

WP5

Conditions that influence GES

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AIM

The aim of WP5 is to review the current knowledge and analyse how natural conditions influence the recovery of the Baltic Sea as well as how the projected future change in climate will affect the measures taken to improve the Baltic Sea.

Task 5a - Best practices: Information on reasons, analyses and results which were used to justify exceptions reported by the HELCOM countries being EU Member States under MSFD PoMs in 2016. Common features across Baltic Sea countries will be identified to determine those aspects most widely perceived as causing the failure to meet GES. Examples of best practices to justify exceptions will be summarized and suggestions will be provided on how to elaborate them further for the 2nd round of MSFD implementation. The document will be presented to the HELCOM GEAR Group to support an exchange on the topic among the Baltic Sea EU countries

Reported exceptions by HELCOM countries in 2016

Country	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11
Denmark					X						
Estonia	X			X	X			X			
Finland			X		X				X		
Germany											
Latvia					X						
Lithuania	X	X		X	X			X	X		
Poland	X	X		X	X	X		X			
Sweden					X			X			

Common for the HELCOM countries was to report failure in achieving GES by 2020 regarding D5 – eutrophication and D8/D9 – contaminants / contaminants in seafood. Several countries also reported it for D1/D4 – biodiversity and/or food web and 1-2 countries regarding non-indigenous species, commercial fish and/or sea floor integrity

D5 – eutrophication

- We only consider justifications falling into Article 14(1)(e) ‘natural conditions which do not allow timely improvement in the status of the marine waters concerned’
- There also were justifications based on Article 14(1)(a) (‘action or inaction for which the Member State concerned is not responsible’) but we did not consider those on the Baltic Sea scale
- Climate change, which is not caused by the HELCOM countries alone was also mentioned
- Mostly, it is not specified when GES is expected to be achieved (in relation to Article 14(1)(e))

D5 – eutrophication

- Main reasons stated are the natural specificities of the Baltic Sea – very closed marine area, limited water exchange with the North Sea and accumulation of nutrients in the seabed sediments over the past decades. Climate change could expand the extent of oxygen-deficient areas in its deeper basins, possibly leading to the release of nutrients from sediments and increased levels of dissolved nutrients in the water column.
- Time-lags also due to retention of nutrients in the drainage area, but mostly historically-enriched sediment may continue to be a net source of nutrients for decades after nutrient loads have been sufficiently reduced

D8, D9 – contaminants

- Persistent pollutants are still found in high concentrations in sediments and biota, namely dioxins and polychlorinated biphenyls; past pollution events, also heavy metals (Hg)
- Very closed basin, accumulation of contaminants in sediments; some contaminants are persistent and take a long time to break down
- Inputs of contaminants from atmospheric deposition are transboundary in nature
- Mostly, it is not specified when GES is expected to be achieved (in relation to Article 14(1)(e))
- Main reasons – retention in the drainage area and accumulation in sediments
- Time-lags depend on the substance

D1, D4 – mammals

- Article 14(1), species for which achievement of GES depends on climatic conditions – climate change, which is not caused by the activities in the Baltic region alone, might modify the Ringed Seal's habitats that could prevent their proper protection
- Article 14(1)(a) ('action or inaction for which the Member State concerned is not responsible') – Harbour porpoises and by-catch
- Difficult to estimate the achievement of GES

D1, D4 – fish and D3 – commercial fish

- Size of cod and climatic conditions
- It will take time for the measures to actually reduce exploitation rates and allow for fish species, such as sea trout, pike, perch and other migratory whitefish species, to achieve a sustainable stock status
- Impact of eutrophication and non-indigenous species
- Mostly, it is not specified when GES is expected to be achieved (in relation to Article 14(1)(e))

D1, D4 – water column habitats and D1, D4, D6 – seabed habitats

- Impact of eutrophication and non-indigenous species
- Slow growth rate, impact of non-indigenous species, oxygen levels
- Mostly, it is not specified when GES is expected to be achieved (in relation to Article 14(1)(e))

D2 – Non-indigenous species

- Article 14(1) (e) ‘natural conditions which do not allow timely improvement in the status of the marine waters concerned’ – Non-indigenous species from other Baltic Sea countries may naturally spread
- Article 14(1)(a) (‘action or inaction for which the Member State concerned is not responsible’) – Introductions of non-indigenous species from transboundary sources
- Mostly, it is not specified when GES is expected to be achieved (in relation to Article 14(1)(e))

Task 5b

Review and analyses: **The WP will review the scientific literature and recent project outcomes, including scenario simulations, to identify gaps or delays in achieving GES due to natural conditions and possible effects of climatic changes.** More detailed analyses (descriptors, criteria) will be provided for **selected topics**. The WP will also evaluate impacts of projected climate change on the effectiveness of measures taken to improve the Baltic Sea, including land-based measures to reduce inputs of nutrients and potential alterations to recent input trends or re-emergence of pressures due to secondary processes (e.g. re-release from sediment).

Eutrophication – criteria and topics

The recovery of the Baltic Sea and the time delay that can be expected between load reduction and signs of improved GES will be analysed in relation to the following MSFD criteria: **D5C1 (nutrient concentrations), D5C2 (chlorophyll a), D5C4 (water transparency), D5C3 (harmful algal blooms), and D5C5 (dissolved oxygen)**. Main reasons for delay are the natural specificities of the Baltic Sea – **very closed marine area, limited water exchange** with the North Sea and **accumulation of nutrients in the seabed sediments** over the past decades. Time-lags also occur due to **retention of nutrients in the drainage area**. **Climate change** could cause further time-lags, e.g. expanding the extent of oxygen-deficient areas in the deeper basins, possibly leading to the release of nutrients from sediments and increased levels of dissolved nutrients in the water column.

Hazardous substances – criteria and topics

The analysis will be carried out mainly in relation to MSFD criterion **D8C2 (concentration of hazardous substances)**. Factors: **burial in sediments and re-dispersal, slow degradation rates** of legacy contaminants, and **long-range transport** of some substances. The Hazardous Substances Topic Team identified **Hg (Mercury), TBT (tributyl-tin), PFOS (perfluorooctane sulphonate), and Diclofenac** as the substances they would focus on. In addition the **PFAS group** is being looked at where information is available since this larger group of substances, into which PFOS is nested, reflects a large and currently not fully assessed range of potentially hazardous substances. **PBDEs (polybrominated diphenyl ethers), dioxins and PCBs (Polychlorinated biphenyls)** are also considered as relevant candidates to gather information on.

Biodiversity – criteria and topics

Impacts of natural conditions on achieving GES regarding the following MSFD criteria: **D1C2 (species abundance)**, **D1C4 (species distributional range)**, **D2C1 (newly- introduced non-indigenous species)**, **D2C2 (abundance and spatial distribution of established non-indigenous species)**, and **D6C3 (spatial extent of habitats)**. **Food webs and benthic habitats** – poor oxygen conditions in deep waters of the Baltic Sea limit benthic fauna distribution and can alter food web productivity. **Fish** – achievement of a sustainable stock status given the duration of the reproductive cycles takes time; **cod** status depends on oxygen, temperature and salinity. **Mammals** – GES might not be achieved for species that depend on climatic conditions (**ringed seals**); inadequate nutritional condition of **grey seals** may be explained by the seal population approaching its ecological carrying capacity (natural population plateau), which beside human impacts (e.g. overfishing) could reflect natural ecosystem processes.