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Report of the JRC's Descriptor 5 workshop to support the review of the Commission Decision 2010/477/EU concerning MSFD criteria for assessing Good Environmental Status

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Report of the JRC's Descriptor 5 workshop to support the review of the Commission Decision 2010/477/EU concerning MSFD criteria for assessing Good Environmental Status

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Abstract

The MSFD workshop on eutrophication (D5), held in Ispra JRC (29th-30th of September 2015) aimed to provide clear proposals and conclusions on some of the outstanding issues identified in the D5 review manual (May 2015 consultation version: <https://circabc.europa.eu/w/browse/ed3cd091-aa56-4f8e-9691-d44bbd666ed5>) in the broader context of support to the review of Commission Decision 2010/477/EU. This report is complementing the Commission Decision 2010/477/EU review manual (JRC96900) and presents the result of the scientific and technical review concluding phase 1 of the review of the Commission Decision 2010/477/EU in relation to Descriptor 5. The review has been carried out by the EC JRC together with experts nominated by EU Member States, and has considered contributions from the GES Working Group in accordance with the roadmap set out in the MSFD implementation strategy (agreed on at the 11th CIS MSCG meeting).

The main issues addressed and tackled in this workshop's report are:

- Criteria and indicators/parameters;
- How to handle coastal waters (i.e. WFD-MSFD overlapping waters);
- Eutrophication assessment frameworks;
- Use of WFD quality standards (GES boundaries) for ecological elements; how are GES boundaries per quality elements set?
- Assessment scales and aggregation rules;
- Initial screening procedures.

The views expressed in the document do not necessarily represent the views of the European Commission.

1. Introduction

The MSFD workshop on eutrophication (D5), held in Ispra JRC (29th-30th of September 2015) aimed to provide clear proposals and conclusions on some of the outstanding issues identified in the D5 review manual (May 2015 consultation version: <https://circabc.europa.eu/w/browse/ed3cd091-aa56-4f8e-9691-d44bbd666ed5>) in the broader context of support to the review of Commission Decision 2010/477/EU. The workshop convened a total of 22 experts (incl. 4 JRC members), representatives of 12 different Member States and 3 Regional Seas Conventions (OSPAR, HELCOM, UNEP/MAP). The issues discussed proved highly complex with many differing views on needs and suitable ways forward. Discussion was lively and informed, as the group was diverse (MSFD and ECOSTAT related experts) and very experienced. This report intends to complement the review manual for D5, further support the review process, feed the drafting of the revised Commission Decision on criteria and methodological standards on good environmental status (GES) of marine waters and define the way forward on further technical and scientific needs.

The outline of the report follows the workshop's agenda (Annex I), focusing on the following major issues:

- Criteria and indicators/parameters;
- How to handle coastal waters (i.e. WFD-MSFD overlapping waters);
- Eutrophication assessment frameworks;
- Use of WFD quality standards (GES boundaries) for ecological elements; how are GES boundaries per quality elements set?
- Assessment scales and aggregation rules;
- Initial screening procedures.

The participants of the workshop are listed in Annex II.

2. Criteria and indicators/parameters

As reported in the review manual, it was agreed not to change the criteria for descriptor D5, as they represent a well-known process linking the pressure of anthropogenic nutrient enrichment to impacts directly and indirectly affecting the ecosystem. This model has also been demonstrated to be extremely useful for management purposes and has also already been applied in the RSCs or was being discussed for future implementation. The discussion focused then on the suite of indicators within each of the criteria with the view to introduce specifications that may be considered EU-wide (core set of mandatory indicators) and others that would reflect area specific characteristics as recommended by RSCs (Tables 1 to 3). The selection of the indicator/s per criterion took into consideration the results of MSFD Art. 12 and the on-going assessment processes from the RSCs, to enhance the comparability and consistency of the assessment on both EU and regional level.

Table 1. Proposal for indicators in Criterion 5.1

Criteria	Indicator as in Com. Dec. 2010	Proposal for core/EU mandatory indicator	Proposal for additional regionally-agreed indicator	Comments
5.1 Nutrient enrichment	5.1.1 nutrient concentration in the water column	5.1.1 nutrient concentration in the water column		supporting indicator in WFD
	5.1.2 Nutrient ratios (Si, N, P) where appropriate		5.1.2 Nutrient ratios (Si, N, P)	

Nutrients concentration in the water column is proposed for the core/EU mandatory indicator, because of the data availability (also measured for WFD), fully operational methodological standards and its more or less direct link to nutrient reduction efforts. In contrast, the nutrient ratios indicator is heavily affected by the regional specificities and was not widely reported in the first phase of implementation (2012) which thus prevents any comparable assessments. Even though N/P ratio is easy to retrieve from the concentration measured for each of the nutrients, its variability in some regions may not be strictly related to anthropogenic pressure and can naturally deviate from standards (e.g. Redfield ratios). Boundary values for such an indicator are difficult to define. Consequently, it is proposed to classify nutrient ratios as an additional regionally-agreed indicator.

The expert group discussed the relevance of organic matter enrichment (from e.g. aquaculture and fish processing) within the criteria and how it could be accurately measured. To this end, total organic carbon (TOC) was considered as a potential methodological standard for eutrophication assessment. However, the group agreed on the fact that TOC is not easily measured and measured differently across the Member States (MS). It is essentially not measured in open waters. In addition, it is difficult to set a GES-boundary for TOC since it is not clear which part is caused by anthropogenic inputs of organic matter and which part is natural. As a result, total organic carbon is currently not considered to be a useful indicator for eutrophication. Nevertheless,

anthropogenic inputs of organic matter, e.g. from fish farms, should be assessed as a relevant pressure under Annex III of the MSFD.

Table 2. Agreed proposal for indicators in Criteria 5.2 (BQE: Biological quality element under WFD)

<u>Criteria</u>	<u>Indicator as in Com. Dec. 2010</u>	<u>Proposal for core/EU mandatory indicator</u>	<u>Proposal for additional regionally-agreed indicator</u>	<u>Comments</u>
5.2 Direct effects	5.2.1 Chlorophyll concentration in the water column	5.2.1 Chlorophyll concentration in the water column		WFD Phytoplankton BQE
	5.2.2 Water transparency related to increase in suspended algae		5.2.2 Water transparency related to increase in suspended algae	supporting indicator in WFD
	5.2.3 Abundance of opportunistic macroalgae		5.2.3 Abundance of opportunistic macroalgae	WFD Aquatic flora BQE
	5.2.4 Species shift in floristic composition such as.....		5.2.4 Bloom events of nuisance/toxic algae (e.g. cyanobacteria) caused by anthropogenic nutrient enrichment	WFD Phytoplankton (and Aquatic flora) BQE requiring focus and better knowledge on relationship with anthropogenic nutrient enrichment; more research is needed on the second
			5.2.5 Pelagic phytoplankton species shift	

Regarding the direct effects, the indicator 5.2.4 as originally defined in the Commission Decision appeared problematic in the 2012 reporting, due to its unspecific content that created misinterpretations and inconsistent assessments, wherever it was reported. Two options were included in the review manual, either to omit this indicator for the sake of simplicity or to further define and clarify it in the sake of self-interpretation and clarity. The expert group agreed not to delete criterion 5.2.4, otherwise the ecological information is missing from the direct effects. On the other hand, it was recognised that the criterion 5.2.4 needs to be clarified and further specified. To that end, the group decided to split this indicator to the following:

- Bloom events of nuisance/toxic algae (e.g. cyanobacteria) caused by anthropogenic nutrient enrichment (new 5.2.4, Table 2)
- Pelagic phytoplankton species shift (new 5.2.5, Table 2)

It was also acknowledged that the phytoplankton species shifts requires more research to reach an informed, fully operational direct effect methodological standard for eutrophication, although in some areas such methodological standards are already tested. In addition, more research is needed for the relationship between the two indicators and anthropogenic nutrient enrichment. Splitting the former 5.2.4 indicator enables better focus on specific biological features that may regionally be directly linked to eutrophication.

Table 3. Agreed proposal for the Criterion 5.3 indicators, reflecting the indirect effects that caused by the direct effects of anthropogenic nutrient enrichment.

<u>Criteria</u>	<u>Indicator as in Com. Dec. 2010</u>	<u>Proposal for core/EU mandatory indicator</u>	<u>Proposal for additional regionally-agreed indicator</u>	<u>Comments</u>
5.3 Indirect effects	5.3.1 Abundance perennial seaweeds, seagrasses (..) adversely impacted by decrease in water transparency		5.3.1 Abundance perennial seaweeds, seagrasses (..) adversely impacted by decrease in water transparency	WFD Aquatic flora BQE
	5.3.2 Dissolved oxygen due to increased organic matter decomposition	5.3.2 Dissolved oxygen due to increased organic matter decomposition linked to nutrient enrichment		Supporting indicator in WFD
			5.3.3 Changes in abundance or composition of benthic invertebrates due to increased organic matter decomposition	WFD benthic fauna BQE

The proposed change in the indirect effects criterion is the addition of a new indicator (5.3.3 in Table 3): "Changes in abundance or composition of benthic invertebrates due to increased organic matter decomposition". The rationale for the aforementioned inclusion is based on the following arguments:

- Adding a zoobenthic indicator to D5 would increase the coherence between WFD (ecological status indicators) and MSFD (D5 indicators) and thus increase harmonisation between the assessments of coastal and open sea areas;
- in the present proposal, there is only one indicator (oxygen) assigned into Criterion 5.3, which in practice would cause oxygen to potentially dominate the overall assessment, especially if one-out-all-out (OOAO) is assigned between criteria;
- developing an oxygen indicator in open waters has been shown to be complicated, benthic invertebrates could support the assessment, and provide information on eutrophication in the open sea benthic habitat where macrophytes do not occur for natural reasons;

- a macro-invertebrate indicator, when developed specifically to respond (indirectly) to increases in nutrient enrichment, will in some cases provide additional information to what is provided by the dissolved oxygen indicator, providing information on the impacts of occasional oxygen deficiency, or on whether the area has recovered from oxygen deficiency;
- in soft bottom habitats (e.g. open Baltic Sea), dissolved oxygen provides information from the bottom water column, whereas benthic invertebrates also reflect the sediment conditions – in some cases the former might show good status, while the latter still proves that the area suffers from impacts of eutrophication.

3. How to handle coastal waters (i.e. WFD-MSFD overlapping waters)

According to the COM DEC 2010/477/EU “The assessment of eutrophication in marine waters needs to take into account the assessment for coastal and transitional waters under Directive 2000/60/EC (Annex V, 1.2.3 and 1.2.4) and related guidance¹, in a way which ensures comparability, taking also into consideration the information and knowledge gathered and approaches developed in the framework of regional sea conventions”.

The COM DEC 2013/480/EU provides the outcome of the WFD intercalibration exercise that ensures comparability in the assessments of particular MSFD indicators. On-going processes including the 3rd Intercalibration phase will provide concrete input and assessments within 2017 that can further feed MSFD in terms of assessments and GES boundaries.

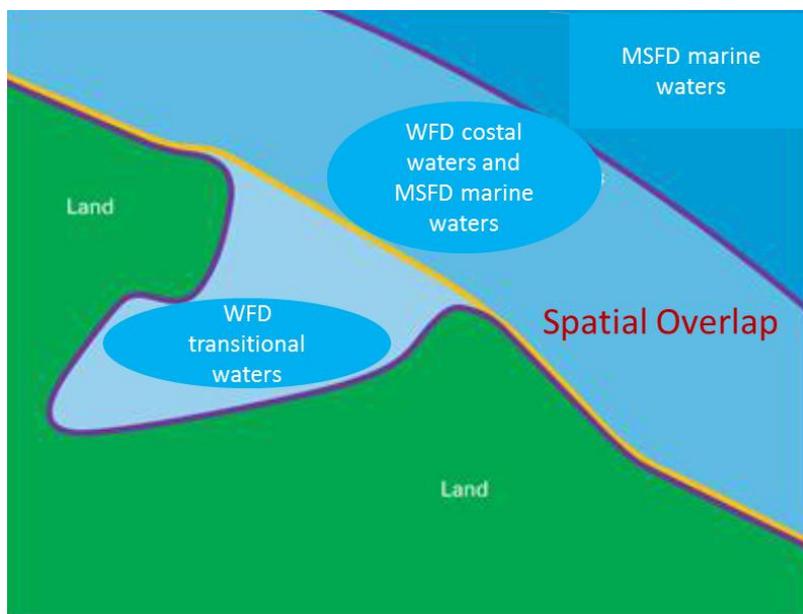


Figure 1: WFD and MSFD spatial extent of implementation and overlapping assessment area

¹ Guidance Document on the Eutrophication Assessment in the Context of European Water Policies, Document No 23. European Commission (2009). See <http://circa.europa.eu/Public/irc/env/wfd/library>

The expert group discussed how the Water Framework Directive (WFD) assessments can be exploited for the MSFD needs, in line with the MSFD's recommendations. The group ended up with two different ways to consider WFD for the MSFD D5 assessments for the overlapping/coastal water (Fig. 1):

- Direct reuse of WFD ecological status assessment for eutrophication assessment in the context of MSFD, where status is clearly related to nutrient pressure;
- Use of WFD data/indicators/good-moderate boundaries to complement the MSFD indicators, but different aggregation rules to assess criteria and Descriptor (i.e. re-assessment for MSFD).

The group provided arguments for both approaches, also indicating the logic for not proposing a single approach. Justification for directly using WFD assessment:

- Avoids assessing coastal waters twice;
- Builds consistency, but only where WFD assessed status is clearly related to nutrient pressure;
- Responds to WFD CIS Guidance No 23.

Justification for not using directly WFD assessment:

- WFD assessments may relate to pressures other than nutrients; MSFD D5 indicators better address pressures and eutrophication development (direct, indirect);
- The Ecological Status assessment does not assess all relevant aspects of eutrophication (e.g. high nutrient concentration without direct or indirect effects resulting in transboundary nutrient transport and eutrophication elsewhere).

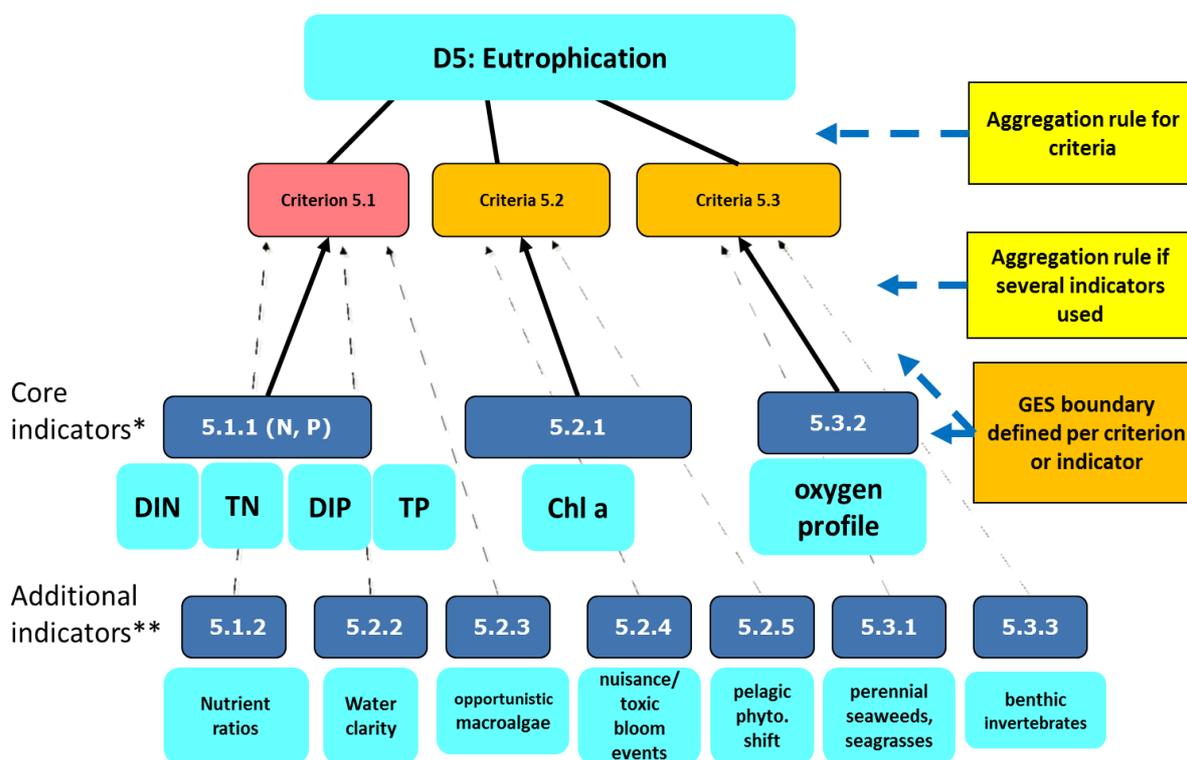
Regarding the first approach, the group indicated the different assessment time period/cycle. The second approach requires the RSCs to organise and harmonise the assessments within the contracted Member States, otherwise this approach would not be effective in terms of consistency and comparability.

The group highlighted the necessity of aligning the level of ambition between MSFD and WFD, as it is reflected through the implementation process of the assessments and the aggregation approaches, especially where the second approach is selected.

4. Eutrophication assessment framework

The expert group agreed on the hierarchical assessment scheme for eutrophication in Figure 2. This scheme presents: (1) the elements that need to be measured and assessed for each indicator, (2) the two levels of indicators and (3) the two aggregation rules at the level of indicators and criteria to achieve the overall eutrophication assessment. The group indicated the need to clarify pressure and state terminology for the pressure and state Descriptors, since the DPSIR concept is not consistently applied between the state and pressure Descriptors, as is illustrated in the "pizza-satellite scheme" in the cross-cutting document².

² Figure 6 in the following document: <https://circabc.europa.eu/w/browse/21a67826-c139-46a1-83e3-b62baa6fedf9>



* Core indicators are EU-wide mandatory to assess D5; ** Additional indicators reflect regional specificities as prescribed by RSCs

4

Figure 2. Common agreed hierarchical assessment for eutrophication from the data to the overall assessment, showing also the two levels of aggregation and the distinction between the two proposed levels of indicators.

5. Use of WFD quality standards (GES boundaries) for ecological elements and GES boundaries determination for offshore waters

The expert group acknowledged the potential of exploiting the WFD standards for the ecological quality elements (outcomes of the intercalibration exercise included in the 2013 COM DEC and on-going work that may end up in another COM DEC within 2017). The group agreed to encourage MSs to define and extrapolate (along gradients, e.g. salinity) GES boundaries according to the good/moderate boundaries for the WFD biological quality elements and their physico-chemical parameters via the intercalibration processes (2013 Decision). It is advantageous that these standards are already intercalibrated contributing to a comparable assessment of MSFD indicators and criteria.

On the other hand, RSCs have already defined and tested GES boundaries (assessment thresholds). Under the RSCs coordination MSs could apply the regionally agreed standards for the open waters, when the direct use of the WFD standards is not suitable because of:

- The gradient in the impact of pressures (inputs) from coastal to open waters requires GES boundaries different from the WFD standards for the 1st nautical mile (Nm), and

- Spatial (hydrographic) variability may affect GES boundary setting beyond the 1st Nm.

In this case, the revised text of the COM DEC 2010/477/EU should make sure that the RSCs' GES boundaries³ (where established) can be directly implemented to achieve coherent and comparable assessments under RSC coordination, as long as a consistent level of ambition with WFD is ensured. Comparable or similar level of ambitions should also be achieved between the coastal and offshore waters in terms of eutrophication. The RSCs approaches for setting GES boundaries are briefly presented in Annex III for OSPAR and HELCOM.

6. Assessment scales

Assessment scales were discussed within the expert group aiming to define common approaches for coherent assessments, considering also the assessment scales established for other EU legislation and RSCs (e.g. WFD and HELCOM's nested approach). The group concluded on the following points:

- a) The generic approach (nested) of the cross-cutting document (Fig. 3) is suitable for D5
- b) Hydrological conditions can define homogenous assessment units (salinity gradient reported from some MSs)
- c) Consideration of RSCs scales definition for eutrophication
- d) Small-scale assessment units are of particular importance in coastal waters to identify eutrophication hotspots and help to define measures

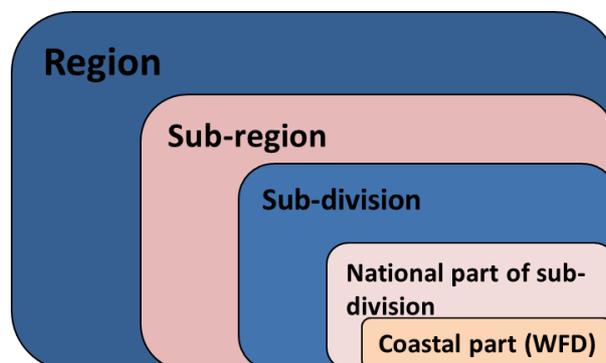


Figure 3. Schematic representation of a nested set of assessment scales which could be used to cover all assessment needs for MSFD. Region, sub-region and subdivision are provisions of Art. 4⁴. 'National part of a sub-division' would be delineated using national boundaries of marine waters. 'Coastal part' refers to the coastal waters defined under WFD (MSFD Art. 3(1b)) extending to 1nm for ecological status and 12nm for chemical status (cross-cutting document⁵).

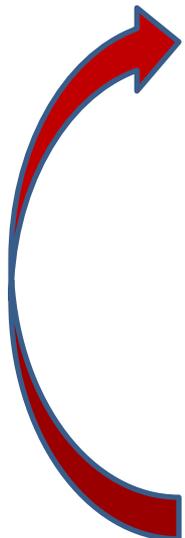
³ Note that OSPAR Contracting Parties use "Assessment thresholds" and not "boundaries"

⁴ Stock assessments under CFP use specified areas based on ICES/GFCM assessment areas which can be broadly related to the above scales. This generic scheme needs adaptation to regional needs; for example the Trilateral Wadden Sea Cooperation subdivides coastal waters in respect to certain aspects (elements/groups).

⁵ <https://circabc.europa.eu/w/browse/21a67826-c139-46a1-83e3-b62baa6fedf9>

Furthermore, the group discussed and agreed on Table 4 that describes general assessment steps suitable also for D5 where particular scales are assigned to each step.

Figure 4. Implementation steps for D5 assessments and associated scales, considering also WFD assessment scales.



1	Define GES	(sub)Region
2	Define 'indicators' for assessment	(sub)Region (EU)
3	Collect the data (monitoring)	National (coastal - WFD, offshore - MSFD)
4	Process the data for use in indicator assessment	National (WFD water body, MSFD)
5	Aggregate the data and assess indicator	Sub(Regional) ('national' sub-basins) *
6	Combine the outcomes of the indicators to assess GES for Descriptor 5	(sub)region

* sub-region may be divided into assessment areas reflecting hydrological conditions and pressure gradients

7. Aggregation rules for the impact

Common aggregation rules are fundamental for comparable and coherent eutrophication assessments. Different approaches for the two stages of aggregation (across indicators and criteria) for the assessment of the eutrophication have been developed and applied by the RSCs. These reflect differences in the degree of ambition and precaution in the eutrophication assessment. The group discussed the current state of aggregation rules used in the RSCs and other pieces of legislation and how these can be applied for the eutrophication assessment in the hierarchical eutrophication assessment (Figure 1) and concluded with the following points:

- i. Common aggregations rules are fundamental for a coherent and comparable assessment
- ii. Two levels of aggregation for D5 (i.e. across indicators and criteria)
- iii. RSCs do not follow the same aggregation rule, currently they use different aggregation rules for each level (see OSPAR's Common Procedure and HELCOM Eutrophication Assessment Tool)

No agreement emerged for a common pan-European approach. Further guidance may be required on common aggregation rules starting with comparative analysis between

regionally agreed methodologies and their assessment outcomes, if it were considered that the overall result of each eutrophication assessment did not lead to action appropriate to the circumstances of that region. Clarity is needed to ensure that eutrophication status is diagnosed with certainty to ensure appropriate actions may be taken.

8. Initial screening procedure (risk-based management approach) to identify non-problem areas

The COM DEC 2010/477/EU states that: "Based on a screening procedure as part of the initial assessment, risk- based considerations may be taken into account to assess eutrophication in an efficient manner". The group discussed if the initial screening procedure needs to be maintained in the revised text and how can be applied. The group agreed on the following points:

- a. The initial screening procedure is an important aspect in the eutrophication assessment;
- b. The initial screening procedure can contribute to the cost-effectiveness of the MSFD implementation;
- c. Other legislations should be considered to support the initial screening (e.g. input coming from the Nitrate Directive, WFD, etc);
- d. Screening process needs to be regularly repeated at least once within MSFD cycle.

Methods for applying the initial screening procedures were discussed in a general framework, without aiming to agree on a fixed list of methodological standards. Remote sensing data can provide essential information for the initial screening procedure, for some regions.

9. Pending issues

Several issues were discussed in the workshop that need further consideration regarding the D5 assessment. Such issues include:

- Interoperability of common indicators across Descriptors (e.g. assessment of benthic invertebrates for D5 & D4 & D6, dissolved oxygen for D5 & D6);
- Links of D5 with other Descriptors (e.g. macroalgae and macrophytes for D1, D4 and D5) and the position of eutrophication in the ecosystem management approach at the overall assessment of MSFD for the GES determination (in line with Fig. 6 of the cross-cutting document⁶) and the Descriptors integration (in line with Table 15 of the aforementioned document);
- Metrics and measurements: guidance for measurements, sampling frequency etc.
 - o Consideration of the differences arising when using different methods to analyse chlorophyll (HPLC versus spectrometry) as addressed by the EU-funded JMP NS/CS project;
 - o Oxygen: What is the best way to measure oxygen so to reflect impacts of anthropogenic nutrient enrichment? (Oxygen debt as measured in HELCOM has the

⁶ <https://circabc.europa.eu/w/browse/21a67826-c139-46a1-83e3-b62baa6fedf9>

advantage to remove the influence of the physics on oxygen concentration and thus remove possible impact from climate change. On the other hand, Oxygen debt is not easy to measure, requiring a specific statistical procedure).

Annex I: Agenda of the workshop

Day 1 – Tuesday 29th September	
09:00	Introduction to the workshop, ‘tour de table’
09:15	Update on the Commission Decision review process and next phase (JRC)
09:30	<p>Session 1: how to handle coastal waters (i.e. WFD-MSFD overlapping waters)?</p> <p>Summary on ECOSTAT group activities on biological quality elements and nutrient standards – work in progress and next steps. (JRC)</p> <p>Discussion topics</p> <p>For WFD Coastal Waters, we would like to use WFD assessments directly for the D5 assessment. This would be achieved by using the relevant WFD quality elements (all elements except hydromorphology and chemical appear to be relevant for assessment of eutrophication), quality standards, aggregation rules (OOAO) and WFD Coastal Water bodies. This would lead to a D5 assessment for each WFD Coastal Water body, based directly on the WFD assessments.</p> <ul style="list-style-type: none"> • What are the links and potential conflicts between WFD and MSFD? • <u>Use of WFD assessments</u>. Assessments of WFD ecological quality elements (Chlorophyll a, phytoplankton, macrophytes, oxygen levels, water clarity) are typically focused towards assessing eutrophication such that they can be considered to provide an assessment for D5. Is this approach applicable in all regions or are the assessments in some regions (e.g. Mediterranean, Iberian Peninsula, Macaronesia) addressing other pressures? If so, is the proposed reuse of WFD assessments invalid in some regions?
10:45	COFFEE/TEA BREAK
11:00	Session 1 continued and wrap up
12:30	LUNCH BREAK
13:30	<p>Session 2: Criteria and indicators/parameters (open waters)</p> <p>For marine waters beyond WFD Coastal Waters, MSFD assessments are needed which ensure compatibility with the coastal water assessments. They are likely to use the same/similar quality elements and comparable standards. It is expected that the assessment scale is much larger, probably the 'national part of a subdivision' or a 'subdivision of a subregion' (where assessments are undertaken jointly by RSCs) (see cross-cutting paper).</p> <ul style="list-style-type: none"> • <u>Quality elements for pressure</u>: Criterion 5.1 focuses on assessing the pressure as N and P. What is the relevance of organic matter enrichment, such as from aquaculture and fish processing, as this can have a significant role in impacts such as deoxygenation (5.3.2)? What is the best measurement for organic matter? ARE TN and TP suitable parameters? What aggregation rules between these elements are to be applied for this pressure criterion? • <u>Quality elements for impact</u>: Is the proposal of having primary (mandatory) and secondary (optional/regional) indicators suitable for assessment of D5? Is the set of primary indicators adequate to assess eutrophication at the criteria level? How to justify/ define secondary indicators? • <u>Quality elements</u> – are all elements proposed of equal importance? Is their redundancy, e.g. water clarity is correlated with biomass (Chl-a)? • <u>Use of WFD quality standards (GES boundaries) for ecological elements</u>: WFD provides standards for ecological quality elements via the intercalibration processes (2013 Decision), defining the good/moderate boundary for each region. Can these be applied in offshore

waters? Regional (RSC) standards?

- How are GES boundaries per quality element set? On the basis that standards (GES boundary values) need to be set per region (to reflect varying ecosystem characteristics), can generic guidance be given as to how these standards are set (perhaps in relation to reference conditions)? Principles for setting standards per quality element are given in the WFD eutrophication guidance – are these applicable in offshore waters? What principles are the RSCs using?

15:00 **COFFEE/TEA BREAK**

15:20 Session 2 continued and wrap-up

17:30 **CLOSURE OF DAY 1**

Day 2 – Wednesday 30th September

09:00 **Session 3: Monitoring and methodological standards for eutrophication assessment**

- Assessment scales: is the generic approach in the cross-cutting paper ('national part of a subdivision' or a 'subdivision of a subregion') suitable? Beyond WFD Coastal Waters, should encompassing all waters out to median line/edge of EEZ (i.e. averaging across waters from 1nm to 200nm), mask significant eutrophication problems in nearshore areas (needing subdivisions between coastal and offshore areas (perhaps follow 12nm line to coincide with chemical status)?
- Aggregation rules for the impact: these should distinguish impact on pelagic habitats from those on benthic habitats (or both), based on the contributing parameters/indicators used. The current Decision mixes up pelagic and benthic impacts between 5.2 and 5.3 by focusing on process (direct/indirect effects). Criterion 5.2 is largely pelagic (only 5.2.3 is a benthic assessment), whilst 5.3 could be considered largely benthic. Can the indicators and aggregation process be oriented towards assessing if there is impact per ecosystem element (pelagic or benthic)?
- Initial screening procedure (risk-based management approach) to identify non-problem areas (what criteria?)

10:30 **COFFEE/TEA BREAK**

11:00 Session 3 continued and wrap-up

12:30 **LUNCH BREAK**

13:30 Session 4: drafting items to be included in the Commission Decision revision, recommendations for further guidance documents, slides for next WG GES

The workshop should focus on providing clear recommendations that can be used in a revised Decision. We need to know what can be specified in the Decision (EU-wide) and what should be specified at (sub)regional level (because of varying ecosystem and geomorphological characteristics) – can the latter be guided by common principles?

Cross-cutting issues:

- Use of D5 assessment for D1/D6. The outcomes of a eutrophication assessment, especially where GES is not achieved for D5, should in principle contribute to assessments under D1/D6 alongside assessments for other pressures, notably physical damage, NIS and hydrological changes. This is especially important in the Baltic where large areas are deoxygenated and need to contribute to D1/D6 seabed habitat assessments. Ideally this should be delivered as a footprint

of impact. Is this feasible, given that the assessments are for a defined area and presumably aggregate data up to the 'assessment area' scale rather than define which parts of the area are subject to the pressure and any impact? Presumably this depends on the number of stations used per area and how they are aggregated.

15:00 **COFFEE/TEA BREAK**

15:30 Workshop wrap up session continued

17:30 **END OF THE WORKSHOP**

Annex II: List of participants

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Annex III: HELCOM's and OSPAR's approaches for GES-boundaries/assessment threshold setting approaches and determination of eutrophication status

HELCOM:

In Baltic Sea open areas, eutrophication is assessed by HELCOM through a quantitative multi-indicator approach (HELCOM 2014⁷). Overall eutrophication status is determined using an aggregation tool (HEAT 3.0) for combining information on present levels and GES boundaries of commonly agreed core indicators. The set of indicators as well as the aggregation tool have been adjusted to express the criteria and indicators set by 2010/477/EU. The present GES-boundaries of the core indicators (DIN, DIP, chlorophyll-a, Secchi depth and Oxygen debt) have been established through data mining and/or modelling, with subsequent expert review, and were accepted by the HELCOM Heads of Delegation in 2013, and will be subject to regular review in order to fulfil the requirements of adaptive management. In the coastal areas, eutrophication is assessed using information reported through the WFD by the contracting parties being also EU member states. In the previous assessment, the ecological status of coastal waters was used directly, but in order to increase harmony between coastal and open sea assessments, the following assessment will be done though using WFD indicators in the HEAT 3.0 aggregation tool.

OSPAR:

The OSPAR Eutrophication Strategy (OSPAR Agreement 2010-03⁸) requires assessment of eutrophication to be based on the ecological consequences of nutrient enrichment and not just on nutrient enrichment alone, i.e. finding reliable evidence for accelerated growth of algae and macrophytes caused by anthropogenic nutrient enrichment, leading to undesirable disturbance. To enable a harmonised assessment of the eutrophication status of maritime waters throughout the Convention area, a conceptual framework was developed for the Comprehensive Procedure consisting of a set of cause-effect related assessment criteria that are linked to form a holistic assessment (Figure 1). The holistic approach is reflected in the selection and application of such common assessment criteria. Once inter-linked the criteria reflect the main cause/effect relationships in the eutrophication process (OSPAR Agreement 2013-0⁹). The individual assessment outcome of any one of the harmonised criteria does not diagnose eutrophication by itself.

⁷ HELCOM, 2014. Eutrophication status of the Baltic Sea 2007-2011 - A concise thematic assessment. Baltic Sea Environment Proceedings No. 143

⁸ OSPAR Agreement 2010-03. The North-East Atlantic Environment Strategy. Strategy of the OSPAR Commission for the Protection of the Marine Environment of the North-East Atlantic 2010-2020

⁹ OSPAR Agreement 2013-08. Common Procedure for the Identification of the Eutrophication Status of the OSPAR Maritime Area. Supersedes Agreements 1997-11, 2002-20 and 2005-3

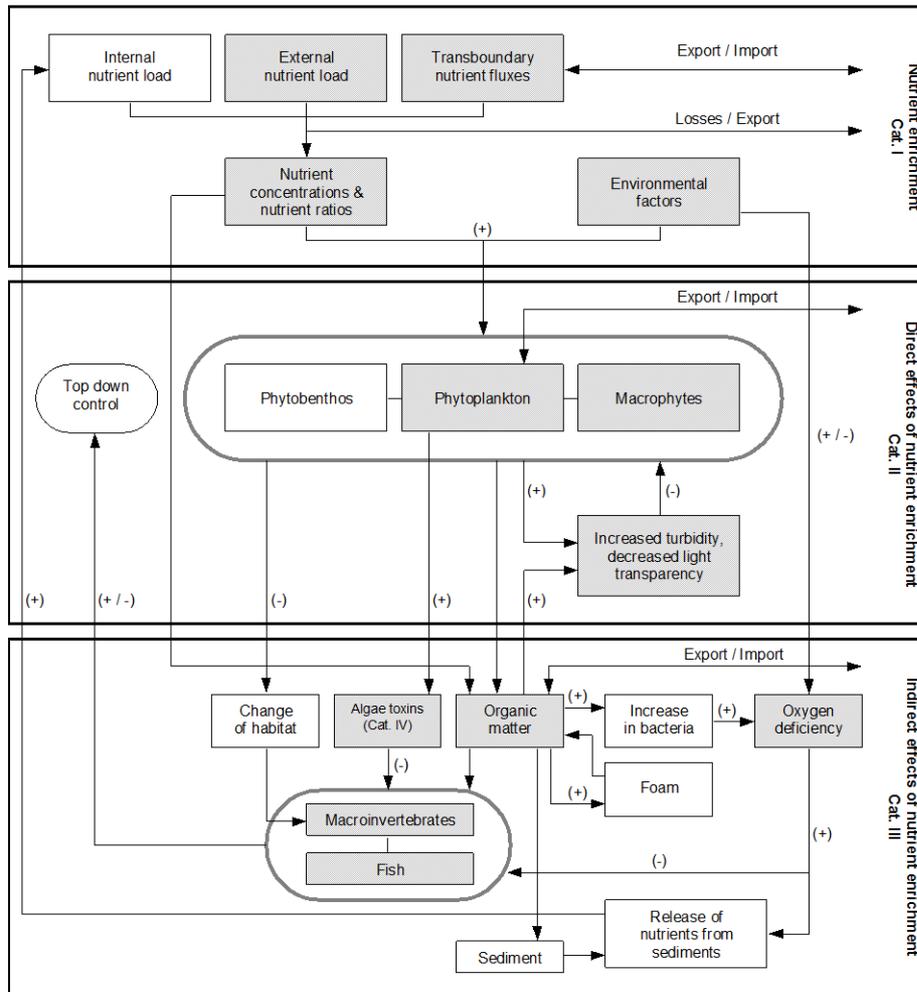


Figure 1. Generic conceptual framework to assess eutrophication in all categories of surface waters illustrating the main cause/effect linkages

Note: Shaded boxes indicate components relevant for the Comprehensive Procedure.

'+' indicate enhancement; '-' indicate reduction;

Cat. I = Category I. Degree of nutrient enrichment (causative factors);

Cat. II = Category II. Direct effects of nutrient enrichment;

Cat. III = Category III. Indirect effects of nutrient enrichment;

Cat. IV = Category IV. Other possible effects of nutrient enrichment

Assessment thresholds

Assessment areas are differentiated according to their salinity into offshore, coastal and estuarine waters. Further ecosystem characteristics, including environmental supporting factors can be taken into account. Area-specific assessment thresholds are defined as in Table 1. In order to allow for natural variability in concentrations, the assessment level is defined as a justified area-specific percentage deviation from background not exceeding 50%.

Table 1: Harmonised assessment parameters and related elevated levels

Assessment parameters	
Category I	<p>Degree of nutrient enrichment</p> <p>1 Riverine inputs and direct discharges (area-specific) Elevated inputs and/or increased trends of total N and total P (compared with previous years)</p>
	<p>2 Nutrient concentrations (area-specific) Elevated level(s) of winter DIN and/or DIP</p>
	<p>3 N/P ratio (area-specific) Elevated winter N/P ratio (Redfield N/P = 16)</p>
Category II	<p>Direct effects of nutrient enrichment (during growing season)</p> <p>1 Chlorophyll <i>a</i> concentration (area-specific) Elevated maximum, mean and/or 90 percentile level</p>
	<p>2 Phytoplankton indicator species (area-specific) Elevated levels of nuisance/toxic phytoplankton indicator species (and increased duration of blooms)</p>
	<p>3 Macrophytes including macroalgae (area-specific) Shift from long-lived to short-lived nuisance species (e.g. <i>Ulva</i>). Elevated levels (biomass or area covered) especially of opportunistic green macroalgae</p>
Category III	<p>Indirect effects of nutrient enrichment (during growing season)</p> <p>1 Oxygen deficiency Decreased levels (< 2 mg/l: acute toxicity; 2 - 6 mg/l: deficiency) and lowered % oxygen saturation</p>
	<p>2 Zoobenthos and fish Kills (in relation to oxygen deficiency and/or toxic algae) Long-term area-specific changes in zoobenthos biomass and species composition</p>
	<p>3 Organic carbon/organic matter (area-specific) Elevated levels (in relation to III.1) (relevant in sedimentation areas)</p>
Category IV	<p>Other possible effects of nutrient enrichment (during growing season)</p> <p>1 Algal toxins Incidence of DSP/PSP mussel infection events (related to II.2)</p>

For each parameter listed in Table 1 an assessment level has been developed, based on levels of increased concentrations and trends as well as on shifts, changes or occurrence. For example, for nutrient inputs insight is needed into both, increased concentrations and an examination of trends. For concentrations, assessment levels are defined in general terms, as a certain percentage above an area-specific background concentration, reflecting natural variability and allowing for a 'slight disturbance' as is also the case for assessment under the Water Framework Directive. The background concentration is defined, in general, as salinity-related and/or specific to a particular area, and has been derived from data relating to a particular (usually offshore) area or from historic data.

Criteria found at levels above the assessment threshold are considered as "elevated levels" and entail scoring of the relevant parameter category as (+). The scores are collated for each Category and an appraisal of all relevant information concerning the harmonised assessment criteria, their respective assessment levels and the supporting environmental factors is been made in order to provide a sufficiently sound and transparent account of the reasons for giving a particular status of Non-Problem, Problem or Potential Problem to an area. Eutrophication is diagnosed if there is evidence for all of the steps shown in Figure 2 and of causal links between them (ECJ 2009¹⁰).

¹⁰ ECJ 2009. European Court of Justice ruling of 10 December 2009 Case C-390/09 Commission v United Kingdom and Northern Ireland. European Court Report I-0000

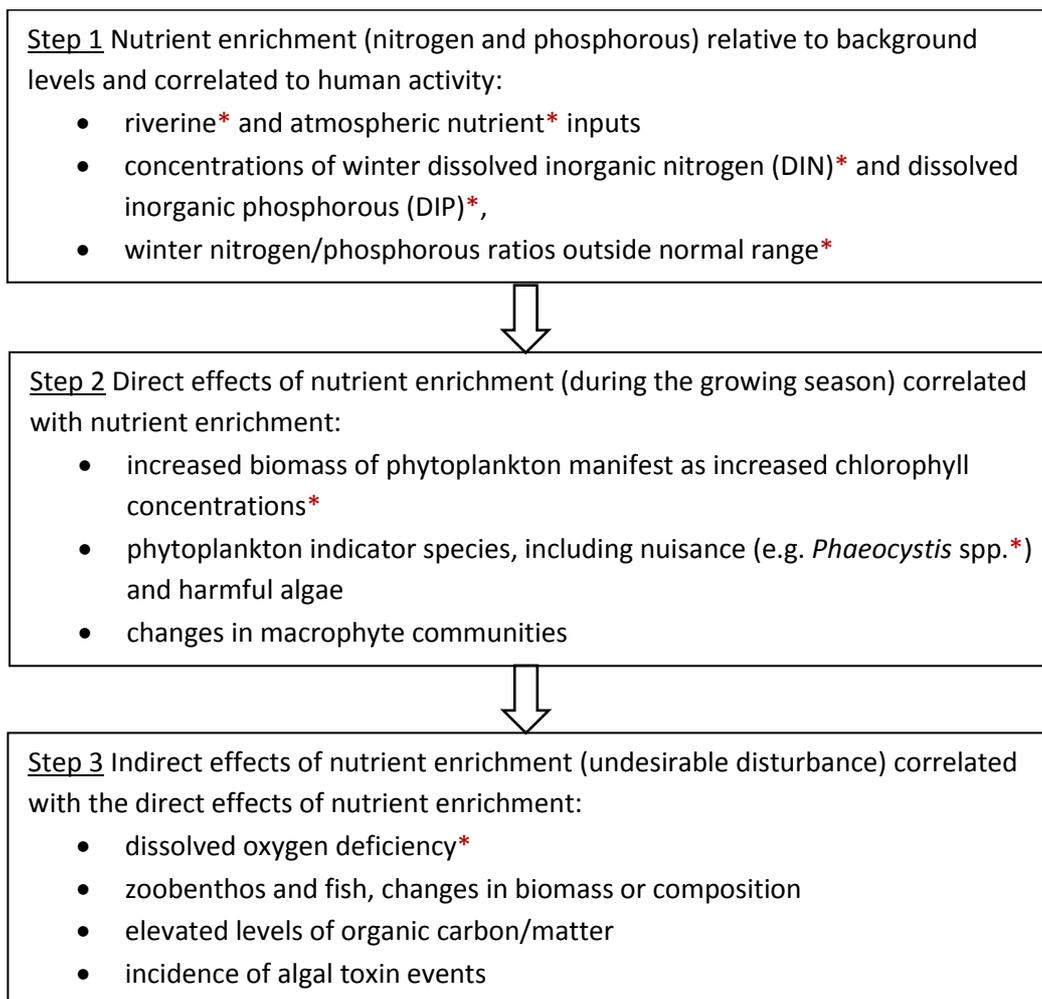


Figure 2: Steps in the identification of eutrophication. The criteria marked* are common indicators for the OSPAR Intermediate Assessment 2017

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