



Document title	Proposal to revise the “Guidelines for waterborne pollution inputs to the Baltic Sea” by including a more specific description of possible methods to quantify natural background losses
Code	4-1
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Reference	

Background

According to the HELCOM Guidelines for Waterborne pollution inputs to the Baltic Sea information on “...natural background (nutrient) losses into inland surface waters within the Baltic Sea catchment area located within the borders of the Contracting Parties...” need to be reported periodically (every six years). Contracting Parties are obliged to quantify and report natural background losses separately for monitored and unmonitored catchment areas as part of the source-oriented approach. The definition of “natural background losses” in the HELCOM PLC guidelines is rather vague. Hence, different methodologies are applied by Contracting Parties to determine natural background losses, leading to a wide spread of natural background emissions reported by Contracting Parties in PLC-6 and PLC-7 (see PLC-6: <http://www.helcom.fi/Lists/Publications/BSEP153.pdf>).

The use of different methods to quantify natural background losses of nutrients has led to a discussion on the need for regional harmonization of methods to identify natural background. WG PRESSURE 11, based on a recommendation by the workshop with river basin management authorities (RBMA) that took place in Riga, Latvia, on 18-20 September 2019, suggested to strengthen the effort to develop harmonized methods for the estimation of natural background losses of nutrients. PLC-7 IG7-2019 considered a draft overview of the methodologies used in the HELCOM countries to identify background losses of nutrients presented by Germany and invited national experts to verify reported information where it's needed (document 4.2 PLC-7 IG 7-2019). The Meeting concluded that the overview of the methodologies is a starting point to update relevant sections of the PLC water guideline. Germany presented a revised draft of the Guidelines for waterborne pollution inputs to the Baltic Sea by including a more specific description of possible methods to quantify natural background losses during the PLC-7 IG 9-2019 (document 4.5 PLC-7 IG 9-2019). The Meeting take note of the proposal of Germany and requested that the description of the natural background should be referred to the WFD Reference Conditions.

The purpose of this document is to propose to the meeting a revision of the “Guidelines for waterborne pollution inputs to the Baltic Sea” by including a more specific description of possible methods to quantify natural background losses. The aim is to harmonize the natural background losses reported by the different Contracting Parties for the upcoming periodic assessment of PLC-8 and to make the reported data comparable. This is essential also in the context of assuming that natural background losses constitute the part of the nutrient load that cannot be reduced by taking measures.

Action requested

The meeting is invited to take note and discuss the proposed by Germany textual revisions to harmonize the quantification/estimation of natural background losses in the “Guidelines for waterborne pollution inputs to the Baltic Sea”.

The meeting is invited to decide whether to include the proposed revisions in the “Guidelines for waterborne pollution inputs to the Baltic Sea”.

Document

References:

SCHÖPP W., M. POSCH, S. MYLONA & M. JOHANSSON (2003): "*Long-term development of acid deposition (1880–2030) in sensitive freshwater regions in Europe*", Hydrol. and Earth. Syst. Sci., 7 (4): 436–446

- Draft -

6. Quantifying diffuse losses of nutrients

Diffuse sources of nutrients are defined as any source of nutrients not accounted for as a point source. Within the periodic PLC-Water, quantifications of background nutrient losses and major diffuse anthropogenic nutrient losses to inland surface waters and to the sea are required (Chapter 14). In the annual reporting, the diffuse inputs are included in the total inputs from monitored rivers and unmonitored areas (cf. Chapter 13).

6.1. Quantification of background nutrient losses

The Contracting Parties may choose between two different approaches when defining background nutrient losses:

- approach 1 - natural background losses of nutrients
- approach 2 - nutrient inputs under WFD Reference Conditions.

When reporting on background nutrient losses the chosen approach must be reported.

The definitions for the different approaches to quantifying background losses are as follows:

- Approach 1 - Natural background is defined as losses of nutrients that would occur from areas if they were in pristine conditions i.e. unaffected by human activities
- Approach 2 - Nutrient inputs under Reference Conditions is defined as losses of nutrient that would occur from areas if they were in Reference Conditions¹² as defined by the WFD in the Common Implementation Strategy for the Water Framework Directive (2000/60/EC) section 4.1.1 and 4.1.2.

To visualize the two approaches, see figure 1 below

Commented [LMS1]: I would very much prefer that we include the definition in the guideline. I have now spent more than 1 hour – and did not find the definition in the reference. Also not all HELCOM CP are member of EU.

But as I understand reference condition it is:
«WFD defines the reference condition for an ecological system as the condition that prevails in the absence or near absence of human disturbance»
-And actually I am not sure there is a definition of reference conditions not related to ecological systems – and talking about natural background losses is not based on/coupled to ecological conditions

Commented [MJ2R1]: Germany is following approach 1 and we do not see a need for approach 2, but it was requested at the PLC-Meeting to refer to WFD Reference Conditions.

¹ The reference condition is a description of the biological quality elements that exist, or would exist, at high status. That is, with no, or very minor disturbance from human activities. The objective of setting reference condition standards is to enable the assessment of ecological quality against these standards.

² **Annex II 1.3 (i)**

“Type specific biological reference conditions shall be established, representing the values of the biological quality elements” ... “for that surface water body type at high ecological status”.

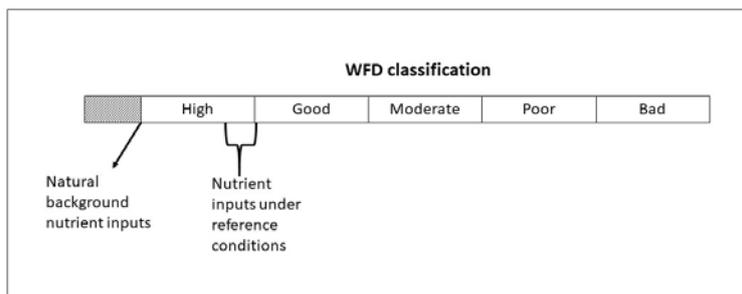


Figure 1. WFD classification and in which part of the WFD classification “Natural background nutrient inputs” and “Nutrient inputs under reference conditions” are placed

Procedures for the periodic quantification of natural nitrogen and phosphorous background losses or nitrogen and phosphorous inputs under Reference Conditions into inland surface waters are described below.

Natural nutrient background losses or nutrient inputs under Reference Conditions need to be quantified for the entire national Baltic Sea catchment area and therefore cover:

- Losses from currently unmanaged land
- Losses from currently managed land that would occur irrespective of anthropogenic, e.g. agricultural, activities.

Hence, the natural background losses / nutrient inputs under Reference Conditions are a part of the total diffuse losses. The Contracting Parties can use different approaches or a combination of the approaches to quantify background nutrient losses in general:

- Use of models including estimation method, and/or
- Monitoring of small unmanaged catchment areas without or negligible inputs from point sources, and other human activities

The methods and approaches used by Contracting Parties need to be described in a background document with applied methodologies for periodic assessments

It should be taken into account that monitoring values include recent (anthropogenically influenced) atmospheric deposition both on lands and on water surfaces. For this reason, and because unmanaged catchment areas nowadays hardly occur, it is preferable to estimate background losses by modelling.

When background losses are estimated by models the following suggestions are given for the different approaches

Commented [LMS3]: Denmark will not be able to support this assumption/statement. And if we cant find such conditions today how will you be able to validate models whitout data?

Commented [MJ4R3]: We prefer modelling because there are no current reference sites in the battic sea catchment area that represent natural background. Models are validated with recent conditions.

Approach 1 – Natural background losses:

Model assumptions	Description of the assumption
Point sources, urban sources	Do not occur/negligeable
Population	none/negligeable
Landuse	entirely forested
Water surfaces	remain unchanged. Reservoirs, drainage ditches and river straightening remains unchanged
N-balance surplus	Not applicable and irrelevant as no agricultural land is accepted
N-deposition	5 kg/ha/yr, status 1880 according to Schöpp et al. (2003), Hofmann et al. (2005)
P-deposition	For the P-deposition a background value of 0.05 kg/ha/yr (Schöpp et al. 2003)
P-accumulation	150 kg/ha/yr according to Behrend et al. (1999)
N-content in the top soil	0.025% according to Hofmann et al. (2005) and Topcu (2011)
Soil erosion	negligibly small
TP-concentration in the groundwater	0.02 mg/l among all locations according to Hofmann et al. (2005) and Topcu (2011)
Drainage	Does not occur, Peatland intact
Dissolved organic nitrogen	Forest: 0.5 mg/l and wetlands: 2.5 mg/l (Vehnor et al. 2011)

Commented [LMS5]: I think we need an indication why the parametres in the table is chosen – is it related to a certain model or inputs that should be indcluded in all models?

Commented [LMS6]: Not necessarily – I should be unmanaged are with natural vegetation, but it could be meadowland, natural open grassland, scrubs – low vegetation – any kinf you would find with being manged and affected bu human. If we state only forested we actually risk to overestimate nitrogen losses

Commented [LMS7]: Unchange or is it not change by humans – as you will have changes duw to change in weather (precipitation/draughts etc.) – and you should not used catchments with darinage ditches, reservoirs and straightned rivers – at least these should be decades or centuries old

Commented [MJ8R7]: We have chosen that because of data availability

Commented [LMS9]: I don't think this is valid for the entired Baltic Sa catchment area (too high!!!) – rather 1-2 kg N/ha

Commented [LMS10]: Is this accumulation durin gflooding, in lakes or ... and in the very lon run net accumulation in the catchment will be negative as we will have a not erosion and fnet fluxe of particulated matter and nutirents to the sea

Commented [LMS11]: That is depending on where you are. In hilly and mountaneous areas it is natural with soil erosion

Commented [LMS12]: Should be further validated – and what for TN

Commented [LMS13]: ?

Commented [LMS14]: In groundwater or?

Approach 2 – Nutrient inputs under Reference Conditions:

Input	Description of the assumption
Point sources, urban sources	To reflect the assumption that inhabitants continue to live in an area but do not cause discharges, the point sources (municipal wastewater treatment plants and direct industrial dischargers) and population nutrient losses have been set to zero, but urban areas and sewerage systems are assumed to remain at the recent level.

Commented [LMS15]: Is it the physical installations that still are in use – but without any nutrient losses? A bit difficukt to understand

N-balance surplus	N-balance surplus is zero
N-deposition	N deposition is set to a background value of 5 kg/ha/yr, which corresponds to the level of 1880 (Schöpp et al. 2003)
N-content in the top soil	0.02 mg/l among all locations according to Hofmann et al. (2005) and Topcu (2011)
P-deposition	For the P-deposition a background value of 0.05 kg/ha/yr is assumed based on Schöpp et al. 2003
Drainage	All agricultural land is assumed to be non-drained, previously drained peatlands are subsequently classified as intact (reduced outputs)

Commented [LMS16]: See corresponding comment under table 1

Commented [LMS17]: This seems only relevant for ceratin models and I am convinced that the value will depend on soil type/gealogy and location in the Baltic Sea carchment area

Commented [LMS18]: What is intact?

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When background nutrient losses are estimated using monitoring data from small, unmanaged catchment areas without or with negligible inputs from point and anthropogenic diffuse sources the following suggestions are given:

- Using representative catchments in natural conditions (soils, geology, climate)
- >90% natural vegetation
- Using a representative number of catchments
- Using catchments with negligible impact from point and anthropogenic diffuse sources

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Suggestions to transfer monitoring information to the entire catchment area

Commented [LMS19]: Some text missing?

Natural background losses of nutrients were reported by the Contracting Parties. The figures given in **Table 6.1** are related to the period 1995-2017.

Table 6.1. Annual natural background losses and flow-weighted concentrations of nutrients as reported by Contracting Parties.

Country	Total Nitrogen in kg ha ⁻¹	Total Nitrogen in mg l ⁻¹	Total Phosphorus in kg ha ⁻¹	Total Phosphorus in mg l ⁻¹	Comments
Denmark		0.61-1.48		0.021-0.089	Subcatchment depending
Estonia		1.21		0.04	
Finland	0.62-2.07	0.169-0.752	0.023-0.072	0.0051-0.034	Subcatchment depending
Germany	<0.1-14 (median 0.2)		<0.001-1.4 (median 0.028)		Subcatchment depending
Latvia	2.6-10.4	0.78-2.25	<0.1-0.5	0.035-0.082	Subcatchment depending
Lithuania		0.58		0.0339	
Poland		0.96-1.9		0.04-0.11	Depending on soil and slope conditions
Sweden		0.11-2.1		0.11-0.04	Depending on different land use areas

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