

WP4.2

WFD targets to achieve the HELCOM BSAP

Stella-Theresa Stoicescu and Urmas Lips
Tallinn University of Technology



Co-funded by the
European Union

TAL
TECH

AIM AND STATUS

The aim is to find nutrient loads per country and sub-basin which reflect the loads if rivers would be in good ecological status (**GES loads**) according to Water Framework Directive (WFD, 2000/60/EC).

We have contacted all HELCOM countries to gather necessary information for estimating GES loads per country and Baltic sub-basin.

Full datasets are available for Estonia, Germany, Latvia, Lithuania, and Poland while some data are still missing or not available from the other countries.

Data needs for the analysis

For GES load estimates, we need **river runoff** data and concentrations of total nitrogen (**TN**) and phosphorus (**TP**) corresponding to the **boundary between good and moderate ecological status** for the rivers (river mouths) according to WFD classification.

River discharge data used in the analysis contain average flow for rivers with over 10 years of data during the period 1995-2017 and average runoff from unmonitored areas (data provided by Bo Gustafsson, Stockholm University).

Comment: In the project application it was determined to use river discharge values from the Reference Period of the HELCOM nutrient reduction scheme (1997-2003), but for this exercise we chose to use the average flow over the full time-series.

Data on WFD ecological status classes

Almost all countries have set the ecological quality criteria as TN and TP concentrations in rivers, except Denmark and Russia.

Denmark has set total nutrient loads (not nutrient concentrations) per year for sub-watersheds, which correspond to the good ecological status. These loads could be compared with the maximum allowable inputs, but the sub-watershed areas cannot be directly assigned to the HELCOM sub-basins (work in progress).

Russia has provided allowable concentrations in river mouths for inorganic nutrients which could be recalculated to TN and TP concentrations. However, these concentrations are not set for ecological quality status assessment rather as quality standards for admissible impact of chemical substances (impact on human health).

For the other countries, several river types are defined, and the concentrations corresponding to good/moderate boundary differ between the river types.

Maximum allowable inputs

To determine if GES loads would be appropriate to achieve/maintain good environmental status in the sub-basins, we compared the estimated **GES loads** with maximum allowable inputs (**MAI**) of nutrients to the sub-basins.

The MAI values used in the analysis should correspond to the share of **riverine loads in MAI** per country and sub-basin. As a first approximation, we used the waterborne MAI values.

These **waterborne MAI** values for total nitrogen and total phosphorus per country and sub-basin are based on information in the annexes of the Summary Report on MAI and CART (Country Allocated Reduction Targets). We assumed that the share of waterborne loads is the same as during the reference period (HELCOM, 2013).

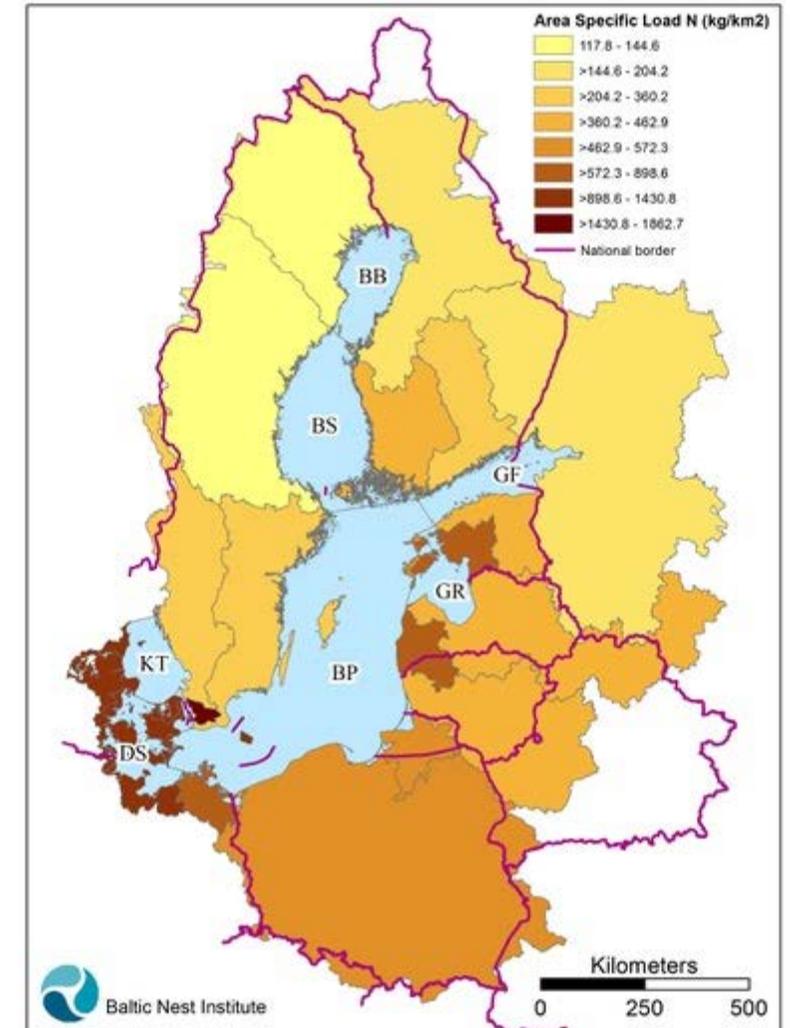
Calculated GES loads and MAI

First, we calculated the **GES load from monitored rivers**

Total GES load was estimated by adding to the GES load from monitored rivers

- either the **average load for the period 1995-2017** from unmonitored coastal areas
- or the **GES load** from unmonitored coastal areas calculated using runoff and nutrient concentrations corresponding to the good/moderate boundary for a selected river type (or an average for sub-basin)

Waterborne MAI [t year^{-1}]

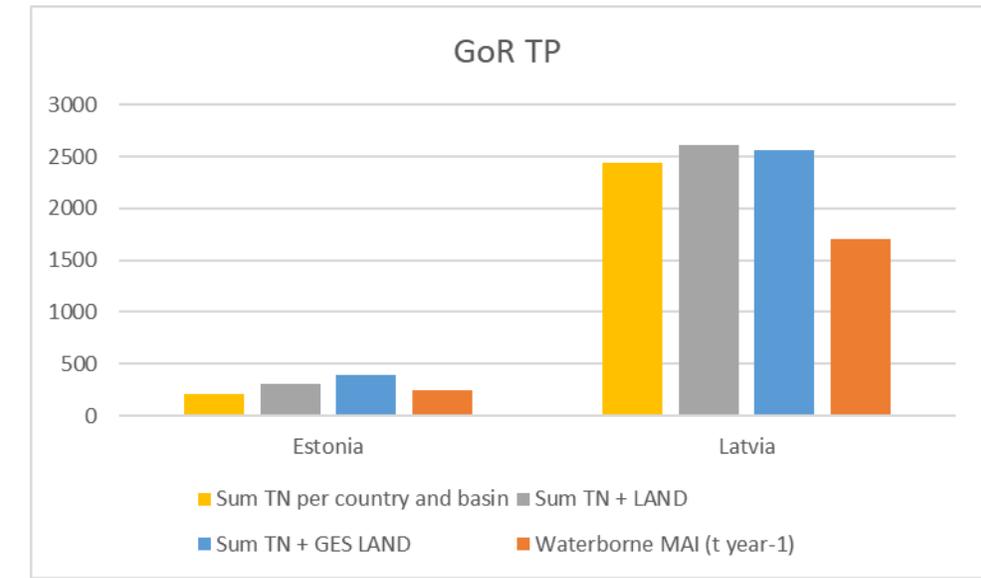
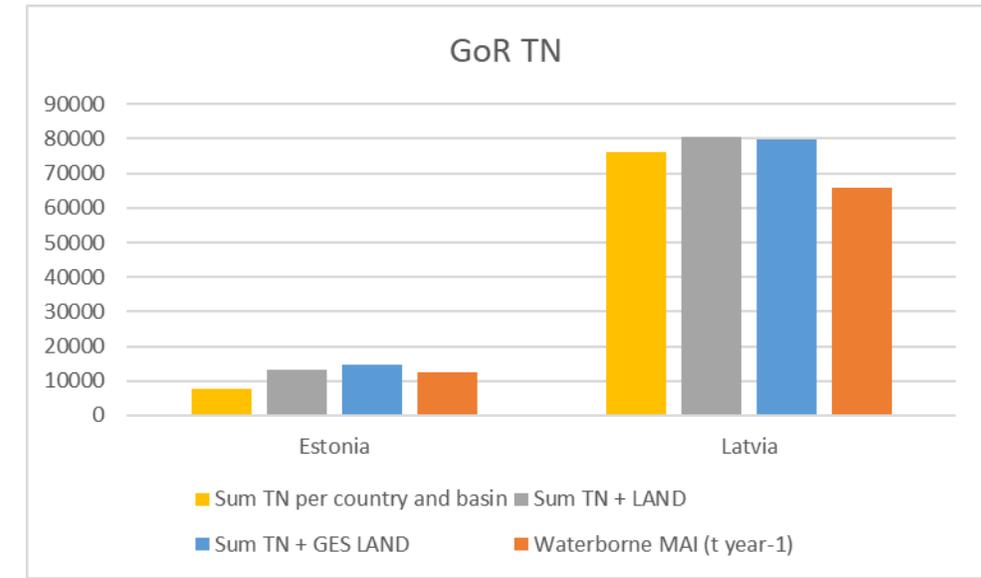


Gulf of Riga

Gulf of Riga TN load (t year ⁻¹)	Estonia	Latvia
Riverine GES load	7881	76009
Riverine GES + average load	13081	78389
Riverine GES + estimated GES load	14872	79612
Waterborne MAI	12530	65843

Gulf of Riga TP load (t year ⁻¹)	Estonia	Latvia
Riverine GES load	210	2443
Riverine GES + average load	306	2522
Riverine GES + estimated GES load	397	2559
Waterborne MAI	240	1699

Country	G/M boundary for TN	G/M boundary for TP
Estonia	3.0 mg N l ⁻¹	0.08 mg P l ⁻¹
Latvia	2.8 mg N l ⁻¹	0.065-0.09 mg P l ⁻¹

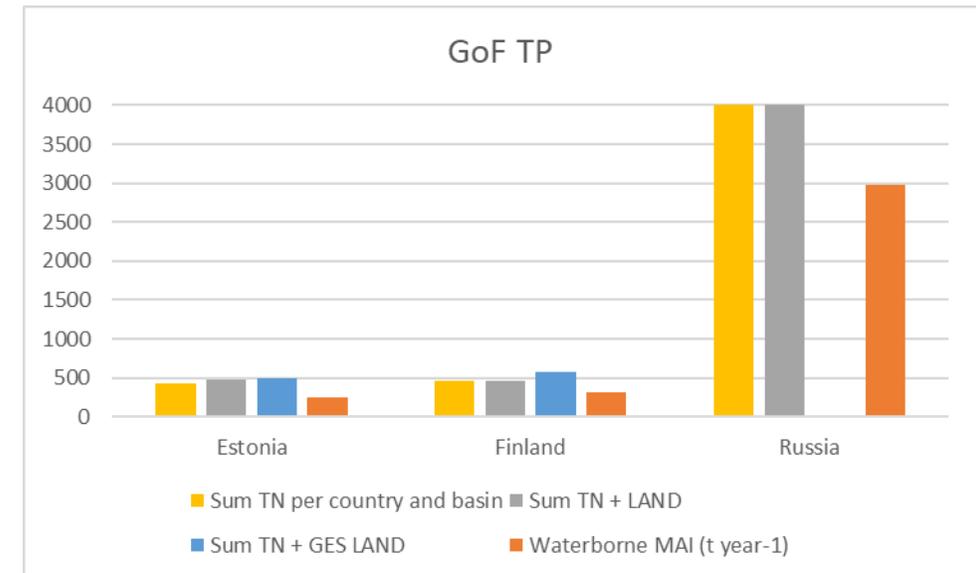
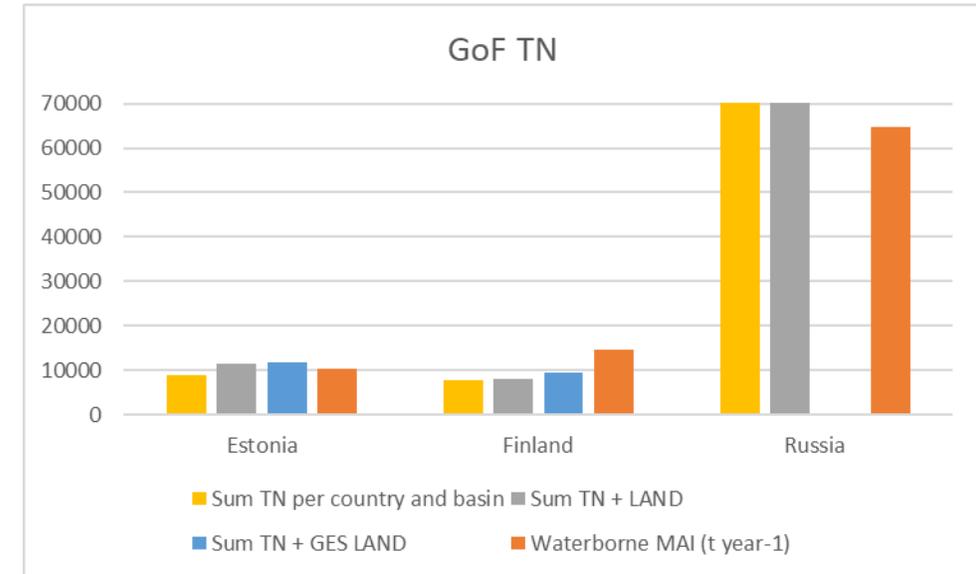


Gulf of Finland

Gulf of Finland TN load (t year ⁻¹)	Estonia	Finland	Russia
Riverine GES load	8978	7833	
Riverine GES + average load	11428	8030	
Riverine GES + estimated GES load	11740	9525	
Waterborne MAI	10511	14807	64806

Gulf of Finland TP load (t year ⁻¹)	Estonia	Finland	Russia
Riverine GES load	427	458	
Riverine GES + average load	484	465	
Riverine GES + estimated GES load	500	569	
Waterborne MAI	242	305	2981

Country	G/M boundary for TN	G/M boundary for TP
Russia*	9.42-9.53 mg N l ⁻¹	0.079-0.918 mg P l ⁻¹
Finland	0.8-0.9 mg N l ⁻¹	0.035-0.04 mg P l ⁻¹
Estonia	0.7-3.0 mg N l ⁻¹	0.06-0.08 mg P l ⁻¹



* For Russia, numbers correspond to inorganic nutrients and health criteria

Baltic Proper

Baltic Proper TN load (t year ⁻¹)	Denmark	Estonia	Germany	Latvia	Lithuania	Poland	Russia	Sweden
Riverine GES load		-	2876	10905	48230	217584		
Riverine GES + average load		986	5136	12545	48912	224704		
Riverine GES + estimated GES load		1372	4097	13386	49299	226232		
Waterborne MAI	1429	869	5249	7768	32610	147834	8395	24060

Baltic Proper TP load (t year ⁻¹)	Denmark	Estonia	Germany	Latvia	Lithuania	Poland	Russia	Sweden
Riverine GES load		-	111	334	2251	16696		
Riverine GES + average load		20	166	391	2278	17141		
Riverine GES + estimated GES load		37	158	407	2301	17514		
Waterborne MAI	24	9	70	108	1059	4946	386	339

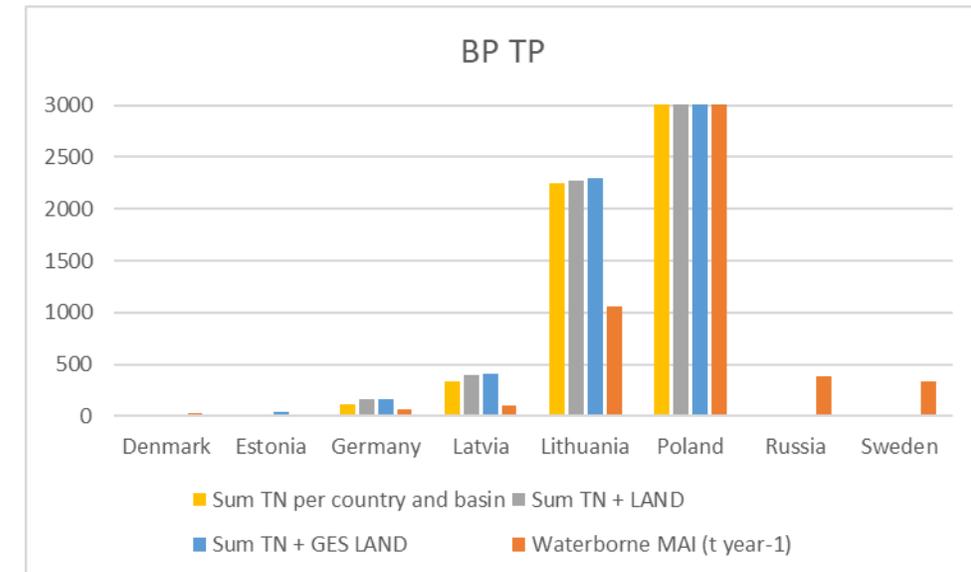
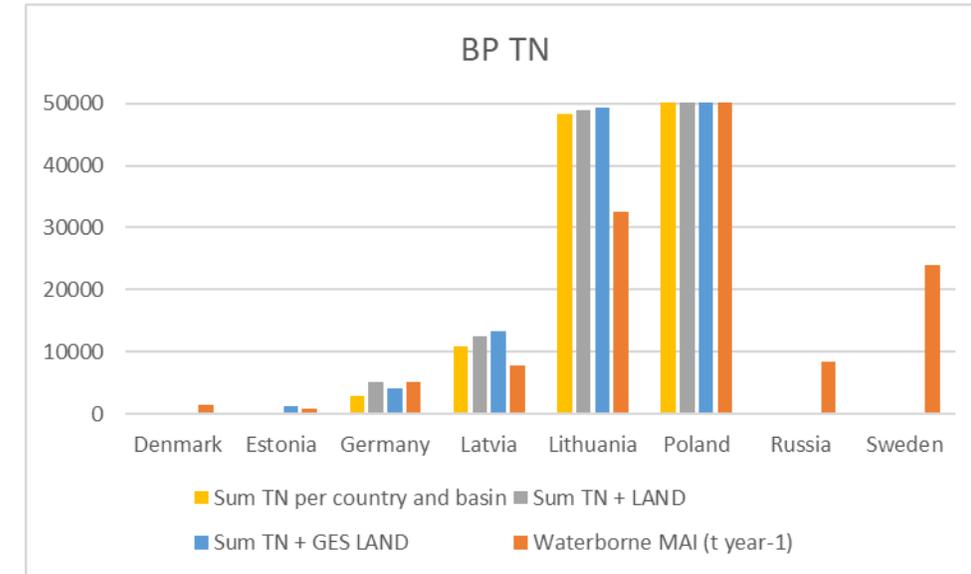
Baltic Proper

Country	G/M boundary for TN	G/M boundary for TP
Denmark	-	-
Estonia	3.0 mg N l ⁻¹	0.08 mg P l ⁻¹
Germany	2.6 mg N l ⁻¹	0.10-0.15 mg P l ⁻¹
Latvia	2.8 mg N l ⁻¹	0.065-0.09 mg P l ⁻¹
Lithuania	3.0 mg N l ⁻¹	0.14 mg P l ⁻¹
Poland	2.7-4.1 mg N l ⁻¹	0.21-0.31 mg P l ⁻¹
Russia	-	-
Sweden	-	-

One of the reasons of higher GES loads than MAI according to the Baltic Sea Action Plan could be too high concentrations corresponding to the WFD good/moderate boundary

For TN, the boundary concentrations are quite similar, only a bit higher values are set in Poland, e.g., 4.0 mg N l⁻¹ for Odra and Vistula rivers

TP good/moderate boundaries have a bit higher values in the south, but about 2 times higher for Polish rivers



Gulf of Riga based on good/very good boundary and reference conditions

Gulf of Riga TN load (t year⁻¹)	Estonia	Latvia
Total GES load	14872	79612
Total load corresponding to good/very good boundary	7436	
Total load corresponding to reference conditions	5999	51179
Waterborne MAI	12530	65843

Gulf of Riga TP load (t year⁻¹)	Estonia	Latvia
Total GES load	397	2559
Total load corresponding to good/very good boundary	248	
Total load corresponding to reference conditions	214	1279
Waterborne MAI	240	1699

Loads corresponding to the reference conditions lower than MAI, especially for TN load

Loads calculated using concentrations corresponding to the WFD good/very good boundary comparable to MAI for TP loads (in this example)

COMMENTS SO FAR

The estimated nutrient loads corresponding to the defined good ecological status in river mouths are mostly larger than maximum allowable inputs per country and sub-basin.

In some cases, the boundaries (used in this study) diverse between the countries in the same region.

First estimates of loads corresponding to the reference conditions are lower than waterborne MAI (but still could be a problem for TP load).

Not all data available or checked yet. Further analysis is needed.

Thank you for your attention!

Stella-Theresa Stoicescu (stella.stoicescu@taltech.ee)

Urmas Lips (urmas.lips@taltech.ee)

Tallinn University of Technology



Co-funded by the
European Union

**TAL
TECH**