



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	4-5
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Agenda Item	4 - Current activities of the PLC-7 project and coordination with other HELCOM activities including ACTION project
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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. PRESSURE 11-2019, 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 IG 7-2019 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 PLC-7 IG 7-2019, 4-2). The meeting concluded that the overview of the methodologies is a starting point to update relevant sections of the PLC-water guidelines. Germany was invited to present the final draft of the document, including classification of the applied methodologies to identify natural background and proposals for common definitions and recommendations on reporting of this information, to the PLC-water database at PLC-7 IG 9-2019.

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 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 textual revisions by Germany 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”.

- 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 natural background 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 the natural background nutrient losses

Natural background is defined as losses of nutrients that would occur areas if they were in pristine conditions i.e. unaffected by human activities.

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

Natural nutrient background losses need to be quantified for the entire national Baltic Sea catchment area and therefore cover~~Natural background losses cover:~~

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

Hence, the natural background losses are a part of the total diffuse losses. The Contracting Parties can use ~~two~~ different approaches or a combination of the approaches to estimate natural background losses:

- Monitoring of small unmanaged catchment areas without or with very minor inputs from point sources, and/or
- Use of models including estimation method

The methods used by Contracting Parties need to be described in a background document.

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

- Using representative catchments in natural conditions (soils ...), natural vegetation
- Using a representative number of catchments
- Using catchments with negligible impact from point and anthropogenic diffuse sources
- ??% of natural vegetation
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It should be taken into account that monitoring values include recent (anthropogenic influenced) atmospheric deposition both on lands and on water surfaces. For this reason, and because unmanaged catchment areas nowadays hardly occur, it preferable to estimate background losses by modelling.

Suggestions to transfer monitoring information to the entire catchment area

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When background losses are estimated by models the following suggestions are given:

Commented [UA1]: Is there a possibility to make a recommendation?

Commented [UA2]: We might need some suggestions here.

- Assumed land use should be corresponding to natural unmanaged areas,
- No impact from point sources,
- Long term average hydrological conditions should be assumed (or used discharge weighted concentrations)
- Assumed anthropogenic impact is negligible
- Assumed atmospheric deposition represents pristine conditions in case pristine conditions are not known historic estimates from the literature should be used, e.g. 5kg/ha/yr according to Schöpp et. al 2003¹ based on 1880).
- ...
- ~~implying e.g. that the prevailing atmospheric nitrogen deposition needs to be taken into consideration.~~

Natural background losses of nutrients ~~are were monitored reported in by several the Contracting Parties countries.~~ The figures given in **Table 6.1** are related to the period 1990-2000 ~~besides data from Denmark that covers 1989-2012. They are obtained from forested catchment areas and/or catchment areas with very low human impact (with the exception of the impact of atmospheric deposition).~~

Commented [UA3]: Need to be updated

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		<u>0.61-1.48</u>		<u>0.021-0.089</u>	<u>Subcatchment depending</u>
Estonia		<u>1.21</u>		<u>0.04</u>	
Finland	<u>0.62-2.07</u>	<u>0.169-0.752</u>	<u>0.023-0.072</u>	<u>0.0051-0.034</u>	<u>Subcatchment depending</u>
Germany	<u><0.1-14 (median 0.2)</u>		<u><0.001-1.4 (median 0.028)</u>		<u>Subcatchment depending</u>
Latvia	<u>2.6-10.4</u>	<u>0.78-2.25</u>	<u><0.1-0.5</u>	<u>0.035-0.082</u>	<u>Subcatchment depending</u>
Lithuania	<u>0.6-1.2</u>	<u>0.32-0.80</u>	<u>0.02-0.08</u>	<u>0.0330-0.05-0.09</u>	
Poland		<u>0.96-1.9</u>		<u>0.04-0.11</u>	<u>Depending on soil and slope conditions</u>
Sweden		<u>0.11-2.1</u>		<u>0.11-0.04</u>	<u>Depending on different land use areas</u>

¹The average of median monitored values for 24 years (1989-2012) ± 2 SE (SE is the standard error, and the expressions corresponding to the 95 % confidence interval) in seven small catchments without or with very low human activities.

²The average of median monitored values for 21 years (1989-2009) ± 2 SE in seven small catchments without or with very low human activities.

¹ 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