HENVI Policy Brief 2

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Old problems and new threats in the Baltic Sea – how can we solve them?

The Baltic Sea is one of the most polluted seas in the world. Its environmental problems are caused by its specific characteristics, such as large catchment area compared to the basin, shallow waters, slow water exchange, combined with the intensive human activities – agriculture, wastewaters, and transportation of oil – to name a few. In addition to the already known problems, there are new emerging factors that affect the environmental condition of the sea. The aim of this policy brief is to shed light to the old and new environmental challenges in the Baltic Sea and propose solutions to tackle them.

Persistent environmental challenges and new emerging stressors

Environmental challenges known for a long time are based on strong scientific empirical evidence, their environmental impacts are well documented and the factors causing them have been recognized. These include:

- Eutrophication
- Environmental toxic compounds
- Alien species (those already arrived)
- Overfishing

New environmental challenges are not yet widely recognized and their negative impacts are not yet fully experienced. However, these emerging stressors may cause considerable harm in the future. New stressors include:

- Microlitter
- Underwater noise
- New chemicals
- Dissolved organic matter (DOM)

Some of the stressors have been known for a long time, but their relative importance has increased recently due to improved understanding on their consequences or increased probability of hazards. Furthermore, interactions and joint impacts of the new stressors with the old factors are still poorly known.

How to solve the old and new challenges?

The key policy framework to solve the numerous and diverse problems of the Baltic Sea consists of EU Marine Strategy Framework Directive, Water Framework Directive, Habitats Directive, and HELCOM Baltic Sea Action Plan as well as EU fisheries and agricultural policies. Still, there is room for development for more integrated monitoring approaches that allow assessing the state of the Baltic Sea in a comprehensive way from land to sea, in the framework of international and national policies.

Policies and decision-making related to the Baltic Sea should be based on latest scientific research, with a solid understanding on the ecosystem structures and the underlying societal factors affecting the trends of the environmental stressors.

The alarming state of the Baltic Sea is an international environmental problem, and the costs and benefits of improving its state are not symmetrically distributed between different stakeholders in the 9 states surrounding the sea.

Microplastics – new challenge to the Baltic Sea

Plastic litter degrades very slowly and it is a serious and increasing problem to Baltic Sea marine ecosystems. Besides plastic packaging or fishing nets which animals can swallow or get entangled in, microscopic plastic litter (particles < 5 mm) is found in the sea.

These particles can be mistaken for food by small marine organisms like zooplankton or mussels. Once swallowed, they can have a toxic effect either caused by components in the plastic material itself or by harmful additives that migrate from the plastic into the animal tissue. The surface of plastic litter particles will also adsorb high concentrations of other pollutants present in the sea.

There are many sources to microlitter: plastic waste from the beaches fragment into smaller particles or is carried with storm water into the sea. Small plastic pellets are very commonly used as raw material for the plastic industry and in cosmetics.

What is DOM?

One of the emerging stressors is Dissolved Organic Matter (DOM) whose environmental effects are not yet known. DOM means the organic (carbon) compounds that are smaller than 0.45 micrometers. In the Baltic Sea, the DOM load is originated from the catchment areas. Increasing DOM load is mainly observed as brown substance making surface water less transparent. This has a potential effect on the production dynamics and species composition and the eyesight of fish. However, much of the DOM is uncolored, and its dynamics are largely unknown. Recent studies show that the amount of DOM increases in some basins of the Baltic Sea. Climate change affects heavily to the catchments and will increase the transport of DOM to the seas.

Changing diet patterns affect the nutrient loads from agriculture

Eutrophication is a persistent problem in the Baltic Sea and agriculture is a major source of phosphorus and nitrogen causing eutrophication. Two big agricultural producers, Denmark and Poland, are both major sources of agricultural-based nutrient loading into the Baltic Sea. However, the development trends in the loads of the two countries are quite the opposite.

Although Denmark still has intensified agriculture and has big nutrition loads, by applying green technology solutions Denmark has successfully managed to reduce the load. Transition countries such as Poland are currently in the midst of rapid structural and land-use changes in the agricultural sector and fertilizer use has increased significant after the political changes in 1989. Furthermore, the diet patterns are rapidly changing towards more meat consumption, which is partly met by increased meat production in the Baltic Sea catchment area.

If these trends continue, Poland will soon be a bigger source of nutrients to the Baltic Sea than Denmark was in the 1970s. In this case the Baltic Sea will not recover from anoxia. Lessons learnt e.g. with green technologies in Denmark should be applied elsewhere, too.

The good news is that according to surveys, the citizens in the Baltic Sea states are well informed about the alarming situation, and are motivated to contribute to the efforts needed for a cleaner sea. It has been estimated that the overall benefits of planned protection efforts are at least 1,7 times higher than the costs.

What to do to get a healthier Baltic Sea?

- Increase awareness about the new threats like microplastics, and enable the behavioral changes by awareness raising campaigns or by e.g. increasing the amount of waste bins in coastal cities and beaches.
- Favor the diet that contains less meat products.
- Apply green technologies in agriculture such as increased storage capacity for slurry produced in pig and cattle breeding.
- Equip waste water treatment plants with filters that reduce the amount of plastic particles.
- Encourage the plastic industry to phase out plastic material with toxic properties.
- Implement the protection measures that are science-based, cost-efficient and societally legitimate. This can be achieved through continued cycle of multidisciplinary research, integrated analyses and science-policy dialogue.
- Encourage Baltic Sea states to consider new economic instruments when reducing their nutrient load. Lessons learnt from emission trading, clean development mechanisms and joint implementation to reduce greenhouse gas emissions could be explored as a way to even out the asymmetry in the geographical distribution of costs and benefits of the cleaning up the Baltic Sea.
- Finally, look further both in time and place – environmental history gives us insight into the present and future.

The HENVI Science Days were organized the 11th time on the 13 – 14 May 2014 on the topic Past and Future Challenges in the Baltic Sea by the Helsinki University Centre for Environment, HENVI. The information in this policy brief is based on research presented by the speakers in the event: Christoph Humborg, Kari Hyytiäinen, Harri Kuosa, Kerstin Magnusson, Richard Tucker, Mari Walls, Tomasz Zylicz and HENVI MULTIDOM researchers. Read more about HENVI at www.helsinki.fi/henvi. This policy brief was compiled by Kaisa Korhonen-Kurki and Kirsi-Marja Lonkila.

Forum for Environmental Information

HENVI, Helsinki University Centre for Environment, funds and enhances the interdisciplinary environmental research and teaching in the university as well as strengthens the use of scientific knowledge in the society.