

VillageWaters User's manual

Legislation and technological solutions

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Baltic Sea

Surrounded by nine countries



- One of the world's largest brackish water bodies in the world
- Almost entirely land-locked and the water exchange is very limited.
- 420,000 km² water surface, catchment area more than four times larger (1,720,000 km²)
- Special geographical, oceanographic, and climatological characteristics
- More than 85 million people live around the Baltic Sea
- More than one third of the Baltic Sea is shallower than 30 meters, giving it a small total water volume in comparison to its surface area.

Eutrophication of the Baltic Sea

Eutrophication is one of the main threats to the biodiversity of the Baltic Sea and is caused by excessive inputs of nutrients to the marine environment.

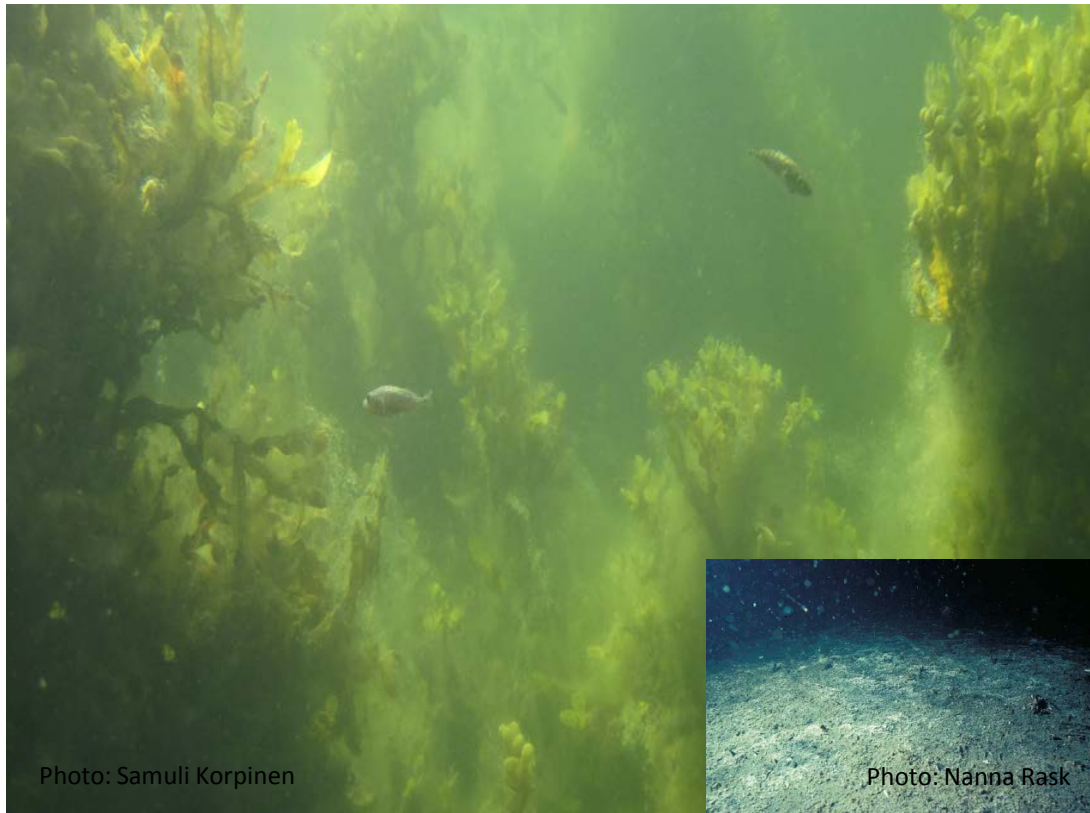


Photo: Samuli Korpinen

Photo: Nanna Rask

Nutrient over-enrichment causes

- elevated levels of algal and plant growth
- increased turbidity
- oxygen depletion
- changes in species composition and nuisance blooms of algae.

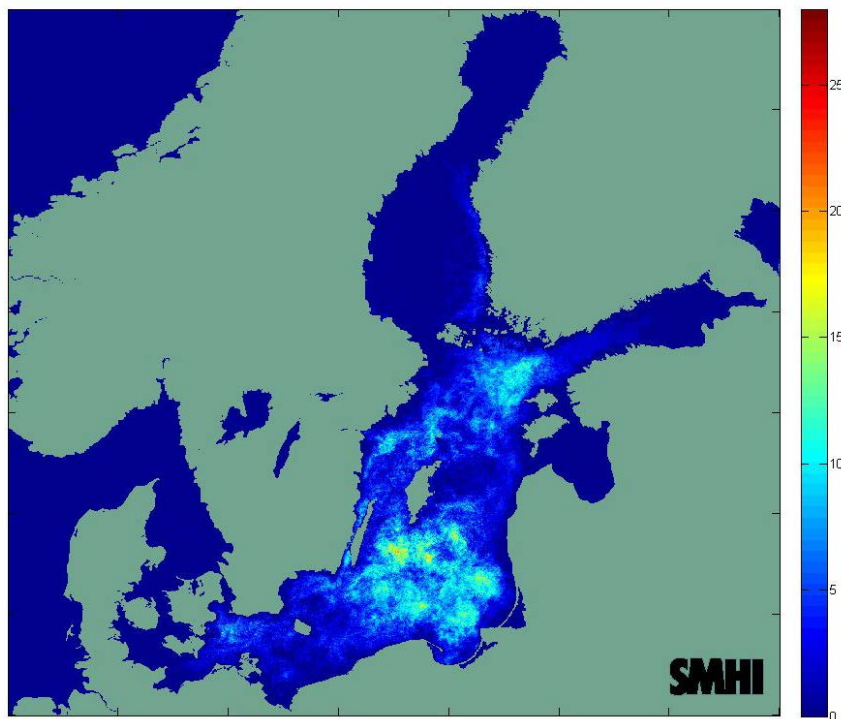
Sources:

Helcom, Eutrophication. <http://www.helcom.fi/baltic-sea-trends/eutrophication>
 Öberg, J., 2016. Cyanobacteria blooms in the Baltic Sea. HELCOM Baltic Sea Environment Fact Sheets 2016. Online. [1.10.2017 Viewed],
<http://helcom.fi/baltic-sea-trends/environment-fact-sheets/eutrophication/cyanobacterial-blooms-in-the-baltic-sea/>

Cyanobacterial blooms in the Baltic Sea in 2016

New core eutrophication indicator

Number of days with cyanobacteria observations during 2016



- In 2016, surface blooms of cyanobacteria were observed almost uninterruptedly for three months, from June 20 to September 21.
- Large blooms can cause an oxygen-depleted dead zone where other organisms cannot survive.
- Cyanobacterial blooms may serve as indicators in the sense of the EU-Marine Strategy Framework Directive (European Union 2008). A new core eutrophication indicator for cyanobacterial blooms is implemented (HELCOM 2017).

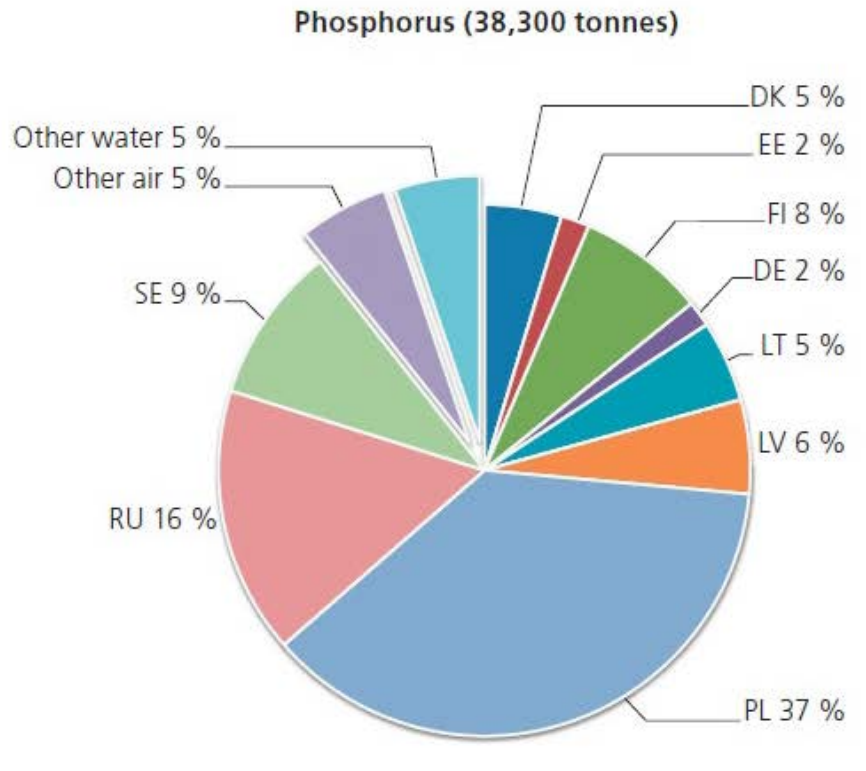
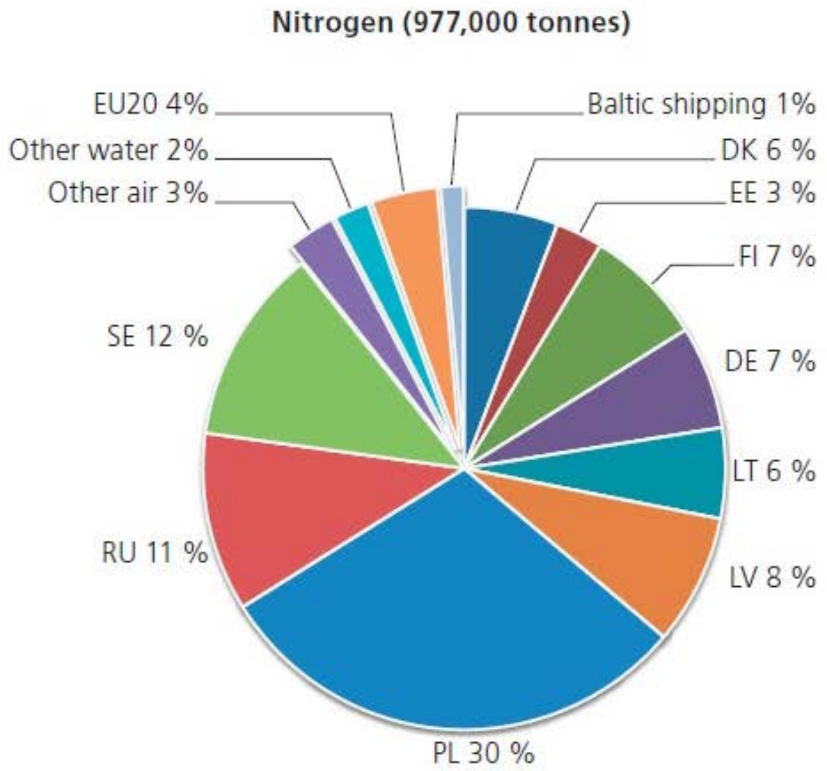
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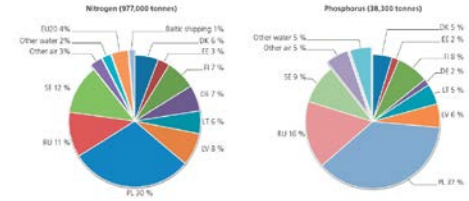
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<http://helcom.fi/baltic-sea-trends/environment-fact-sheets/eutrophication/cyanobacterial-blooms-in-the-baltic-sea/>

Total actual water- and airborne inputs of nitrogen and phosphorus to the Baltic Sea in 2010 by HELCOM Contracting Parties and other sources.



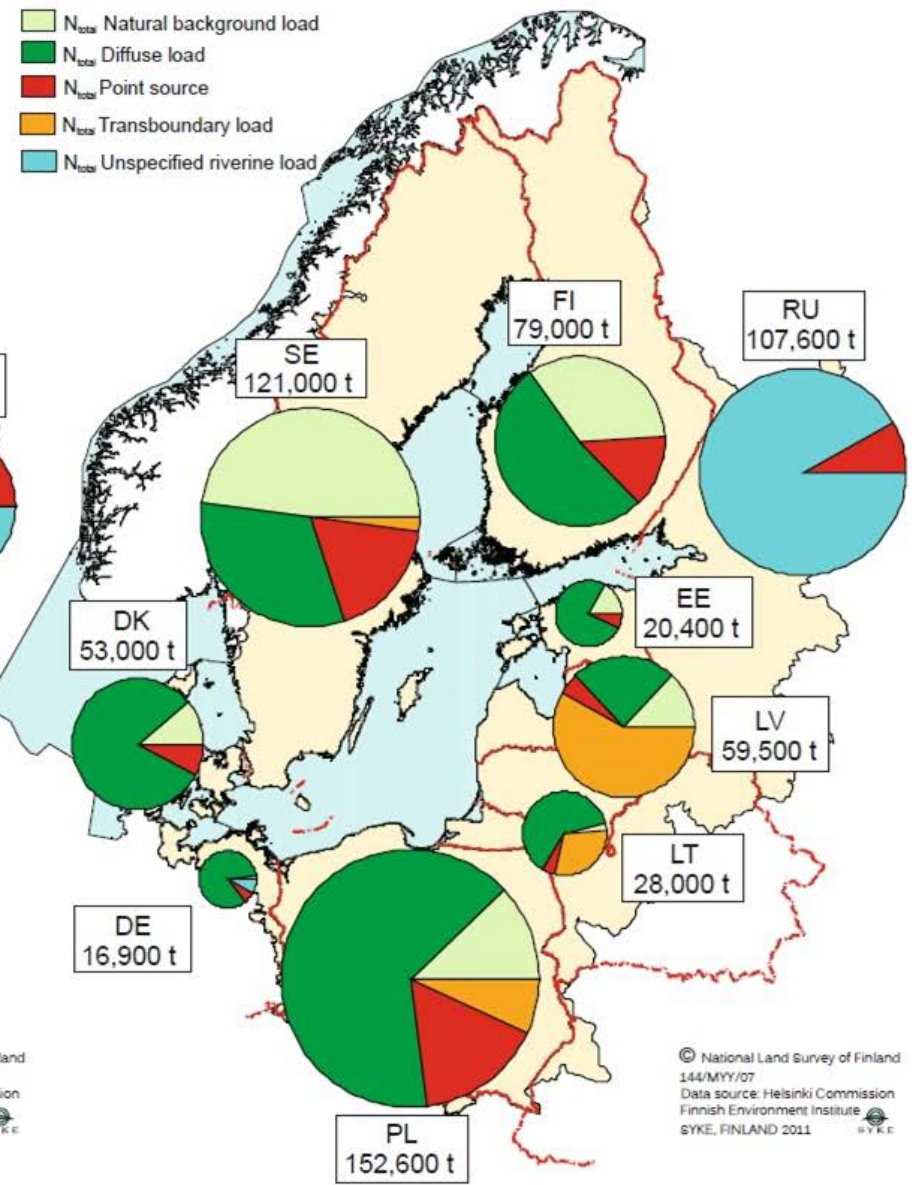
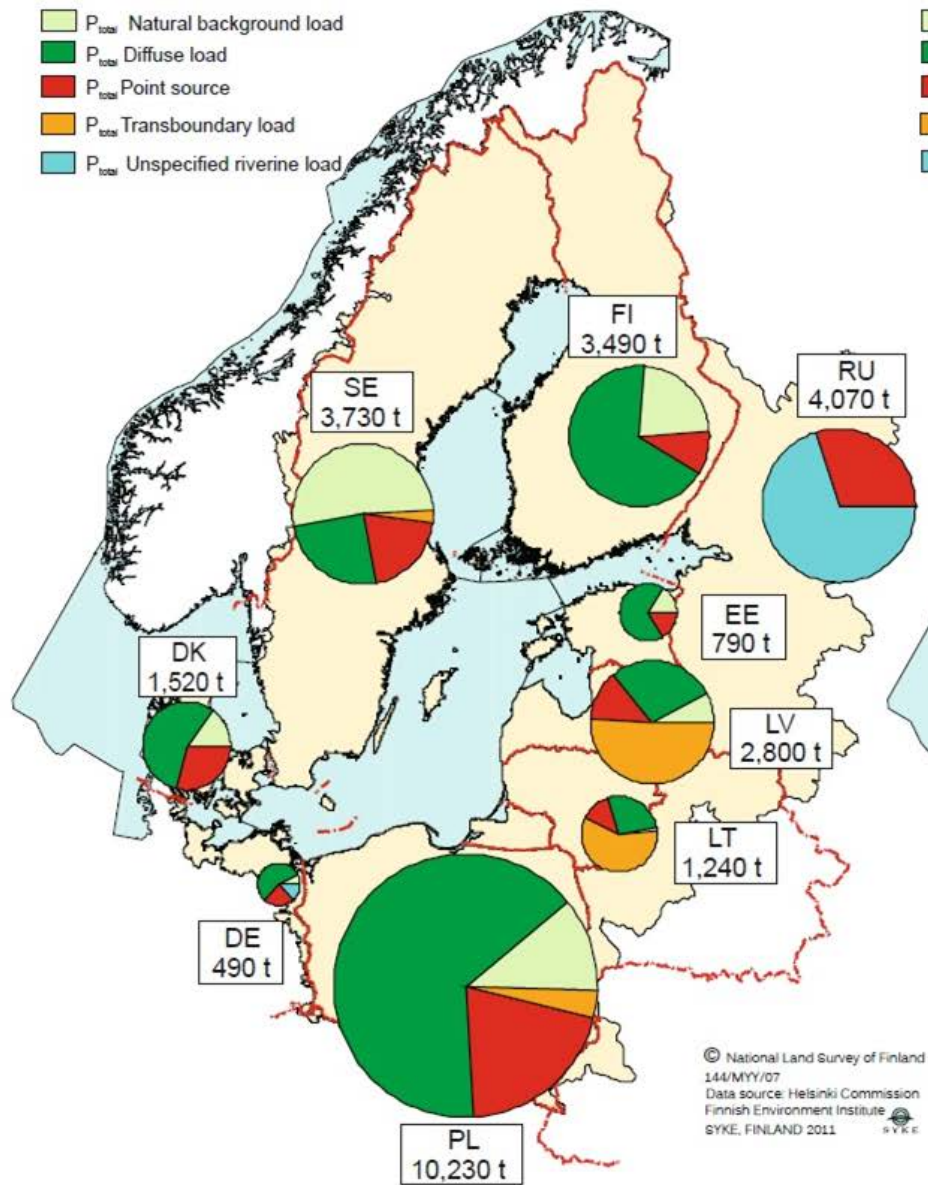
NUTRIENT REDUCTION SCHEME



HELCOM estimated in 2007 that for good environmental status to be achieved, the maximum allowable annual nutrient pollution inputs into the Baltic Sea would be 21,000 tonnes of phosphorus and about 600,000 tonnes of nitrogen. Annual reductions of some 15,000 tonnes of phosphorus and 135,000 tonnes of nitrogen would be required to reach to achieve the plan's crucial "clear water" objective.

There are two main components of the nutrient reduction scheme:

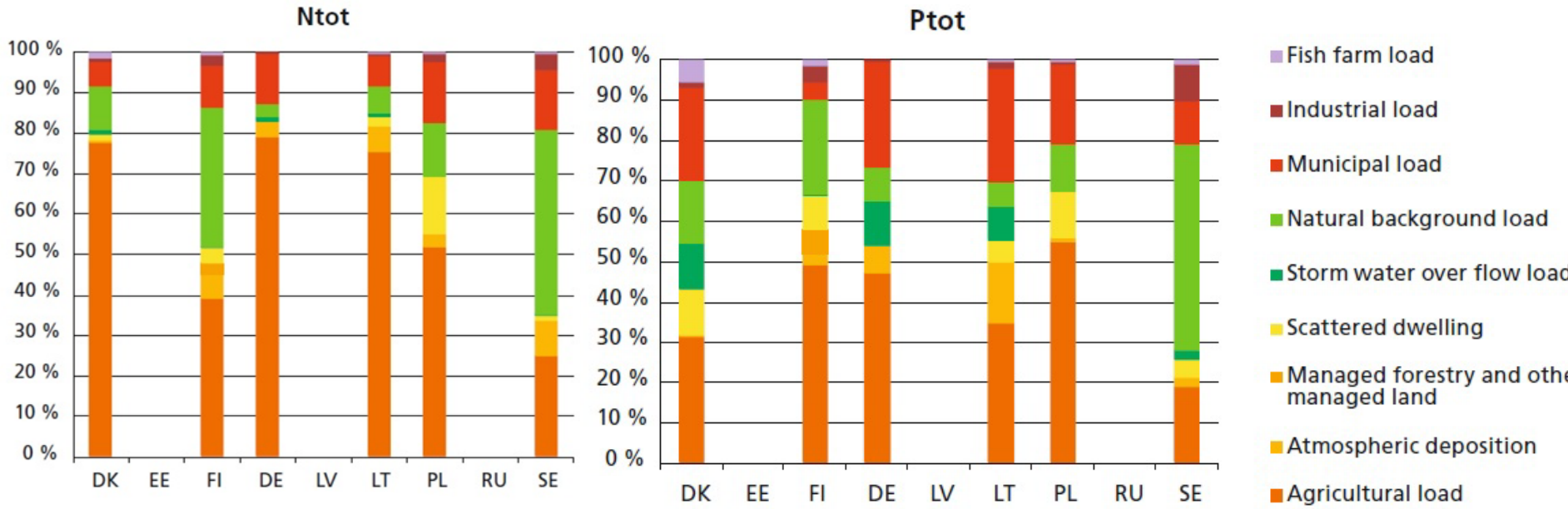
- Maximum Allowable Inputs (MAI) of nutrients, indicating the maximal level of inputs of water- and airborne nitrogen and phosphorus to Baltic Sea sub-basins that can be allowed to fulfill the targets for non-eutrophied sea;
- Country-Allocated Reduction Targets (CART), indicating how much nutrient inputs the HELCOM countries need to reduce comparing to a reference period (1997-2003).



Source apportionment of a) total waterborne phosphorus and b) total waterborne nitrogen loads (in tonnes) to the Baltic Sea by country in 2006.

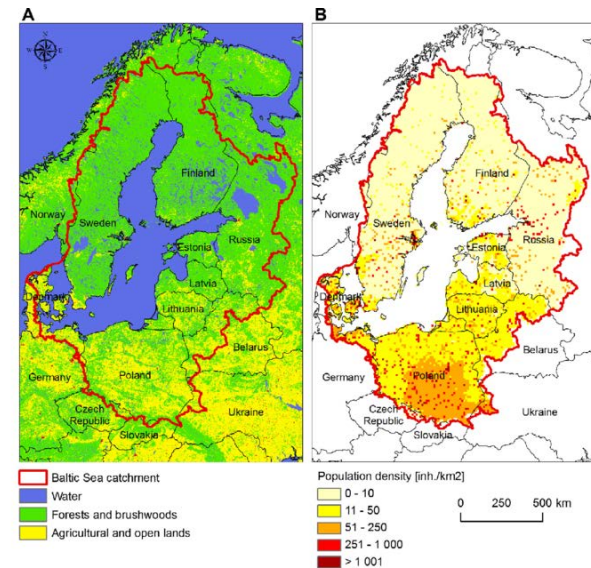
Source: Helcom, <http://www.helcom.fi/Lists/Publications/BSEP128A.pdf>

Proportions of different sources contributing to the total waterborne inputs of phosphorus and nitrogen to the Baltic Sea in 2006.



Population not connected to urban wastewater collection and treatment systems in project countries

- Estonia – 19 % (426 000 people)
 - Finland – 19 % (900 000 people)
 - Latvia – 29 % (645 000 people)
 - Lithuania – 38 % (975 000 people)
 - Poland – 38 % (14.7 million people)
 - Sweden – 13 % (1 million people).
- **Total over 18.5 million people**



In the sparsely populated areas, the organic materials and total phosphorous in the wastewaters of a household pollute the environment **6 – 8 times more** than the household wastewater of a resident whose house is connected to the water supply company's sewage network.

EU legislation

- The **EU Water Framework Directive (2000/60/EC)** - to achieve 'good status' for all ground waters and surface waters by 2015 at the latest.
- The **Urban Waste Water Treatment Directive (91/271/EEC)** - the treatment of wastewater in the whole EU area.
- The **Waste Framework Directive (2008/98/EC)** - basic concepts and definitions related to waste management.
- The **Nitrates Directive (91/676/EEC)** - protection of waters against pollution caused by nitrates from agricultural sources



EU legislation

- **The protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture (86/278/EEC)** - use sewage sludge as a fertiliser, to prevent it harming the environment and human health
- **Construction Products Regulation (CPR), (EU) No 305/2011** - The Construction Products Regulation (CPR) lays down harmonised rules for the marketing of construction products in the EU
- **Marine Strategy Framework Directive** - aims to achieve Good Environmental Status (GES) of the EU's marine waters by 2020 and to protect the resource base upon which marine-related economic and social activities depend.



The HELCOM Baltic Sea Action Plan

The overall goal of HELCOM is to have a Baltic Sea unaffected by eutrophication.

Table . The country-wise provisional nutrient reduction requirements

Country	Phosphorus (tonnes)	Nitrogen (tonnes)
Denmark	16	17 210
Estonia	220	900
Finland	150	1 200
Germany	240	5 620
Latvia	300	2 560
Lithuania	880	11 750
Poland	8 760	62 400
Russia	2 500	6 970
Sweden	290	20 780
Transboundary Common pool	1 660	3 780

HELCOM recommendation 28E/6

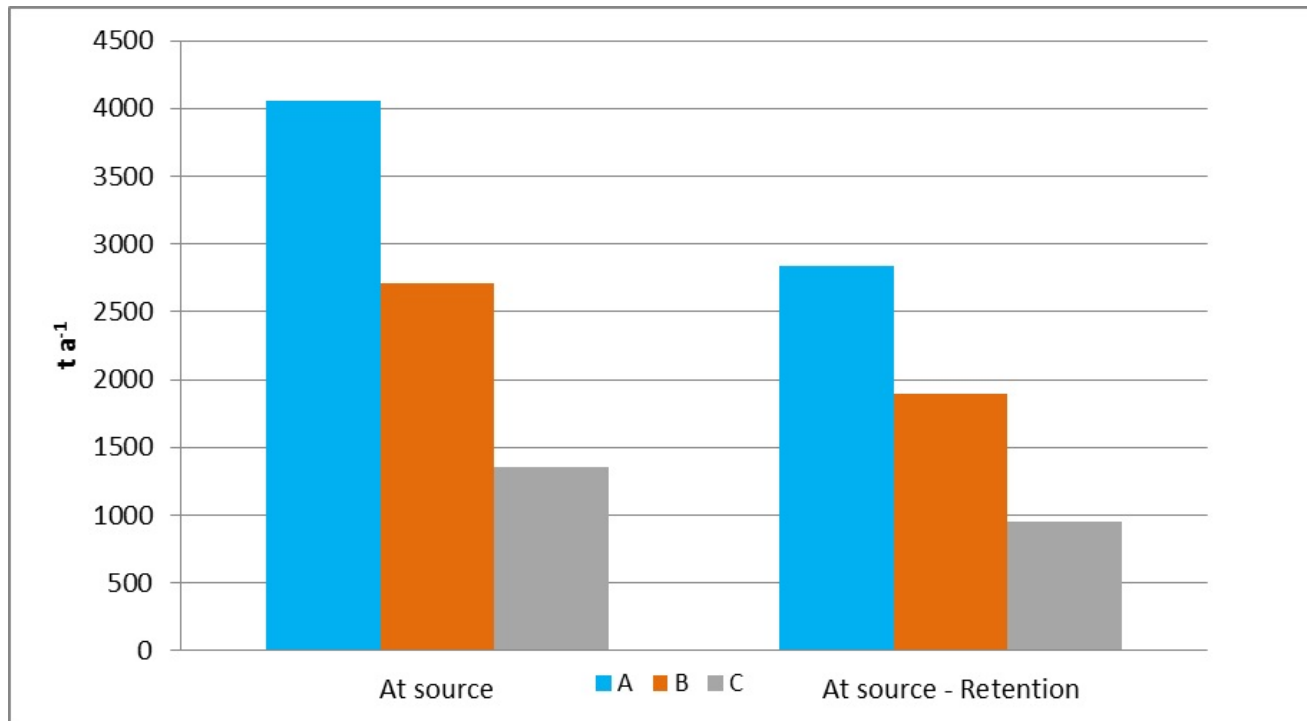
HELCOM Recommendation 28E/6 "On site wastewater treatment of single family homes, small businesses and scattered settlements" (transitional – 2017, final - 2021). Encourage educational cooperation and exchange of best practices and experiences of solving the problem of municipal sewage in smaller municipalities and scattered settlements.

Table . Different levels of treatment, depending on the sensitivity of the waterbody.

Receiving water sensitivity	Treatment type	BOD5 reduction (%)	Phosphorus reduction (%)	Nitrification (%)
Class 1	Enhanced OP treatment	95	90	90
Class 2	Enhanced O treatment	95		90
Class 3	OP treatment	90	90	
Class 4	O treatment	90		

HELCOM- Scattered settlements

Figure. Phosphorus net reduction potential (in $t a^{-1}$) from scattered dwellings (about 21 million people) according to three scenarios. A: The whole population in areas where reduction can be assumed to benefit water courses; B: 2/3 of the population; and C: 1/3 of the population.



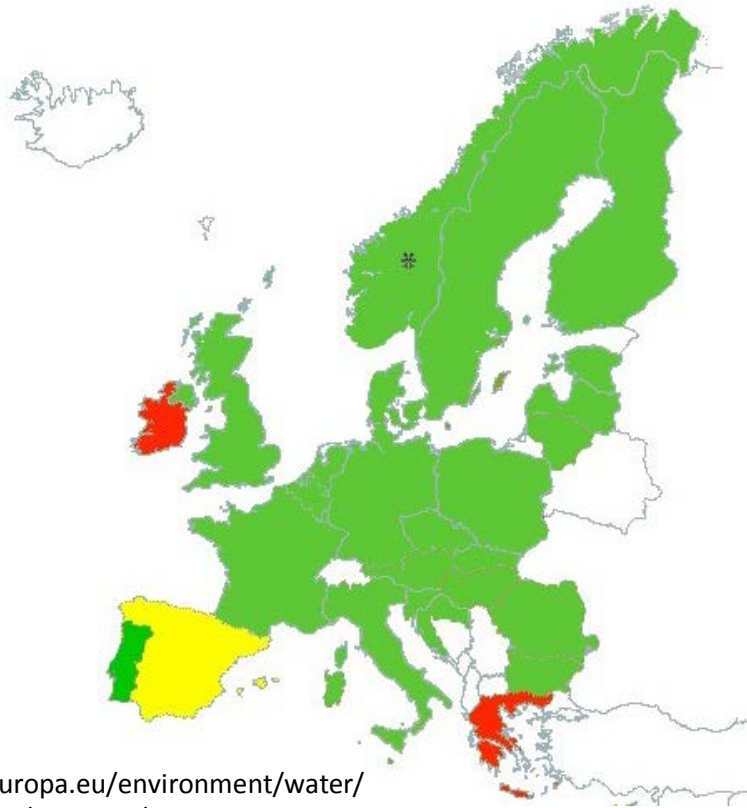
Other International co-operation and agreements

- **EU water strategy (Blueprint)** - The key conclusion of the Blueprint is that, while hardly any additional water-related legislation is needed, there is room for improvement in its implementation.
- **River Basin Management Plan (RBMP)** - protection, improvement and sustainable use of the water environment across Europe.
- **Transboundary water cooperation** - to improve water security. Prevent, control and reduce the actual or potential transboundary impacts of water pollution.



Status of implementation of the WFD

A framework for the protection of European waters to reach "good status"



http://ec.europa.eu/environment/water/participation/map_mc/map.htm

The 2nd RBMPs were adopted

- Estonia 7.1.2016
- Finland 3.12.2015
- Latvia 22.12.2015
- Lithuania – not yet been adopted
- Poland 18.10.2016
- Sweden – not yet been adopted

Management cycles 2016 to 2021, 2021 to 2027

Challenges:

International river basins

Common Implementation Strategy (CIS)

GREEN - all second River Basin Management Plans adopted

YELLOW - part of the second River Basin Management Plans adopted

RED - second River Basin Management Plans not yet adopted

National legislation

Minimum treatment efficiency

	Estonia	Finland	Latvia	Lithuania	Poland	Sweden
	< 300 PE		< 200 PE	< 2000	< 2000	
BOD	is not adapted	80 %	no limits	-	-	90 %
Total phosphorus	is not adapted	70 %	no limits	-	-	70 %
Total nitrogen	is not adapted	30 %	no limits	-	-	30 %
	300 - 1999 PE	Sensitive areas	200 - 1999 PE	2000 - 10000 PE	2000 - 9999 PE	
BOD	80 %	90 %	50–70 %	70-90 %	70-90 %	
Total phosphorus	70 %	85 %	10–15 %	80 %	-	
Total nitrogen	30 %	40 %	10–15 %	70-80 %	-	

Implementation - has not been fully effective

- Under the Helsinki Convention, all bordering EU Member States and non-EU countries, as well as the EU, are engaged in the environmental protection of the Baltic Sea.
 - The EU legal framework requires Member States to implement measures to combat excessive loads of nutrients and to achieve the good environmental status of marine waters.
 - Report concluded that these actions have led to limited progress towards nutrient reduction in the Baltic Sea.
- plans lack ambition as they focus on ‘basic measures’ for implementing EU directives in relation to the specific activities causing nutrient pollution.



On-site wastewater management

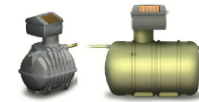
Temp



sludge



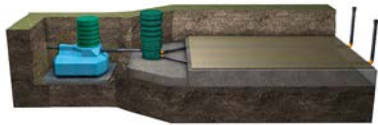
Ntot



Volume



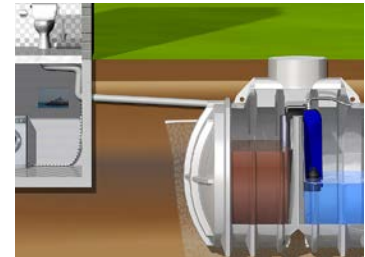
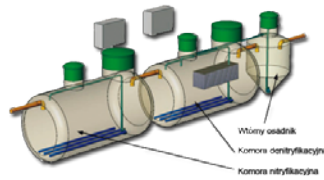
BOD



pH



Ptot



m3/day



What?
Kodėl?
Mis? Co?
Kā? Tāh?



VillageWaters –application

Real solutions to acute problems



- Application that offers for users to choose the most effective, practical, cost-effective and environmentally friendly on-site wastewater treatment solutions.
- The tool considers the topic of waste water treatment from a technological, environmental, economic and social point of view.

Thank You!

Stay tuned <https://villagewaters.eu>



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<https://villagewaters.eu/>



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