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Background

This document contains the first draft of the segment specific introduction for eutrophication, as prepared by the Secretariat at the request of HOD 57-2019. The first drafts for each segment are presented to the respective Working Groups for comments in autumn 2020 and then to GEAR 22-2020 and HOD 59-2020. DG BSAP 1-2020 agreed that the segment teams will start their work by reviewing the drafts of the segment-specific preambles in the autumn 2020, concomitantly with their submission to the GEAR 23-2020 meeting. The segment specific preamble on eutrophication has been submitted to PRESSURE 13-2020 to be held 13-16 October 2020 and it will be also be submitted to AGRI 10-2020 to be held on 4-5 November 2020.

HOD 58-2020 requested the DG BSAP to identify how best to incorporate the updated nutrient input reduction scheme in the updated BSAP. DG BSAP 2-2020 took note that the Secretariat has made an initial proposal on integrating parts of the nutrient input reduction scheme as part of the segment-specific preamble but further discussion on integrating the whole scheme is needed in the eutrophication segment team.

The segment team will continue working on the preamble text in spring 2021 based on the guidance from HOD.

Action requested

The Meeting is invited to take note of and comment the segment preamble for eutrophication noting the comments given by PRESSURE 13-2020.

Segment Eutrophication - A Baltic Sea unaffected by Eutrophication - continued and renewed actions to limit inputs of nutrients and organic matter

Eutrophication is a condition where high nutrient concentrations stimulate the excessive growth of primary producers and this leads to imbalanced functioning of the aquatic ecosystem. In the Baltic Sea, symptoms of eutrophication include intense algal growth, increase in oxygen consumption and oxygen deficiency. Eutrophication contributes to the depletion of oxygen on the bottom of the sea, leading to vast areas with anoxic or hypoxic conditions in the central Baltic Sea.

Contracting Parties to the Helsinki Convention have agreed on the following ecological objectives to describe the characteristics of a Baltic Sea unaffected by eutrophication:

- Concentrations of nutrients close to natural levels,
- Clear water,
- Natural level of algal blooms,
- Natural distribution and occurrence of plants and animals,
- Natural oxygen levels.

These conditions are not met in any area of the Baltic Sea today. Effects of eutrophication are seen in all parts of the Baltic Sea, with impacts in several different trophic levels of the food web. Failure to reach the objectives for eutrophication also has negative effects on the resilience of species and habitat against other pressures, and on human well-being.

Eutrophication is caused by excess inputs and levels of nitrogen and phosphorus

Nutrients reach the Baltic Sea via both water and air. Waterborne nutrient inputs come through rivers, as well as from direct point sources and diffuse runoff. The major land-based sources of waterborne inputs are agriculture, wastewater sector, industrial discharges and leakage from nutrient rich wastes. Transboundary inputs of nutrients from sources within and outside the Baltic Sea catchment area are of great importance. Airborne nutrient inputs occur mainly through ammonia and nitrogen oxides which are emitted from activities within agriculture, transport (including ship traffic in the Baltic and North seas) and the energy sector. Such human activities at sea as ship traffic (ship sewage and fertilizers transportation) and sea-based aquaculture also contribute to the total nutrient load to the Baltic Sea.

Further, as inputs of nutrients to the Baltic Sea have occurred for a long time, huge resources of phosphorus have accumulated in the bottom sediments of the Baltic Sea. The accumulated phosphorus builds up an internal load. When phosphate is released from the sediments, this contributes further to the total nutrient load on the Baltic Sea ecosystem.

Impacts of eutrophication are exacerbated by climate change and other human pressure

Climate change increases the eutrophication management challenge. An important uncertainty is the effect of changes in temperatures and precipitation on the nutrient runoff from land and the respond of marine ecosystem. The level of effect also depends on human activities for climate change mitigation and adaptation.

ACTION AREAS

The management objective of the Baltic Sea Action Plan in respect to eutrophication is to minimize human-derived inputs of nitrogen and phosphorus to the Baltic Sea. The targets for nutrient input reduction are expressed as maximum allowable inputs of nutrients. The maximum allowable inputs identify the maximal level of total water- and airborne nitrogen and phosphorus load on the Baltic Sea sub-basins. According to the latest assessment, the reduction achieved by all countries in the past two decades is 14 percent for

nitrogen and 24 percent for phosphorus. The agreed regional nutrient input targets are given in the table, by sub-basin and for the total Baltic Sea.

Baltic Sea Sub-basin	**Maximum Allowable Inputs (MAI)**	
	TN, tonnes	*TP, tonnes*
Kattegat	74,000	1,687
Danish Straits	65,998	1,601
Baltic Proper	325,000	7,360
Bothnian Sea	79,372	2,773
Bothnian Bay	57,622	2,675
Gulf of Riga	88,417	2,020
Gulf of Finland	101,800	3,600
Baltic Sea	**792,209**	**21,716**

Reductions at national level, including targets for transboundary riverine inputs and airborne inputs which can be achieved by non-HELCOM countries through implementation of various relevant regional and global policies, are described in the HELCOM nutrient input reduction scheme (Annex XXX to this segment).

Connection to other segments

Failure to reach the objectives for eutrophication will impair the achievement of a favourable status of biodiversity.

Further, reaching the environmental objectives for eutrophication can be facilitated by other BSAP management objectives, since human activities addressed in other segments contribute to achieving of the good environmental status of the Baltic Sea in respect to eutrophication. Management objectives of the Sea-based segment such as minimize contribution to eutrophication and air emissions, zero discharge from sea platforms, ensure sustainable use of the marine resources contribute to achieving eutrophication related goals. Also, nature conservation measures from the Biodiversity segment aimed at reduction of pressures that cause food web instability may interact with eutrophication. For example, impacts related to effects of overfishing can induce instabilities and reduce the resilience of the ecosystem against both eutrophication and other pressures.

Connection to other treaties

Implementation of the EU Water Framework Directive, Nitrogen Emissions Control Directive, Nitrates Directive, Urban Wastewater Treatment Directive and the Industrial Emissions Directive, as well as the Water Code and Law on Environment protection of the Russian Federation are prerequisites to the success of the Baltic Sea Action Plan. Achievement of the BSAP goals for this segment is also dependent on global regulations and targets, most importantly those set under the International Maritime Organization, the Gothenburg Protocol and the Convention on the Protection and Use of Transboundary Watercourses and International Lakes.

SDGS

The eutrophication-related goal and objectives of the Baltic Sea Action Plan contributes to target 14.1 of the UN Sustainable Development Goals 2030 - Reduce Marine Pollution.

Operative section - Further efforts to achieve the BSAP goal are needed

Description of current state

The Baltic Sea still suffers from eutrophication. There has been a slight long-term improvement in many of the assessed indicators, which reflects an improved eutrophication management. However, according to the latest thematic assessment, 96% of the region is still below good eutrophication status, including all of the open sea area and 86% of the coastal waters (assessment years 2011-2016). Further, the eutrophication status has deteriorated in four of the 17 sub-basins during more recent time, which might be attributed to temporal variability in climate and hydrography.

Inputs of nutrients have decreased significantly to almost all sub-basins. Maximum allowable inputs of both nitrogen and phosphorus have been achieved in the Bothnian Sea, the Kattegat and the Danish straits. Nonetheless, remaining reductions for the whole Baltic Sea are still 13 percent of MAI for nitrogen and 38 percent for phosphorus. The highest reduction requirements remain for the Baltic Proper.

Most of the reduction so far has been achieved through measures addressing direct point sources, such as municipal and industrial sewerage systems and wastewater treatment facilities in the coastal areas. However, riverine input is the dominating pathway for nutrients to the Baltic Sea, constituting 70 percent of the nitrogen load and 95 percent of total phosphorus load. Despite diffuse nutrient run off contributes almost 35 percent of the riverine input, a remarkable reduction potential remains for point sources in the upper parts of the river catchments, including non-HELCOM countries in the Baltic Sea watershed.

No visible reduction of diffuse loads has been achieved in the last two decades. Agriculture is the main contributor to the diffuse load of nutrients to the Baltic Sea, and another important source is scattered dwellings and individual houses. Reductions of air deposition of nitrogen, which constitutes almost a third part of total nitrogen load, have mainly been achieved in the energy and transport sectors. Emissions of ammonia remain at the same level and have even grown recently, indicating a need for renewed emission reduction measures in the agricultural sector.

Description of desired state

Maximum allowable nutrient inputs as defined by the updated Baltic Sea Action plan have been reached for all sub-basins, and the targets are continuously evaluated and revised to consider the effects of external drivers including climate change.

The circular economy, which promotes sustainable production and consumption systems, is one of the key contributors to achieving and maintaining the eutrophication objectives. The HELCOM regional nutrient recycling strategy supplements the Baltic Sea Action Plan including also measures to be applied for smart nutrient management to close nutrient cycle. When nutrients are recycled within the production systems, fewer virgin raw materials are needed. The development of circular economy also contributes to climate change mitigation by cutting the dependency on fossil materials and fuels.

As nutrient inputs from the catchments are of great importance, continuous cooperation with River Basin Management Authorities is established to ensure that river basin management plans incorporate the nutrient input ceilings set by the HELCOM Baltic Sea Action Plan and, thus, ensure sufficiency of measures undertaken under different policies to achieving the environmental targets of the BSAP. Cooperation with river basin management authorities of non-HELCOM countries is institutionalized through signing official agreements with relevant authorities, to address transboundary waterborne nutrient inputs from non-Contracting Parties according to the HELCOM nutrient input reduction scheme.

It should also be acknowledged that achieving of the maximum allowable inputs to all sub-basins does not imply immediate achieving of the good environmental status with respect to eutrophication related indicators such as nutrients concentrations, water clarity, algal blooms, benthic plants and animals, as well as oxygen levels. Restoration of the ecosystem which has been under the environmental pressure

for more than a century requires according to various assessments from a few to a dozen of decades after the input has been reduced.

Annex to the eutrophication segment of the BSAP - "HELCOM nutrient input reduction scheme"

The regional targets to reach good environmental status of the Baltic Sea are (remain) the maximum allowable inputs of nutrients - indicating the maximal level of inputs of water- and airborne nitrogen and phosphorus to Baltic Sea sub-basins.

Nutrient input ceilings define maximum inputs via water and air to achieve good status with respect to eutrophication for Baltic Sea sub-basins for each country and transboundary river. They are calculated as shares of the maximum allowable inputs to each sub-basin according to the polluter pays principle using the proportions of nutrient inputs in the reference period 1997-2003.

National net nutrient input ceilings for each sub-basin are sums of national shares in transboundary rivers ceilings and ceilings for remaining territory with input to the respective sub-basin. They correspond to the input targets set for the Baltic Sea sub-basins, reflecting fair share of the contribution of all Baltic Sea countries and other sources of nutrients to the total nutrient load and assuring the good environmental status of the Sea in terms of eutrophication.

As the values in the HELCOM nutrient reduction scheme are based on the best available scientific information, [maximum allowable inputs and nutrient input ceilings] are reviewed as necessary using a harmonized approach when new scientific knowledge is available.

The maximum nutrient input to the Baltic Sea that can be allowed so that good environmental status with regard to eutrophication can still be reached is 792,209 tons of nitrogen and 21,716 tons of phosphorus. The maximum allowable inputs of nutrients for the Baltic Sea sub-basins to reach good status with respect to eutrophication, based on the currently available data on nutrient fluxes in the Baltic Sea marine ecosystem, are given in the preamble to this segment.

Achieving the nutrient reduction targets of the BSAP requires substantial improvements in fresh water environmental quality, close cooperation with river basin management authorities is necessary to achieve all our environmental objectives.

The achievement of good environmental status in relation to eutrophication in the Baltic Sea also relies on additional reduction efforts by non-Contracting Parties as follows: 52758 tons of airborne nitrogen from non-Contracting Parties assuming full implementation of the Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-level Ozone of the UNECE Convention on Long-range Transboundary Air Pollution until 2020 and National Emissions Ceilings (NEC) Directive (2016/2284/EU) until 2030 since the reference period (1997-2003); 5561 tons of waterborne nitrogen and 930 tons of waterborne phosphorus from non-Contracting Parties assuming that they take the same responsibility to reduce nutrients input as the Contracting Parties since the reference period,

The decision of the IMO to establish NECA in the Baltic Sea and North Sea on reduction of airborne nitrogen pollution from shipping which will lead to the reduction of 16803 tons of atmospheric nitrogen, but noting with concern that some vessels may seek to achieve this reduction by replacing atmospheric emissions with direct discharges to the sea.

Almost half of the waterborne input of nutrients enters the Baltic Sea via transboundary rivers which requires setting nutrient input ceilings for 9 major transboundary rivers, addressing inputs from the whole river catchment areas, separately from the remaining territory of countries. The nutrient input ceilings are:

Nutrient input ceilings for nitrogen for HELCOM countries, transboundary rivers and other sources:

	BOB	BOS	BAP	GUF	GUR	DS	KAT	BAS
DE	946	3923	32281	1645	1747	23647	4662	68852

DK	281	1149	9026	420	463	28067	28525	67931
EE	113	404	1478	11330	13099	22	24	26471
FI	35086	28677	1827	15627	295	76	89	81677
LT	108	495	3620	305	462	65	80	5135
LV	74	330	2789	246	12223	31	34	15727
PL	668	3127	35486	1406	1595	1481	1444	45206
RU	839	1994	7321	22875	662	238	246	34175
SE	17718	32651	30691	625	525	6056	32810	121076
OC	1375	5008	26947	2985	2188	4933	4502	47938
BSS	284	1141	5180	675	345	651	701	8978
NOS	131	475	2427	196	150	729	884	4992
NEMUNAS			29338					29338
BARTA			957					957
VENTA			6033					6033
LIELUPE					15864			15864
DAUGAVA					38801			38801
ODER			49298					49298
VISTULA			74808					74808
PREGOLYA			5494					5494
NEVA				43462				43462
MAI	**57622**	**79372**	**325000**	**101800**	**88417**	**65998**	**74000**	**792209**

Waterborne nitrogen input ceilings for HELCOM and non-HELCOM countries within transboundary river basins:

River	Basin	NIC	DE	FI	LT	LV	PL	RU	BY	CZ	UA
NEMUNAS	BAP	29338			18934				10404		
BARTA	BAP	957			377	581					
VENTA	BAP	6033			3730	2303					
LIELUPE	GUR	15864			5867	9996					
DAUGAVA	GUR	38801			897	22450		2634	12820		
ODER	BAP	49298	179				43951			3551	
VISTULA	BAP	74808					70063		3052		1693
PREGOLYA	BAP	5494					2498	2995			
[NEVA]	GUF	43462		4855				38607			

Nutrient input ceilings for phosphorus for HELCOM countries, transboundary rivers and other sources:

	BOB	**BOS**	**BAP**	**GUF**	**GUR**	**DS**	**KAT**	**BAS**
DE			71			401		472
DK			21			979	815	1815
EE			9	225	185			418
FI	1683	1245		297				3224
LT			50					50
LV			62		499			560
PL			543					543
RU			146	1531				1677
SE	811	1134	318			116	754	3133
OC	181	394	1046	150	93	105	118	2087
NEMUNAS			914					914
BARTA			25					25
VENTA			106					106
LIELUPE					302			302
DAUGAVA					942			942
ODER			1554					1554
VISTULA			2350					2350
PREGOLYA			147					147
NEVA				1398				1398
MAI	**2675**	**2773**	**7360**	**3600**	**2020**	**1601**	**1687**	**21716**

*Sources of atmospheric deposition of phosphorus cannot be allocated to countries.

Waterborne phosphorus input ceilings for HELCOM and non-HELCOM countries within transboundary river basins:

RIVER	BASIN	NIC	DE	FI	LT	LV	PL	RU	BY	CZ	UA
NEMUNAS	BAP	914			628				286		
BARTA	BAP	25			5	20					
VENTA	BAP	106			26	80					
LIELUPE	GUR	302			109	193					
DAUGAVA	GUR	942			33	403		99	407		
ODER	BAP	1554	38				1459			57	
VISTULA	BAP	2350					2240		63		47
PREGOLYA	BAP	147					51	96			
NEVA	GUF	1398		20				1378			

Action in the catchment has a delayed effect on reduction of nutrient inputs. That is why all necessary nutrient reduction measures will be fully implemented latest [by 2027] in order to be able to demonstrate that national input targets expressed as nutrient input ceilings for each sub- basin have been achieved by [2030].

The input ceilings for nitrogen and phosphorus are based on current scientific knowledge and are subject to uncertainties thus following the precautionary principle, increase of nutrient inputs to a basin is not allowed until both MAI and [good status with respect to eutrophication] have been reached even in basins where nutrient inputs are already below the nutrient input ceilings.

Regular assessments of implementation of the Scheme will be performed - annually for MAI and every 2 years for input ceilings to follow up implementation of regional and national targets for inputs of nutrients based on the most recent monitoring data of riverine nutrient loads, the data on air deposition of nutrients, transboundary loads and national data on inputs from direct point sources including sea-based aquaculture. National monitoring networks will be maintained in up-to-date state and striving for harmonized methods to estimate nutrient inputs from unmonitored areas and to provide timely sufficient and consistent data on nutrient loads to the Baltic Sea (HELCOM Recommendations 37-38/1 and 37-38/2) in order to ensure reliability of the follow-up system.

As reductions in nutrient inputs in sub-basins may have wide-spread effects, extra reduction – reduction of nutrient input below the national nutrient input ceiling for a sub-basin - can be accounted for, in proportion to the effect on a neighboring basin, by the countries in reaching their nutrient input ceilings.