		-	-	-	-
<i>Sarda sarda</i>	-	-	-	-	-
<i>Katsuwonus pelamis</i>	-	-	-	-	
<i>Sparisoma cretense</i>	-	-	-	-	-
<i>Prionance glauca</i>	-	-	-	-	
D4 - FOOD WEBS	-	-	-	-	-
D5 - EUTROPHICATION		Some areas			-



	DM NOR		DM SUD		DM LEBA		DM ESAL		DM CAN
D5C1		Some areas		Some areas		Some areas		Some areas	-
D5C2						Some areas			-
D5C3	-		-		-		-		-
D5C4	-		-		-		-		-
D5C5					-				-
D5C6	-		-		-		-		-
D5C7	-		-		-		-		-
D5C8	-		-		-		-		-
D6 - SEABED									
D6C1									
D6C2									
D6C3									
D6C4									
D6C5									
D7 - HYDROGRAPHIC CONDITIONS									
D7C1									
D7C2									
D8 - POLLUTION									



	DM NOR	DM SUD	DM LEBA	DM ESAL	DM CAN
D8C1	Grey	Grey	Red	Red	-
D8C2	Grey	Grey	Red	Grey	-
D8C3	Grey	Green	Grey	Green	Red
D8C4	Grey	Grey	Grey	Grey	-
D9 - CONTAMINATION IN FISH	Grey	Grey	Grey	Grey	Grey
D9C1	Grey	Grey	Grey	Grey	Grey
D10 - MARINE LITTER	Red	Red	Red	Red	Red
D10C1	Red	Red	Red	Red	Red
D10C2	Grey	Grey	Grey	Grey	Grey
D10C3	Grey	Grey	Grey	Grey	Grey
D10C4	Grey	Grey	Grey	Grey	Grey
D11 - UNDERWATER NOISE	Grey	Grey	Grey	Grey	Grey
D11C1	Grey	Grey	Grey	Grey	Grey
D11C2	Grey	Grey	Grey	Grey	Grey



There is a large percentage of greyness in the table, mainly due to the absence of threshold values in many of the cases, which prevents firm conclusions on whether or not good environmental status is achieved, even when data is available.

On the other hand, although the marine strategy monitoring programmes have greatly improved data collection in the marine environment, large data sets are needed to address many of the criteria. Such monitoring programmes do not exist in the marine environment except for some specific cases (commercial species, nutrients and pollutants in coastal waters, etc.). This limitation is partly due to the recent inclusion of new aspects of the marine environment to be considered by the MSFD, which has given little time for data collation (e.g. underwater noise, marine litter, etc.). In these cases, the existing data came from various projects, theses, initiatives, and it is necessary to take into account the bias of the information.

The implementation of strategy monitoring programmes will undoubtedly improve the quantitative and qualitative knowledge on descriptors, which will be reflected in future evaluations.

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