

HarmoNIA



Harmonization and Networking for contaminant assessment
in the Ionian and Adriatic Seas

Adriatic – Ionian regional strategy for
harmonized monitoring and assessment of
contaminants in the marine environment



2020

Contents

1. Introduction.....	3
2. Mission statement.....	3
3. State of play of monitoring program and assessment.....	4
3.1. WFD versus MSFD	4
3.2. Barcelona convention - IMAP	4
3.3. Environmental Impact Assessment	6
4. Identification and definition of short-term and long-term goals	6
5. References:	8

1. Introduction

The current lack of coherence and harmonization in the ADRIION area, requires an Adriatic – Ionian regional strategy to establish a harmonized monitoring and assessment process of contaminants in the marine environment, based on the transnational comparison of analytical protocols, data analysis and assessment of marine pollutants, and on sharing of best practices adopted to evaluate the impact due to offshore activities.

In particular, the monitoring programs for the assessment of pollutants in the ADRIION Region are based on objectives defined by the EU Directives (WFD - Water Framework Directive, MSFD - Marine Strategy Framework Directive), Barcelona Convention protocols (Dumping Protocol, LBS – Land Based Sources Protocol, Offshore Protocol, Prevention and Emergency Protocol, Hazardous Wastes Protocol) and national level control and prevention plans.

The two European Directives WFD (2000/60/EC) and MSFD (2008/56/EC) differ on the spatial scale. The Commission Decision 2017/848/EU on criteria and methodological standards on MSFD good environmental status, has greatly clarified and enhanced an integrated and coherent assessment process between the two framework directives.

For each of the Barcelona Convention Protocols, specific monitoring and assessment programs have been defined and agreed by Mediterranean Contracting Parties which include EU and as well as non-EU Countries with a high level of heterogeneity between them. In this context, the MSFD has substantially contributed to the development and adoption of a full and integrated Ecosystem Approach also for Barcelona Convention through the definition of Common Indicators grouped by Ecological Objectives that strictly resemble MSFD Descriptors with the sole exception of coastal ecosystem and landscape in the context of Integrated Coastal Zone Management (ICZM). Such issue is not specifically addressed by any of the EU Directives, although Maritime Spatial Planning Directive 2014/89/EU refers to land-sea interactions. Monitoring protocols and assessment for each of the Common Indicators have been further developed in the Integrated Monitoring and Assessment Program (IMAP).

Last but not least, Environmental Impact Assessment procedures regulated according to EU/national legislation require specific monitoring programs to evaluate the impact of marine and coastal infrastructures including offshore activities. Although EIA procedures adopted by ADRIION countries are similar, the actual monitoring program implemented in terms of parameters, stations, temporal frequencies and analytical methods are substantially different both in the phase before the infrastructure is realized (*ante-operam*) and in the phase when the infrastructure is fully operational (*post-operam*).

This situation is likely to undermine the principle of equal conditions which economic operators in the area should encounter in terms of environmental impact assessment posing risk to the achievement and maintenance of Good Environmental Status at the ADRIION region level.

2. Mission statement

An Adriatic – Ionian regional strategy is proposed **to overcome** the current lack of coherence and harmonization in the implementation of the environmental directives related to Good Environmental Status achievement and conservation, and **to assure** that comparable environmental quality standards are granted in all countries in the ADRIION region and, as a consequence, socio-economic opportunities are underlined by equal environmental sustainability principles.

3. State of play of monitoring program and assessment

3.1. WFD versus MSFD

The objective of the WFD on good status for coastal and marine water bodies requires the following elements to be taken into consideration when designing the monitoring programme:

- Definition of marine-coastal water bodies at 1 nautical mile distance from the coastline.
- Ecological status assessment applied for marine-coastal water bodies.
- Chemical status assessment applied for marine-coastal water bodies and for territorial waters defined at 12 nautical miles from the coastline.
- List of priority substances (PS) with associated ecological quality standards (EQSD) threshold values applied for the assessment of the chemical status with a 'one-all-out' criteria. Such list is updated and EQSD threshold values are defined for water and biota matrix based on ecotoxicological data according to a complex process, described in the point 1.2.6 of the Annex V WFD.
- River Basin Specific Pollutants to be identified at the level of River Basin District as physico-chemical elements to support ecological status assessment.

Such elements have determined the choice of monitoring stations related either to state or to pressure assessment with a prevalence of the former ones and water as the main matrix due to the widespread availability of associated EQSD threshold values.

On the other hand, MSFD focuses on the definition and assessment of Good Environmental Status (GES) for Descriptor 8 (contaminants in marine ecosystem) and Descriptor 9 (contaminants in seafood) considering:

- Priority Substances for which the EQSD provide threshold values or measured in different matrices not included in EQSD and for which threshold values should be established by Member States through regional or sub-regional cooperation
- River Basin Specific pollutants defined in WFD
- Additional contaminants
- Contaminants listed in Regulation (EC) No 1881/2006 for seafood

Spatial scale for MSFD is primarily fixed at regional (Mediterranean Sea) or sub-regional level (Adriatic and Ionian Sea) with the possible use of further subdivisions to be included in Marine Reporting Unit (MRU) defined by Member States.

3.2. Barcelona convention - IMAP

With the adoption of the Ecosystem Approach (EcAp) program by the Contracting Parties of the Barcelona Convention and the further development of the Integrated Monitoring and Assessment Program (IMAP) Common Indicators, an overall approach for the Mediterranean Sea that tackles contaminant pollution as a whole issue regardless of specific protocols, has been definitely put in place.

In particular, IMAP Common Indicator 17 deals with contaminants for biota and sediments (seawater is optional) but assessment is based on Environmental Assessment Criteria (EAC) and Background Assessment

Concentration (BAC). BAC and EAC definition process follows a methodology developed by the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR), which proposes two threshold limits to be defined in sediments and biota:

- T0 to define the threshold at “pristine” sites and
- T1 to define the threshold between acceptable (GES) and unacceptable environmental conditions.

Using Mediterranean data from the United Nations Environment- Mediterranean Action Plan (UNEP/MAP) MED POL database and applying the OSPAR methodology, an evaluation of the background concentrations (BCs) and the background assessment concentrations (BACs) of trace metals (mercury, cadmium and lead) and organic contaminants (chlorinated hydrocarbons and PAHs) in sediments and biota in the Mediterranean basin have been derived.

Technically, background assessment concentrations (BACs) are statistical tools defined in relation to the background concentrations (BCs). They enable statistical testing of whether observed concentrations can be considered to be near background concentrations, i.e. if the mean concentration is statistically significantly below the corresponding BAC.

Regarding the definition of BACs in Mediterranean sediments, limited data are available in MEDPOL database and therefore more dated sediment cores from different areas are needed in order to increase the confidence of the proposed values. Additionally, in order to further test the use of normalization to take into account sediment particle variability, aluminum (Al) and organic carbon (OC) content should be considered as mandatory parameters in the IMAP. Furthermore, in the definition of BAC, sediment size class should be clearly stated.

In order to define the relationship between BC and BAC, a statistical test is required, taking into consideration the variability of the reported measured values on Certified Reference Materials (sediment and biota) used by Mediterranean laboratories in proficiency tests and in inter-calibration exercises. A statistical test on the UNEP/MAP MED POL monitoring program is not yet available. OSPAR defined relationships between BC and BAC for metals in sediments, fish and shellfish to assess the BACs levels. Thus, for sediments and shellfish $BAC = 1.5 \times BC$, for fish $BAC = 2 \times BC$.

As regards to the definition of Mediterranean Environmental Assessment Criteria (EAC) for biota using the UNEP/MAP MED POL database, it is underlined that: a) EAC represent the threshold contaminant concentrations below which no chronic effects are expected to occur in marine species; b) ecotoxicological data for autochthonous marine species are required but in fact are largely lacking in the Mediterranean; c) it is inappropriate to evaluate it for one species based on data from close relative species. Therefore, for trace metals (Cd, Hg, Pb) in biota, values are based on European policy (EC/EU 1881/2006 and 629/2008 Directives for maximum levels for certain contaminants in foodstuffs). Similarly, for sediments, EAC is based on US Effects Range Low (ERL). Such approach for both biota and sediment EAC is aligned with OSPAR.

In order to support monitoring for the assessment of GES for IMAP Common Indicator 17 a two-fold approach has been proposed:

- a threshold value (BAC) for GES could be set using concentrations from relatively unpolluted areas on a sub-regional level;
- a decreasing trend should be observed from values representing the actual level of contaminants concentrations that are above the background assessment concentrations (BACs).

3.3. Environmental Impact Assessment

Environmental Impact Assessment procedures are regulated according to EU/national legislation that require specific monitoring programs to evaluate the impact of marine and coastal infrastructures including offshore activities.

Threshold values applied can be broadly classified into the following:

1. Limit values for direct discharge or emission, usually included into authorization process;
2. Environmental Quality Standards close or not far from the discharge or emission point, usually according to the WFD and/or MSFD or Barcelona Convention/ IMAP.

4. Identification and definition of short-term and long-term goals

A regional strategy to establish **a harmonized monitoring and assessment** process of contaminants in the marine environment needs to include a process **to align the EQSD threshold values definition procedure from EU and BAC/EAC implementation from Barcelona Convention.**

The EQSD threshold values should be based on sound and reliable ecotoxicological studies and when these are lacking, Quantitative Structure-Activity Relationship (QSAR) approach (Dudek et al., 2006) jointly with bioaccumulation/biomagnification factor are used in order to comply with the precautionary principle. QSAR models are regression models, where a property of a substance (i.e. activity) is deduced from its structure considering chemical substances that have similar structures and with well-known activities by measurements.

On the other hand, BAC/EAC definition process requires wide monitoring datasets that should cover both hotspot and pristine area for long time series.

In this context, the following **list of goals** is proposed, taking into account a short-term and long-term implementation plan.

Short-term goals to be achieved as a follow up of the actions, tools and platform made available by HarmoNIA project:

1. Collect and harmonize monitoring data sets on contaminants for all matrices covering ADRION region available on a **common data management platform**. Harmonia project has provided one with a first collection.
2. Review of the available ecotoxicological studies available for the ADRION region or such that results could be used for ADRION region, in order **to properly define the EQS in accordance with WFD and MSFD.**
3. Suggest a **specific EQSD threshold value definition process** at EU level dedicated to coastal and marine environment where risk assessment and precautionary principles are applied taking into account the appropriate marine ecological functions and processes that are involved in the transport and fate of contaminants.
4. Estimate **natural background concentrations** for metals and PAHs based on robust and reliable data sets that also take into account local natural characteristic.
5. Produce a **joint and coherent list of parameters and their environmental quality standards**

(EQS) and the relative natural background concentrations for metals and their compounds (BC) in accordance with EQSD as appropriate and apply it at ADRION and Mediterranean regional level.

6. **Compare such list with BAC/EAC from UNEP/MAP process** and, if necessary, propose to revise them to assure consistency at Mediterranean basin.
7. Long-term goals to be achieved by a sound regional process established on the grounds of short-term goals and with the full involvement of institutional and research bodies responsible for the monitoring and assessment of contaminants not only in the ADRION but also in the Mediterranean Region:
8. Agree and adopt a coherent monitoring protocol for biota and sediment matrix in order to assure comparability of results regarding species, size, type of tissue for biota and grain size and thickness for sediment.
9. Implement an effective joint monitoring programme at the Mediterranean level on contaminants in order to acquire detailed information on sources, pathways, sedimentation, bioaccumulation and biomagnification processes.
10. Propose and adopt a harmonized set of threshold values for contaminants in the relevant matrix based on the above joint monitoring programme in order to assure full compatibility between MSFD and UNEP/MAP process through the implementation of indicators for GES assessment.
11. Define and implement a Programme of Measures based on risk assessment and socio-economic analysis at Mediterranean level to mitigate and, in some cases, phase out contaminants in order to reach and maintain GES. Close interactions and synergies between the MSFD Programme of Measures and the UNEP/MAP Action Plans should be defined and implemented following the different protocols (Offshore, Land-based).

Such list of actions should be prioritized according to the following roadmap that has been agreed at the EU and UNEP/MAP level:

Short-term roadmap

- a. MSFD Contaminants D8+D9 Workshop – 30th April 2020, organized by JRC with the following main points:
 - i. Criteria for exclusion of certain Priority Substances from MSFD assessments
 - ii. Criteria for selection of additional contaminants
 - iii. Contaminant thresholds in Marine Waters
 - iv. Updates on biological-effects monitoring
- b. Coordinated CorMons Meeting of the 3 clusters: Biodiversity & Fisheries, Eutrophication, Pollution & Marine Litter and Coast & Hydrography – November 2020, organized by Coordination Unit of UNEP/MAP with the aim to assure coherence of actions between the different process for the implementation of Ecological Objectives of IMAP including contaminants
- c. CorMon Meeting on Eutrophication, Pollution & Marine Litter – March 2021, organized by MEDPOL of UNEP/MAP to assess the implementation of IMAP monitoring programme and discuss assessment procedures (BAC/EAC vs EU Commission Decision on GES)
- d. MEDPOL Focal Point meeting – May 2021, organized by MEDPOL of UNEP/MAP to assess the level of implementation of Land Based Source protocol and MEDPOL monitoring program

The above goal 1) should provide an additional data set to further improve and inform the discussion of MSFD Contaminants D8+D9 Workshop (a). On the other hand, workshop a) and Coordinated CorMons b) may provide further information to properly approach goals 2) and 3). Both should be completed by January 2021 in order to produce an informative document to be properly discussed during CorMon Meeting on Eutrophication, Pollution & Marine Litter c). Finally, goals 4) and 5) should be completed by April 2021 to pave the way for the adoption or agreement by MEDPOL Focal Point meeting of HarmoNIA proposal for the harmonization of monitoring and assessment of contaminants in the marine environment.

Long-term roadmap

- e. Full implementation of national IMAP Monitoring Programmes which include Ecological Objective 9 on contaminants – 2020-2021
- f. Update of Programme of Measure ex. art. 13 of MSFD – 2022
- g. Quality Status Report – QSR for UNEP/MAP Barcelona Convention - 2023
- h. Update of Environmental Status Assessment (art. 8), definition of Good Environmental Status – GES (art. 9) and Environmental Target (art. 10) – 2024

Long-term goals 7) and 8) should be included in point e) which is also part of the Programme of Work - PoW for Barcelona Convention in 2020-2021. Goal 9) should serve both points g) QSR which according to PoW should be mainly data-based on monitoring survey with a minimum use of expert judgment and h) for art. 8 and art. 9 assessments and eventually the overall revision process of MSFD. Point f) should be based on goal 10) as much as possible even if only a draft proposal at Mediterranean level will be presumably available by 2022.

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ARSO ENVIRONMENT
Slovenian Environment Agency



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