



ECOSTAT Classification Workshop

29- 30 May 2018 - Tallinn

Summary Report on Hydromorphology

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Contents

1	Aims of the workshop	4
2	Plenary: Introductory session.....	4
3	Group discussions on Hydromorphology.....	5
4	Plenary session: Conclusions & next steps.....	10
	Annex I: Workshop Agenda	12

1 Aims of the workshop

The aim of the ECOSTAT Classification workshop with respect to hydromorphology is to facilitate a better common understanding on the use of hydromorphological quality elements for the overall assessment of ecological status and potential. This is part of a wider work item on classification in the ECOSTAT work programme focusing on the linkage between supporting and biological quality elements (BQEs). It also aims to specifically contribute to planned activities outlined in the Terms of Reference of the Ad-hoc Task Group on Hydromorphology.

The aims of this workshop are to

- discuss challenges related to indicating hydromorphological pressures by BQE methods and possible good practices already in place in the Member States;
- discuss possible ways of aligning supportive hydromorphological QE assessment with BQE assessment to classify the ecological status.

Prior to the workshop, a background paper was prepared and circulated to participants providing background information to the topic and suggesting questions for discussion. The background paper is available on CIRCABC at:

<https://circabc.europa.eu/sd/a/57aa5ad6-88af-4c73-97e3-ef5c73d20c5d/Ecological%20Classification%20Workshop%20discussion%20paper%20-%20Hydromorphology.pdf>

This document presents the main discussions that occurred during the workshop plenary and breakout sessions. The Annex presents the workshop agenda.

2 Plenary: Introductory session

Introductory presentations to set the context and aims for the workshop covered the following issues:

- Use of BQEs and supporting elements in water body classification: information from the 2nd RBMP reporting, presented by Anne Lyeche Solheim (on behalf of the EEA)
- BQE methods and their sensitivity to pressures, presented by Sandra Poikane (JRC)
- Hydromorphology – methods, links with BQEs, use for classification, issues, presented by Martina Bussetini (IT)
- Nutrients – methods, links with BQEs, use for classification, issues, presented by Martyn Kelly
- Coastal/Transitional waters, presented by Fuensanta Salas Herrero (JRC)
- River basin specific pollutants – methods, links with BQEs, use for classification, issues, presented by Wouter van de Bund (JRC)

All presentations are available on CIRCABC at:

<https://circabc.europa.eu/w/browse/088a6446-6a3a-48c2-a559-c1efb1f0e013>

Plenary discussions addressed mainly the following:

- **Ecological status and potential in the EU summary presentations based on the WISE reporting:** It was noted that ecological status and ecological potential are combined in all the EU summary graphs presented as part of the EEA analysis from the 2nd RBMP reporting. However, the WFD requires different colour codings for status and potential, it is therefore not considered correct to mix ecological status and potential in the presentations. For future discussions within ECOSTAT, especially related to classification issues and hydromorphology, it would be useful to have EU graphs separate for natural and HMWB/AWB. It was noted that HMWB are still a minority compared to natural water bodies, but nonetheless, separate

graphs for natural and HMWB can easily be created in the WFD visualisation tool (use of filters).

- **EQS values and links to biology:** It needs to be decided whether ECOSTAT or the Working Group on Chemicals should address the issue of EQS and links of chemical status to ecological status in their next mandates. Furthermore, the lack of comparability of river basin specific pollutants between Member States is potentially a serious issue, as some countries may be using less stringent quality standards than others.

3 Group discussions on Hydromorphology

The parallel group on Hydromorphology started off with two Member State presentations showing different ways to deal with hydromorphology in classification, links between hydromorphological alteration and BQEs:

- Hymo-sensitive biological assessment methods – Example from Austria, presented by Gisela Ofenböck (Federal Ministry for Sustainability and Tourism)
- Presentation from Sweden, presented by Katarina Vartia (Swedish Agency for Marine and Water Management). This presentation addressed hymo assessment tools in Sweden, legislative changes regarding water environment and hydropower and the Environmental Fund for Hydropower.

These presentations are available on CIRCABC at:

<https://circabc.europa.eu/w/browse/088a6446-6a3a-48c2-a559-c1efb1f0e013>

In the breakout session on hydromorphology, group participants discussed the following questions:

1. What are the main challenges in developing biological assessment methods sensitive to hydromorphology?
2. Which BQEs are used to assess the effects of hydromorphological pressures, which indicative parameters and bioassessment metrics/features of the biological community are most relevant?
3. How was the sensitivity of your BQE method(s) to hydromorphological pressures validated?
4. Has your BQE method sensitive to hydromorphology been intercalibrated successfully?
5. Is a pressure-specific BQE method for hydromorphology in place in your country? Which specific types of hydromorphological pressures are covered?
6. Do you use the same typology for biological and hydromorphological assessment in your country?
7. Do the biological reference conditions in your country sufficiently consider the biological variability at high status due to different hymo-types within a particular WFD water body type?
8. Have biological monitoring sites been selected in consideration of hydromorphological conditions/processes within WFD water body types?
9. Which hydromorphological quality elements (morphology, hydrology, continuity) relate to your national BQE methods?
10. Are your BQE methods/metrics related to different hydromorphological pressures (e.g. flow reduction, channelization, hydropeaking)?
11. How have indicators of hydromorphological QE been matched with BQEs to validate sensitivity to hydromorphological pressures?
12. Member States have defined the high hydromorphological status in different ways (see Madrid report). How were the definitions of high hydromorphological and high biological status aligned?
13. How is the hydromorphological classification used in support of the BQE assessment to classify the ecological status below the high status class?

The outcomes of the group discussions are presented below.

Overview of national BQE methods and their sensitivity to hymo pressures (first day)

The group discussions on hydromorphology started with a 'tour de table' inquiring details on the sensitivity of national BQE methods regarding hydromorphological pressures.

- The majority of countries have BQE methods that respond to general degradation and not specifically to hymo pressures (Table 1). At the same time, many countries have recently developed better systems to assess hydromorphology.
- Some countries use water body typology systems which respect hymo aspects, and some efforts have been done (or are planned) to establish linkages between BQEs and hymo.
- Some countries use hymo assessment to supplement (and correct) assessments based on biology (especially if the confidence of the biological classification is low, e.g. due to lack of biological monitoring). A comprehensive overview of Member States' practices could be gained through a questionnaire activity.

The following table 1 summarises information provided by European countries in the 'tour de table' concerning the sensitivity of national BQE methods with regard to hydromorphological pressures.

Table 1: Overview of BQE method sensitivities, including consideration of hymo in method-validation and water body typology in 20 European countries

Country	Pressure-sensitivity of BQE assessment methods	Hymo-sensitivity validated?	Validated BQE	Hymo assessment method	Typology considering hymo aspects?
Austria	General degradation (incl. hymo)	Yes	Benthic invertebrates, fish fauna	In place (5 classes)	Yes
Cyprus	General degradation (incl. hymo)	Yes	Benthic invertebrates	In development	Yes (flow regime)
Croatia	Tools in development			In development	
Denmark	General degradation	No	--	In development	No (except soft bottom rivers)
Estonia	General degradation (incl. hymo)	No	--	In place	No
Finland	General degradation (incl. hymo)	No	--	In place (5 classes)	No
France	General degradation (incl. hymo)	Yes	Benthic invertebrates, fish fauna. Development of biological diagnostic tools to establish the sensitivity of biological metrics to certain hydromorphological pressures	In place (5 classes of risk of alteration (probabilities))	Yes (typology of rivers)
Germany	General degradation (incl. hymo)	Yes	Benthic invertebrates, fish fauna	In place (5/7 classes)	Yes
Hungary	General degradation (incl. hymo)	No	--	In place (5 classes)	No (?)
Ireland	Pollution	No	--	In development (5 classes)	No
Italy	Nutrients	No	--	In place (5 classes)	Yes
Luxembourg	General degradation (incl. hymo)	No	--	In place (5 classes)	No
Netherlands	General degradation (incl. hymo)	Yes	Fish fauna, benthic invertebrates,	In place	Yes (?)

Norway	Pollution	No	--	Physical criteria for risk assessment	No
Poland	Hydromorphology	Yes	Fish fauna	In place	Yes
Portugal	General degradation (incl. hymo)	Yes	Fish fauna, benthic invertebrates	The present assessment method is going to be revised	No
Romania	General degradation (incl. hymo) ¹	No ²	--	In place (5 classes)	Yes
Slovakia	General degradation (incl. hymo)	Yes	Benthic invertebrates, fish fauna	In place	Yes
Slovenia	General degradation (incl. hymo)	Yes	Benthic invertebrates	In place (5 classes)	Yes
Spain	Pollution, mainly nutrients	No	--	In place	Yes
Sweden	General degradation (incl. hymo)	Yes	Fish fauna (rivers), macrophytes (lakes)	In place (5 classes)	Yes
United Kingdom	???	???	???	In place	Yes

Note 1: Table illustrates information on European countries which attended the discussion group on Hydromorphology; therefore it does not cover EU-28.

Note 2: It is noted that concerning the column of the table "Hymo-sensitivity validated?", validation criteria have not been commonly defined/agreed upon.

- The discussions showed that BQE methods sensitive to hymo pressures are indispensable for determining the hymo mitigation efforts towards good ecological status. Hymo-sensitive BQE methods are also in the interest of the 'license owner' (e.g. in case of hydropower activities) obliged to mitigate, because they provide the baseline for the necessary extent of mitigation action and thus avoid any over-acting.
- To address hydromorphological pressures, the site of biological monitoring needs to be properly located to detect the effects of the hydromorphological pressure.
- Member States often have established BQE-specific river typologies to account for different habitat requirements of the BQEs when defining reference conditions. Such typologies provide a good basis for establishing BQE methods sensitive to hymo pressures, if hydromorphological river characteristics have been considered. Site-specific biological assessment as applied by several countries serves the same purpose, if hydromorphological river characteristics have been considered.
- Amending river typologies and water body delineations to consider hymo characteristics seems to contradict the current trend in Member States to reduce the overall number of water bodies in support of a more economic monitoring. However, establishing hymo-sensitive BQE methods requires such amendments to river typologies and water body delineations. Instead of reducing the number of water bodies, more economic monitoring can be gained, for instance, via the grouping of water bodies based on a sound understanding of pressure-impact relationships: If the biological monitoring in a set of few water bodies with similar hymo pressures/ alterations leads to the same result (status class), then this biological result can also be transferred to other water bodies which are impacted by similar hymo pressures/ alterations and thus do not need to be monitored. It is noted though that grouping (and reducing monitoring efforts) can be applied only if the pressure analysis has been done properly with appropriate level of detail.

¹ Methods intercalibrated for BQEs sensitive to hymo pressures.

² On most of the water bodies, multiple pressures are acting, making it difficult to specifically validate the hymo-sensitivity.

- Several countries conduct 'plausibility checks' or 'weight-of-evidence' approaches when classifying the ecological water body status. These procedures are not mere (and thus intransparent) 'expert judgements' but are built upon lines of arguments providing a clear rationale for the classification. This has proven to be very useful in communicating to stakeholders especially when the classification case is less obvious. For instance, if BQE fish is 'good' but the hygro classification is 'moderate', the condition of the tributaries should be considered (e.g. whether spawning grounds are available), which may result in classifying good ecological status (despite the moderate hygro class).

Aligning the hydromorphological with the biological classifications (second day)

Focal point in the session discussions of the second day was the use of the hydromorphological quality elements in the ecological classification of good and moderate status.

- It was discussed if and how the hydromorphological classification of a water body shall influence its overall classification of ecological status. The workshop participants acknowledged this issue, and most agreed that the hydromorphological classification should be considered in the ecological status classification of a water body, as already practiced by many Member States. Yet, a harmonized approach in doing so is pending.
- The following scheme was envisaged during the workshop, proposing a procedure on how to integrate the hydromorphological assessment into ecological status classification. The main features of this proposal are geared to the CIS guidance no. 13 "Overall approach to the classification of ecological status and ecological potential" (2003), suggesting the adoption of an approach similar to that used for the supporting physico-chemical quality elements in ecological status classification.

Hydromorphological quality elements in the ecological classification of good and moderate status

- Most Member States have established at least three classes of hydromorphological status: High status and 'not high' status as prescribed by WFD Annex V; good status and 'worse than good' status in the pressure analysis of hydromorphological conditions. As already highlighted in the Madrid workshop on river hydromorphological assessment methods (November, 2017), many Member States have in fact five-class methods available for hydromorphology. However, in most countries the link between hydromorphological classes and BQEs has not been assessed.
- The use of hydromorphological assessment to support classification of status beyond high/good is also important for determining deterioration in potential exemption cases under Article 4(7) on new modifications. In order to determine whether a deterioration is expected due to a new physical modification, hydromorphological assessment should allow classification even beyond the three classes of high, good and moderate.
- Having biological and hydromorphological assessment methods in place allows for classifying the biological and hydromorphological status of water bodies. With these two classifications, four cases can theoretically exist regarding the achievement of good ecological water body status (Figure 1):
 - *Case A. Biology 'good' and hydromorphology 'good':*
The water body is in good ecological status (provided that the general physico-chemical and specific pollutants are in at least good status).
 - *Case B. Biology 'not good' and hydromorphology 'not good':*
The water body is not in good ecological status. "Clear-cut" situations of poor or bad hydromorphological status (e.g. very low residual flow, complete concrete channelization of river bed) represent biological 'knock-out' criteria and may not require biological

cal monitoring to confirm the ecological status being moderate or worse.³ A standardized list of such biological knock-out criteria (for rivers but also for lakes, coastal and transitional waters) could be developed to support more harmonized classification across Member States.

- *Case C. Biology 'not good' and hydromorphology 'good':*
In most cases this will be caused by other pressures than hydromorphology conditioning the ecological status.
- *Case D. Biology 'good' and hydromorphology 'not good':*
This case relates to the pertinent discussion on many biological classifications currently being insensitive to the effects of hydromorphological pressures. Three options were discussed to deal with this case:
 - (i) No ecological status classification of the water body (unclassified water body),
 - (ii) keeping the good status or
 - (iii) downgrading from good to moderate status.

Irrespective of the option chosen, this classification mismatch is indicative of a low level of confidence in classification and should initiate a “checking procedure” as described in the CIS guidance no.13 for the physico-chemical classification.

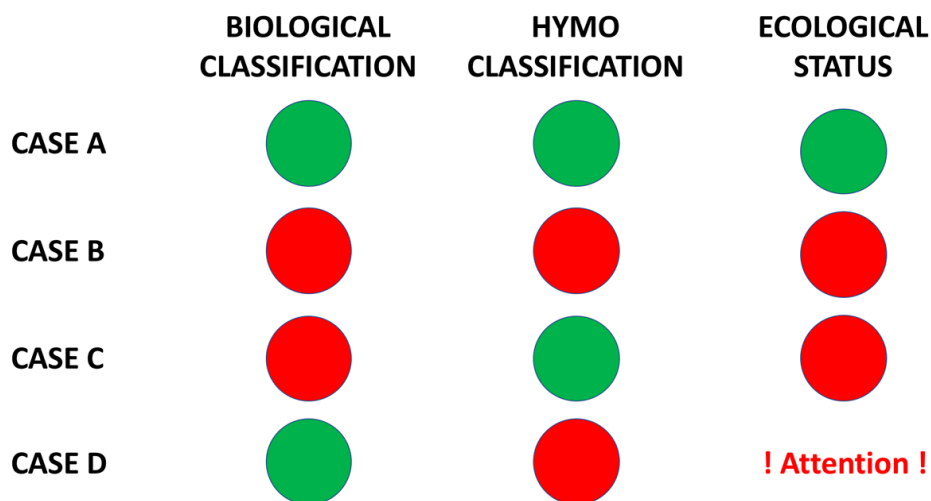


Figure 1: Four possible cases of classifying the ecological water body status based on biological and hydromorphological classifications. The mis-classification of ‘Case D’ requires specific attention in ecological status assessment. Colour code: Green – “good status”; Red – “not good status”.

- The “checking procedure” was introduced in Chapter 4 of the CIS classification guidance no.13 on the role of the general physico-chemical quality elements in the ecological classification of good and moderate status/potential. This procedure comes into play when the biological and the physico-chemical classifications do not match (i.e. similar to above mentioned Case D). The procedure includes first to check whether the classification mismatch is ‘real’ or

³ In this context, “clear-cut” situations mean a kind of “grouping” as the degree of biological impact has already been proven by monitoring of many similar cases in the past.

merely due to uncertainty caused, for instance, by temporary alterations due to unusual natural conditions (e.g. prolonged droughts or flooding) or by low statistical confidence (e.g. due to low sample sizes). Then the sensitivity of the BQE method to the pressure is scrutinized, with the long-term commitment (“through the river basin planning cycles”) of improving the method, if necessary. Delayed biological response may be another reason for the classification mismatch. If the two latter points do not apply, a revision of the physico-chemical classification is indicated⁴.

- Extending this principle of the classification guidance no.13 to the supporting hydromorphological quality elements allows for establishing a more harmonized approach linking the hydromorphological with the biological classification. Since Member States have defined hydromorphological criteria to identify water bodies at risk of not achieving the good ecological status, a threshold resembling the boundary between good and moderate hydromorphological status is available in each Member State. Aligning this hydromorphological classification with the biological assessment according to the checking procedure outlined above would (i) guarantee full consideration of the impact of hydromorphological pressures in ecological status classification, and (ii) promote the consolidation of the two classifications (biological and hydromorphological) towards harmonized, holistic schemes of ecological status.
- The application of the “checking procedure” is proposed for the short-term implementation in the next river basin planning cycle. By using this approach, countries can use their existing intercalibrated biological methods and combine them with their hymo assessment methods to support classification.
- In cases where the biology is assessed as ‘good’ and hydromorphology as ‘less than good’ and Member States opt for keeping the good status as classification outcome, consideration of the non-deterioration principle is needed. In the next river basin planning cycle, such a water body may be downgraded from good to moderate status, on the basis of improved assessment methods. Such change of status may require detailed justifications due to the WFD non-deterioration principle.
- Ultimately, in the medium/long-term, the goal should be to develop biological metrics sensitive to hydromorphology. The national BQE methods need to be improved regarding their sensitivity to hydromorphological pressures, as the ecological status classification should primarily be based on biological assessment and merely supplemented by the supportive quality elements. Such improvements may, among others, encompass changes in river typology and water body delineation, as well as in locating the representative monitoring sites or selecting sensitive biological metrics. A catalogue of criteria (check-list) to improve the biological assessment methods with regard to hydromorphological pressure indication would help Member States in moving forward with such actions.

4 Plenary session: Conclusions & next steps

In the final session of the workshop, the following presentations took place:

- Reporting back from the group discussions on Hydromorphology, Nutrients and Coastal and Transitional Waters
- Multiple pressures and classification: Presentation of the MARS project, presented by Sebastian Birk (UDE)

⁴ In view of recent scientific evidence (e.g. EU MARS project) mismatches may result from antagonistic effects when multiple pressures are acting. For instance, river channelization can dampen the effects of nutrient enrichment due to better aeration through turbulent flows. Such interactive effects need to be considered in any revision of the checking procedure.

These presentations are available on CIRCABC at:

<https://circabc.europa.eu/w/browse/088a6446-6a3a-48c2-a559-c1efb1f0e013>

The following next steps were outlined when closing the workshop:

- The conclusions of the ECOSTAT Classification Workshop will be finalized in time for the next ECOSTAT meeting in October 2018.
- The next steps for the CIS work programme will be addressed in the context of the ECOSTAT Working Group:
 - o The nutrients discussion group already made specific recommendations for follow-up activities.
 - o Also in the hydromorphology discussion group, proposals for further activities have been formulated, e.g. further work on the use of BQEs in combination with hydromorphology in a consolidated paper, establishment of criteria (check-list) for BQE sensitivity, biological knock-out criteria for classification, and option of revising the CIS classification guidance no.13 with regard to the links of BQEs to hydromorphology. In the long term, ECOSTAT should continue work on developing better BQE methods to solve problem of the lack of sensitivity to hydro pressures.
 - o Group on transitional and coastal waters will also develop recommendations for future work as follow-up to this workshop.

Annex I: Workshop Agenda

ECOSTAT Classification Workshop

29-30 May 2018

Park Inn by Radisson Meriton Conference & Spa Hotel,
Tallinn, Estonia

Draft Agenda

<i>Tuesday 29 May 2018</i>		
Time	Presentation	Speaker
8:30 – 9:00	Registration	
9:00 – 9:10	Welcome/Introduction to the workshop	
9:10-9:55	Use of BQEs and supporting elements in water body classification: information from the 2 nd RBMP reporting	EEA
9:55-10:30	BQE methods and their sensitivity to pressures	Sandra Poikane (JRC)
10:30-11:00	<i>Coffee break</i>	
11:00-11:30	Hydromorphology – methods, links with BQEs, use for classification, issues	Martina Bussetini (IT)
11:30-12:00	Nutrients – methods, links with BQEs, use for classification, issues	Martyn Kelly
12:00-12:30	Coastal/Transitional waters	Fuensanta Salas Herrero (JRC)
12:30-12:45	River basin specific pollutants – methods, links with BQEs, use for classification, issues	Wouter van de Bund (JRC)
12:45-14:10	<i>Lunch</i>	
14:10-14:20	Introduction to breakout groups / questions / expected outcome	
14:20-17:00	Breakout groups	
	<p style="text-align: center;">Group 1: Hydromorphology:</p> <p>Including MS presentations showing different ways to deal with hydromorphology in classification, links between hydromorphological alteration and BQEs:</p> <ul style="list-style-type: none"> • Austria (Gisela Ofenböck, Veronika Koller-Kreimel) • Sweden (Katarina Vartia) • UK-Scotland (SEPA tbc) • Others tbc 	

	Group 2: Nutrients:
	The Nutrients group will discuss the use of nutrients and other physico-chemical elements in the classification of ecological status. Different strategies of the use of nutrients will be discussed related to the relationships between these supporting elements and BQEs
	Group 3: Coastal and Transitional waters
	The Trac group will discuss: <ul style="list-style-type: none"> • the availability of methods for the assessment of hydromorphology and nutrients • the relationships between these supporting elements and BQEs, • the use of supporting elements and BQEs in the classification of ecological status <p>On Tuesday afternoon discussions will focus on hydromorphology, Wednesday morning on nutrients.</p>
17:00	<i>End of day 1</i>

<i>Wednesday 30 May 2018</i>		
9:00-10:30	Breakout groups (continued)	
10:30-11:00	<i>Coffee break</i>	
11:00-12:30	Breakout groups (continued)	
12:30-14:00	<i>Lunch</i>	
Time	Presentation	Speaker
14:00-15:00	Reporting back on breakout group discussions and conclusions <ul style="list-style-type: none"> • Hydromorphology • Nutrients • Coastal and Transitional Waters 	Rapporteurs on Hymo, Nutrients, Trac
15:00-15:45	Multiple pressures and classification <ul style="list-style-type: none"> • Presentation MARS project • Discussion 	Sebastian Birk, UDE
15:45-16:15	Wrap-up conclusions & Next steps	
16:15	<i>End of the workshop</i>	

