

# 6. Conclusions and future outlook



The health of the Baltic Sea ecosystem is under threat from the increasing effects of climate change and biodiversity degradation, catalysed by pollution, demands on land use, resource extraction and other pressures. At the same time, knowledge about the Baltic Sea ecosystem and policies to support its environment have developed substantially in the past six years. Such advancements are of key importance in enabling a sustainable future, although much work remains. Implementing the updated Baltic Sea Action Plan and mitigating the pressures and impacts, including from climate change, are focal areas for HELCOM in the coming years.

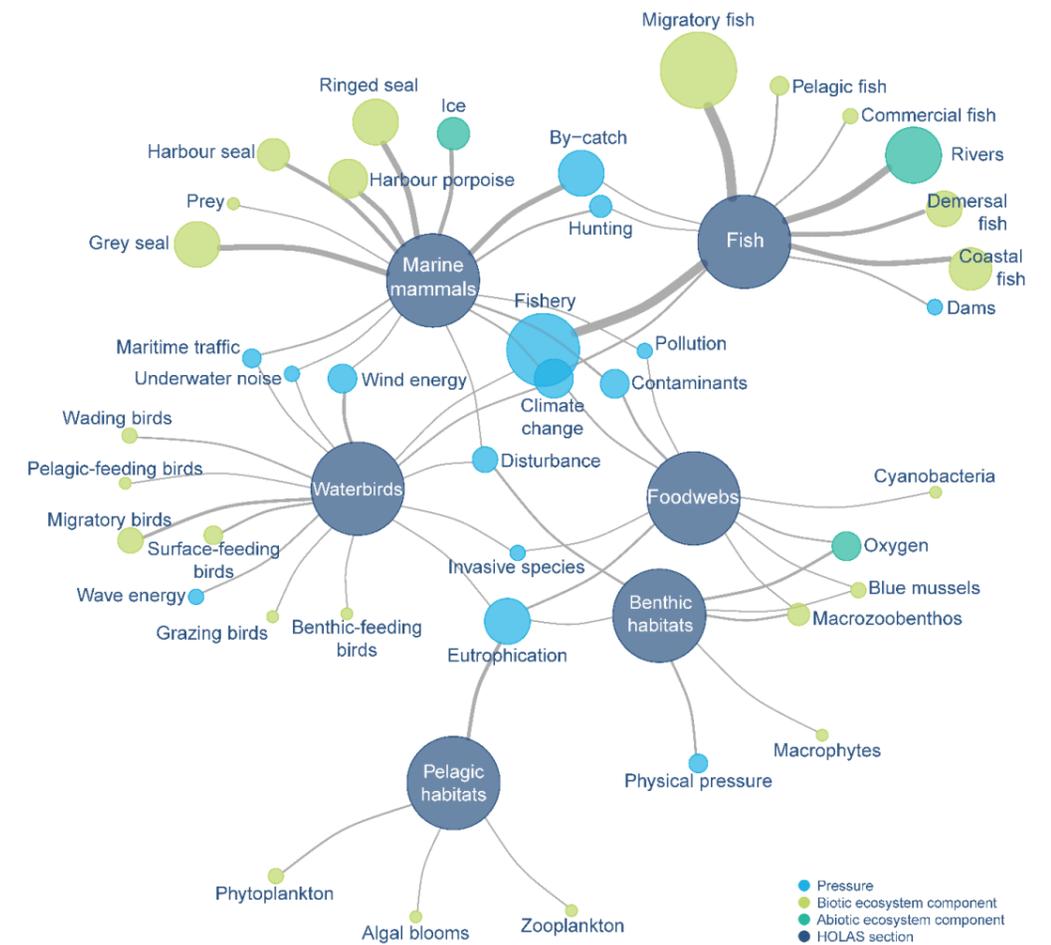
The third holistic assessment, focusing on the years 2016–2021, provides a benchmark for the updated Baltic Sea Action Plan adopted by all HELCOM Contracting Parties in 2021. The Baltic Sea Action Plan (HELCOM 2021) specifies our shared objectives and agreed actions and measures for the Baltic Sea environment, building on the vast knowledge and experiences developed among HELCOM countries over several decades. Compared to the preceding Baltic Sea Action Plan (HELCOM 2007), the 2021 BSAP integrates management efforts for the Baltic Sea environment more clearly into an ecosystem approach and into the global setting. It thus takes a more holistic approach to management and governance, with the ecosystem at the centre of the process.

Both the Baltic Sea Action Plan and the results of this third HELCOM holistic assessment make it clear that achieving good environmental status of Baltic Sea ecosystems requires direct actions to support marine biodiversity along with transformative change, in all sectors, of the processes or economy affecting the sea. Measures across many domains are needed to rebuild ecosystems and stop negative trends. Strengthening and expanding protection efforts, as well as reducing current negative impacts on biodiversity from pollution and sea-based activities, are all cornerstones of conservation and of reinforcing deteriorated ecosystems.

The third holistic assessment shows that there are cases of inadequate status in biodiversity and pressure-related indicators across the full extent of the Baltic Sea and in most ecosystem components. Only a few biodiversity indicators have acceptable levels in parts of the region, and none in all evaluated spatial units. In cases where the deterioration is first noted for certain species or parts of the ecosystem, it can then spread to other parts through links within the food web. Persistent negative trends threaten populations, habitats and the functioning of the ecosystem. Importantly, a poor status for biodiversity also increases the risk of further degradation, since it re-

## 6.1. Conclusions of the summary report

The third HELCOM holistic assessment of the ecosystem health of the Baltic Sea is a milestone in the HELCOM monitoring and assessment system (Figure 6.1). This assessment provides us with an opportunity to reflect on how our current actions affect the Baltic Sea environment and assess the need for new or improved measures. Societal and ecosystem processes are complex, and we need to consider both how well measures that were agreed have actually been undertaken and whether they have had the intended effect. In line with the principles of adaptive management, the assessment also enables us to tune our management efforts as needed in order to ensure that our actions are relevant in relation to the current state of knowledge and environmental conditions.



**Figure 6.1.** An illustration of the components of the Baltic Sea ecosystem encompassed in this summary report for the third holistic assessment of the ecosystem health of the Baltic Sea, together with their multiple connections. The figure shows a network graph of the aspects (pressures, components of the ecosystem, and ecosystem services) covered in this report. Each of the key ecosystem components covered in a section of this report is symbolised by a dark blue circle, and the other circles reflect key elements (terms) mentioned in the sections. The size of the circles is based on how often the term is mentioned and should only be interpreted in this way. Similar terms are aggregated, so each circle includes both the term itself and all terms deemed to be synonymous (e.g. “eutrophication” includes “eutrophication” and associated terms such as “nutrient input” or “concentrations”). The width and length of the lines and the placement of the items are arbitrary. The image gives a simple visual overview of which topics may interact (e.g. a pressure and certain ecosystem components) while simultaneously providing a gap analysis of where more information may be required in the future to increase the holistic nature of the evaluation (e.g. if the interaction between a pressure and an ecosystem component has not been well addressed). The overview was made using igraph.

duces the resilience of the ecosystem against further environmental changes. Pressures on the environment, including hazardous substances, eutrophication, fishing and the introduction of non-indigenous species, remained above sustainable levels during 2016–2021, and the effects of climate change are increasing.

The degradation of the marine ecosystem also reduces its ability to produce goods and services for the benefit of society, with effects on our well-being. Considering the cost of inaction, achieving a healthy Baltic Sea is an investment in our region’s sustainable economic and social development.



## 6.2. What is needed next?

The poor status of many species and habitats in the Baltic Sea reflects their response to multiple environmental pressures acting in combination rather than to individual pressures. Several environmental objectives for the Baltic Sea require a combination of measures in order to be accomplished. Importantly, with the exception of a few measures, such as habitat restoration, the only viable action to improve the status is to alleviate the pressures by

managing our activities so that they are within the limits the ecosystem can tolerate. This calls for the engagement of all sectors impacting on or dependent on the sea. Reaching the nutrient input reduction targets continues to be a priority in HELCOM work, with measures needed in all countries to implement the agreements of the Baltic Sea Action Plan. Coordinated and innovative management is needed to address the wide range of sources from which hazardous substances reach the Baltic Sea, which is part of ongoing work under action HL1 of the BSAP (2021). The impacts of fishing continue to affect fish stocks and the productivity and resilience of food webs. Together, measures to relieve such pressures are key to strengthening the ability of the Baltic Sea to recover and to respond to future challenges.

Even if the third holistic assessment only touches upon a fraction of the complexity of the ecosystems of the Baltic, the large amount of information provided gives us a good understanding of the main pressures on the Baltic Sea, where they primarily occur and the status of key ecosystem components (Box 6.1). A key aim for us now is to incorporate this new knowledge into an operational ecosystem-based management, and into national, regional and global actions for a sustainable future.

The results of the third holistic assessment, including this summary report and all its underpinning products, can support policymakers in determining the decisions and priorities to ultimately secure a healthy ecosystem and a sustainable future for the Baltic Sea. National work in HELCOM countries is at the core of implementing the agreements of the Baltic Sea Action Plan. The third holistic assessment also helps EU countries within HELCOM meet the requirements for the marine environment under the EU Marine Strategy Framework Directive. Actions to support the Baltic Sea environment also support various national, regional and global commitments, such as commitments towards the United Nations Sustainable Development Goals (SDGs). Ultimately, a key factor at all levels of governance is our ability as a society to adapt to an environmentally sustainable way of living around the Baltic Sea and its catchment.

### 6.3. Climate change will increasingly impact the Baltic Sea in the near future

The need for stronger actions and more integrated management of human activities is enhanced by climate change, which increases the risks of biodiversity loss in marine and coastal ecosystems. Climate change effects are already evident in the Baltic Sea, and global warming is expected to lead to further hydrological and ecological changes in the near future. For example, climate change is expected to lead to considerable changes in the occurrence and abundance of species due to the effects of increasing temperatures, a decreasing ice cover and possible changes in salinity. This can lead to direct effects on the functions of food webs and ecosystems, such as changes in productivity and resilience. Climate change effects can also interact with other pressures or lead to changes in human activities af-

fecting the sea. The effects of climate change therefore need to be considered in all aspects of management and policy.

Although further research and understanding is strongly needed, this should not function as a barrier to action, as the vast existing knowledge should be used to plan and implement measures. Along with actions to mitigate climate change, priority areas for the Baltic Sea include meeting the nutrient reduction targets of the BSAP, ensuring a sufficient network of marine protected areas and strengthening the natural capacity of Baltic Sea food webs to regulate and resist the negative effects of climate change.



### 6.4. How can work in HELCOM contribute?

The results of the third holistic assessment show that much work is still needed to improve the status of the Baltic Sea environment. However, the progress that countries around the Baltic Sea have achieved so far clearly shows that the regional collaboration in HELCOM gives results. It is helpful to recall what the state of the Baltic Sea environment could have been like without the measures implemented to date. Inputs of nutrients and hazardous substances have, in fact, reached sustainable levels in some areas and for some substances, biodiversity conservation has increased, and regional monitoring and assessment has considerably improved. These are all necessary and fundamental actions that we want to sustain and build upon. For many processes in the ecosystem, models show that it will take a long time before recovery can be seen in species and habitats. Pressures that have been acting on the Baltic Sea for a long time have legacies and can cause unacceptable status for species and habitats long after they have ceased. However, in some cases, the recovery trend for biodiversity today is still too slow or even absent.

The Baltic Sea Action Plan, together with the increased capacity for knowledge-sharing developed among countries in HELCOM, forms a basis for further ecological understanding, learning, technical improvement and societal innovation that will facilitate future benefits and further improve our actions (HELCOM 2021a). We want to continue our tradition for cooperation and interaction between institutes, organisations and local initiatives around the Baltic Sea, contributing to sustainable human activities and achieving a healthy Baltic Sea environment together.

Continued efforts to improve the environmental status of biodiversity are of key importance. If we successfully limit the amount of pressure our activities put on the environment, we foresee that biodiversity will show signs of improvement and support a sustainable marine region. The results presented in this report clearly show that in order to ensure that the Baltic Sea ecosystem maintains and improves its functions, we need to both limit the extent and intensity of pressures on biodiversity and enhance the resilience of the natural ecosystem. Ultimately, the recovery of Baltic Sea biodiversity is entirely dependent on how well we can manage our activities to ensure that they are truly sustainable, both in the near future and in the long term.



#### BOX 6.1.

##### Assessment advance in HOLAS 3

The third HELCOM holistic assessment has increased our knowledge of the state of the Baltic Sea environment and has substantially improved our shared understanding of its current status. It has also explored how different parts of the ecosystem are connected and evaluated what needs to be done for the Baltic Sea environment. In order to provide these updated assessment results, experts around the Baltic Sea have contributed several improvements to the HELCOM assessment system. It is important to acknowledge this work and to ensure its continued development.

The holistic assessment encompasses a wide range of evaluations in order to give as comprehensive an assessment as possible, based on currently available knowledge and data. The list below offers some examples of improvements achieved within the third holistic assessment, while more extended information is provided in HELCOM (2023a-e), as well as in the indicator reports.

- The evaluation of pelagic habitat status has a wider geographical extent than before and applies an integrated approach using key indicators.
- Loss and disturbance of the sea floor is assessed via an integrated assessment based on an initial selection of available indicators and includes the newly developed Cuml indicator that evaluates predicted impact.
- The benthic habitats and SPIA assessments encompass a wider range of data on ecosystem components, giving them improved ecological relevance, especially in the northern parts of the Baltic Sea.
- The assessment of fish has developed a regionally agreed list of commercial species and, for the first time, provided suggestions for the evaluation of changes in the age and size structure of fish.
- The assessment of marine mammals now includes an evaluation of the harbour porpoise.

- Assessments of unintentional by-catch of waterbirds and marine mammals against regionally agreed threshold values is included for the first time, and these are also provided as part of an integrated assessment.
- The eutrophication assessment was carried out using an improved version of the integrated assessment tool in which the confidence is reported better and more ecologically appropriate assessment unit divisions are applied.
- The integrated assessment of hazardous substances makes use of more available data, includes new indicators and has an improved evaluation of confidence.
- The first regionally coordinated wide-scope screening of hazardous substances in the Baltic Sea has been completed, and follow-up actions are underway. Pilot evaluations of the biological effects of contaminants have also been carried out, and this will be the focus of future work.
- Assessment protocols for underwater noise and marine litter have been developed and improved, with preliminary or regionally agreed threshold values being applied, respectively.
- A new collaboration for improved and harmonized evaluation of non-indigenous species in HELCOM and OSPAR has been initiated.
- The spatial pressures and impact assessment tool provides an interactive way for users to assess, visualize and evaluate the potential impacts of human activities and pressures on different parts of the Baltic Sea environment.
- Several new and improved approaches for evaluating economic and social aspects have been developed.
- Four driver indicators have been developed, exploring possible trends in human activities that may have impacts on status.
- Substantial amounts of data on human activities, pressures, ecosystem components (species and habitats) and drivers are needed to carry out the HELCOM holistic assessments, and the publication of these data sets provides a unique, region-wide and harmonized data resource to support management.