

## APPLYING MARINE STRATEGY FRAMEWORK DIRECTIVE (MSFD) FOR GOOD ENVIRONMENT STATE (GES) ASSESSMENT AT THE ROMANIAN BLACK SEA COAST

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**Abstract.** The paper relates primarily to marine ecological issues; it is a brief overview of the EU Framework Directive on "Marine Strategy" (MSFD). Although the paper deals with "marine" problems, the author presents information on "Marine Strategy" at a meeting where there is a great variety of specialists with biological, ecological, environmental, nature protection concerns, just having in view the broad theoretical and, especially, applied importance of this directive, which arouses such a general interest. The Marine Strategy Framework Directive (MSFD) (EU, 2004; 2008) is a document of particular theoretical and especially practical significance pursuing a comprehensive approach to the protection of marine biodiversity and minimizing pollution, while recognizing the needs of society to benefit from marine resources and enable the sustainable use of these resources. MSFD practical applications within EU FP7 PERSEUS project, the author being a member of the research team, refers to the identification, development and promotion tools and methods to evaluate the environmental status along Europe's southern seas (the Mediterranean and Black Sea basins), focusing on countries outside the EU and, if possible, finding ways to improve monitoring and evaluation methodology in the future. The author considers that the results advocate the improvement of the monitoring system in the future by several actions, among which: introduction of a preliminary phase of monitoring, providing greater cohesion and trust in the data obtained in future GES evaluations; organizing better coordination, both at national and European level, enabling the inter-comparability of different analyzed areas; providing similar facilities, equipment and standard methods to all Member States, which have to be subject for periodical inter-calibrating and up-dating. In this presentation the author proposes several recommendations to improve future assessments and possibilities of comparing GES results.

**Keywords:** Marine Strategy Framework Directive (MSFD) 2008/56/CE, descriptors, criteria, indicators Black Sea, Romanian Coast.

**Rezumat. Aplicarea Directivei-cadru privind Strategia Marină (MSFD) pentru evaluarea Stării Bune a Ecosistemului (GES) la Coasta Românească a Mării Negre.** Lucrarea se referă, în primul rând, la problematica ecologică marină, fiind o scurtă prezentare a Directivei-cadru UE privind „Strategia Marină” (MSFD). Deși lucrarea se ocupă de probleme „marine”, autorul prezintă informații privind „strategia pentru mediul marin” la o reuniune în care există o mare diversitate de specialiști cu preocupări biologice, ecologice, de ocrotirea naturii, tocmai având în vedere larga importanță teoretică și, mai ales practică, a acestei directive care stărnește astfel un interes general. Directiva-cadru privind strategia pentru mediul marin (MSFD) (UE, 2004; 2008) reprezintă un document de o însemnătate teoretică, dar mai ales practică, deosebită, care urmărește o abordare cuprinzătoare privind protecția biodiversității marine și minimizarea poluării, în paralel cu recunoașterea nevoilor societății de a beneficia de resursele marine și care, în același timp, să permită utilizarea durabilă a acestor resurse. Aplicațiile practice ale MSFD în cadrul proiectului UE FP7 PERSEUS, în care autorul este membru al echipei de cercetare, se referă la identificarea, dezvoltarea și promovarea instrumentelor și a metodelor de evaluare a stării ecologice de-a lungul mărilor sudice ale Europei (bazinele Mării Mediterane și Mării Negre), cu accent pe țările din afara UE și, dacă este posibil, găsirea căilor de a îmbunătăți metodologia de monitorizare și evaluare în viitor. Autorul consideră că rezultatele susțin îmbunătățirea sistemului de monitorizare în viitor prin mai multe acțiuni, printre care: introducerea unei faze preliminare a monitorizării, oferind o mai mare coeziune și încredere în datele obținute în viitoarele evaluări GES; organizarea unei coordonări mai bune, la nivel național și european, care să permită inter-comparabilitatea diferitelor domenii analizate; acordarea de facilități similare, echipamente și metode standard în toate statele membre, care trebuie să fie supuse periodic inter-calibrării și modernizării. În această prezentare autorul propune mai multe recomandări pentru îmbunătățirea evaluărilor viitoare și a posibilităților de comparare a rezultatelor GES.

**Cuvinte cheie:** Directiva-cadru privind Strategia pentru mediul marin (MSFD) 2008/56/CE, descriptori, criterii, indicatori Marea Neagră, coasta românească.

The challenging aim of the European Union's Marine Strategy Framework Directive is to protect more effectively the marine environment across Europe and to achieve Good Environmental Status of EU marine waters by 2020. The Directive defines Good Environmental Status (GES) as: *“The environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive”* Article 3.

GES means that the different uses made of the marine resources are conducted at a sustainable level, ensuring their continuity for future generations.

In addition, GES means that:

- Ecosystems, including their hydro-morphological (i.e. the structure and evolution of the water resources), physical and chemical conditions, are fully functioning and resilient to human-induced environmental change;
- The decline of biodiversity caused by human activities is prevented and biodiversity is protected;
- Human activities introducing substances and energy into the marine environment do not cause pollution effects. Noise from human activities is compatible with the marine environment and its ecosystems.

Studies within the EU FP7 Project PERSEUS (**Policy-oriented marine Environmental Research in the Southern European Seas – SESS**) are the first attempt on wide sea scale, in accordance with the principles and objectives of the Marine Strategy Framework Directive (MSFD), 2008/56/EC, concerning the state of marine

ecosystems, their present situation, the working methods and the gaps in studies, aiming at the improvement of some negative aspects.

Marine Strategy Framework Directive (MSFD) triggered a positive reaction from the marine scientific community of researchers in EU countries, being a call to action (DE GROOT et al., 2010; FARMER et al., 2012; OGUZ et al., 2012; GOMOIU et al., 2013; NAIR et al., 2014; O'HIGGINS et al., 2014).

#### **What does a Marine Strategy include?**

- The initial assessment of the current environmental status of national marine waters and the environmental impact and socio-economic analysis of human activities in these waters;
- The determination of what GES means for national marine waters;
- The establishment of environmental targets and associated indicators to achieve GES by 2020;
- The establishment of a monitoring programme for the ongoing assessment and the regular update of targets;
- The development of a programme of measures designed to achieve or maintain GES by 2020;
- The review and preparation of the second cycle.

#### **Assessing GES – Romania.**

The main tasks with regard to the implementation of MSFD elements of PERSEUS Project are to identify, develop and promote instruments and methods to assess the environmental status across the Mediterranean and the Black Sea basins, with emphasis on non-EU countries. Based on results obtained in the EU FP7 project PERSEUS, a research team involved in the work package on "**Basin-wide application of MSFD implementation elements**" made an analysis of the reports submitted by the Member States (MS) on the initial assessment (IA) and the GES assessment, mainly concluding: lack of regular monitoring; lack of adequate monitoring networks; lack of monitoring for special purposes; national monitoring programs overlap leading to the waste of research efforts and, implicitly, to different results which cannot be compared; lack of information on the extension of monitoring at spatial and temporal scale; lack of data on the intensity and frequency of anthropic / environmental pressures and their impact on biodiversity.

#### **The results explain some conclusions of the study, such as:**

- The IA report and GES output are partially documented;
- Data are missing for a number of criteria → lack of operational methodological elements;
- Assessments are predominantly on sectors / species, considering products separately;
- A more comprehensive analysis is necessary in the near future;
- Absence of thresholds presentation → requires further development;
- Knowledge among countries are heterogeneous → the situation should be improved;
- WFD methodologies are prevalent (80%) → they should be recommended for larger use in non-EU countries;
- The most successful combinations of methodologies are those presented in the European Directives, Regional Sea Conventions and the national methods → the methods should be recommended for general use;
- Methodologies are poorly harmonized, and thresholds, as a rule, are not available → need improving.

In full agreement with the MSFD provisions, the PERSEUS Project, based on EU Member States (MS) Reports on the initial assessment (IA) and assessment of good ecological state (GES) in some basins of the SESs system, completed the characterization of the 11 descriptors together with the presentation of the criteria and defining indicators of the respective states.

The reports started from the situations and existing practices in various academic institutes, regardless of their system to organize marine monitoring activities; in conclusion, the start did not have a common denominator.

The analysis of MSs reports revealed the knowledge level of GES, the methodologies used in different countries and the recorded gaps.

Good Environmental Status (GES) results from the evaluation of the level and trends of ecological parameters considered as descriptors and indicators under MSFD Annex I, within the monitoring programs at local, national, regional levels, etc. GES cannot reflect the real situation in the study area unless the monitoring program has been prepared strictly on the basis of preliminary studies on:

- Historical data monitoring in the area - lessons learned;
- Management schemes of areas under study;
- What to measure vs. what we can measure with the existing facilities;
- What are the most appropriate methods;
- How can we ensure that the designed monitoring program will accurately measure the changes occurring in the system;
- Establishing the spatial model of the monitoring network to ensure that samples and measurements are representative of the study area; how we can proceed:
  - Stations or polygons?
  - Regular network stations or at random?
  - Number of replicates?, etc.;
- Establishing a biological-taxonomic model of the representative monitoring program for the area under study.

Only on the basis of accurate, representative assessments, which follow the same methodology, comparisons can be made concerning the state of ecosystems in different areas and the gaps in our knowledge can be bridged.

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**Good Environmental Status is determined at the level of marine region or sub-region** - in this case the Black Sea, the North-West sector situated under the influence of the Danube River water discharge, as described in Article 9, based on qualitative descriptors listed in Annex I, in accordance with Article 5 of the Marine Strategy Framework Directive (MSFD) (2008/56/EC), (See APPENDIX).

Good Environmental Status as required by Directive was established on the basis of 11 qualitative descriptors in Annex I of the MSFD.

Of the 11 descriptors, the Romanian report considered descriptor 1 (which is closely related to descriptors 4 and 6 and descriptors 5 and 8) to be representative of the Black Sea marine ecosystem as there are sufficient data sets for determining GES.

For a detailed description of the 11 descriptors, 29 criteria and 56 indicators were established according to European Commission Decision (EU/2010/477) on criteria and methodologies for determining good environmental status.

The report notes that, at present, there are very few assessment procedures and very few indicators of Commission Decision 2010/477/EU in operation. Important procedures for assessing the environmental status have been achieved in numerous directives such as: Water Framework Directive (WFD); Habitats Directive (HD) - Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora or; Convention for the Protection of the Black Sea (Bucharest Convention).

## ANNEX I

**Qualitative descriptors for determining good environmental status** (referred to in Articles 3(5), 9(1), 9(3) and 24) (THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION, 2008 - 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). (Text with EEA relevance). (5.6.2008 EN Official Journal of the European Union L 164/19).

**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 climatic conditions.

**2. Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystems.**

**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.**

**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.**

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

**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.**

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

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

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

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

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

To determine the characteristics of good environmental status in a marine region or subregion as provided for in Article 9(1), Member States shall consider each of the qualitative descriptors listed in this Annex in order to identify those descriptors which are to be used to determine good environmental status for that marine region or subregion.

A brief extract from the MSFD for **Descriptor 1** - Biological diversity is presented below as an example.

**ANNEX: CRITERIA AND METHODOLOGICAL STANDARDS FOR GOOD ENVIRONMENTAL STATUS. PART B: Criteria for good environmental status relevant to the descriptors of Annex I to Directive 2008/56/EC**

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.

(THE EUROPEAN COMMISSION, 2010 - 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) L 232/14 EN Official Journal of the European Union 2.9.2010).

***Species level***

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***

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).

**Long-term changes and trends of development of the state of ecosystems**

To make a comparative analysis on long-term changes and trends of development of the state of ecosystems, comparative population dynamics and reproductive habitats, as well as the economic implications of climate change is necessary to give the most appropriate responses of a series to keep wondering, among which in particular:

- How will climate variability and change – for example changes in temperature, stratification, transport, acidification–influence the seasonal cycle of primary productivity, trophic interactions and fluxes of carbon to the benthos and the deep ocean?
- How will the ecosystem response to these changes differ across the basin and among the shelf seas?
- How are the populations of phytoplankton, zooplankton and higher trophic levels influenced by large-scale ocean circulation and what is the influence of changes in atmospheric and oceanic climate on their population dynamics?
- What are the feedbacks of changes in ecosystem structure and dynamics on climate signals?
- How do life-history strategies of target organisms, including vertical and horizontal migration, contribute to observed population dynamics, community structure and biogeography?
- How are life-history strategies affected by climate variability?
- How will life history influence the response of key species and populations to anthropogenic climate change?

**According to the preliminary conclusions of PERSEUS Project, the main important issues for the Southern European Seas, particularly the Black Sea, are the issues hindering the progress towards a good status of the marine environment:**

- structural and functional consequences of ecological pressures during the last decades of the 20<sup>th</sup> Century;
- misunderstanding of the role of natural systems in providing people with services, resources and functions;
- scarcity of data and knowledge on the Social-Economic System based on marine interests;
- weak interest of stakeholders for marine issues;
- high costs for new marine technology used directly in the sea and laboratories – cost of equipment and its maintenance, repair, and operations (including software).

**Assessment of the ecosystems state at the NW Black Sea sector led to the conclusion that the most important gaps in data acquisition and knowledge of the identified issues are:**

- Inadequate programs of monitoring;
- Missing data and knowledge of ecosystems functioning and adaptation to changes;
- Heterogeneous information and lack of integrated, coherent, unitary and clear coordination and cooperation among the organizations involved in marine management and research of marine space;
- Lack or scarcity of shallow-water observatories and instrumented buoys rationally dispersed in regional or sub-regional areas, equipped with modern instruments and equipments (I. N. C. D. M. „Grigore Antipa”, 2012).

**In view of the above, the specific actions necessary to tackle these issues could be summarized as:**

- urgent measures for applying an adaptive management to increase the resilience of the ecosystems and to diminish the vulnerability of biodiversity;
- necessity of participative approach with stakeholders – involvement of stakeholders in the understanding of natural systems supporting their economic activity must be at the same level and intensity with their interest for economic aspects;
- identification and obtaining adequate financial support for new R-D-I projects, including the improvement of oceanic infrastructure;
- adopting the holistic research approaches of monitoring, assessment and management for the efficient integration of the systems – study of the "system of systems".

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