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## Background

This document contains the proposed approach and work plan for the cost-benefit analysis of measures to be carried out by the [HELCOM BLUES project](#)<sup>1</sup> for inclusion in HOLAS III. For a conceptual overview of the link between measures and other planned assessments please see figures 1 and 2.

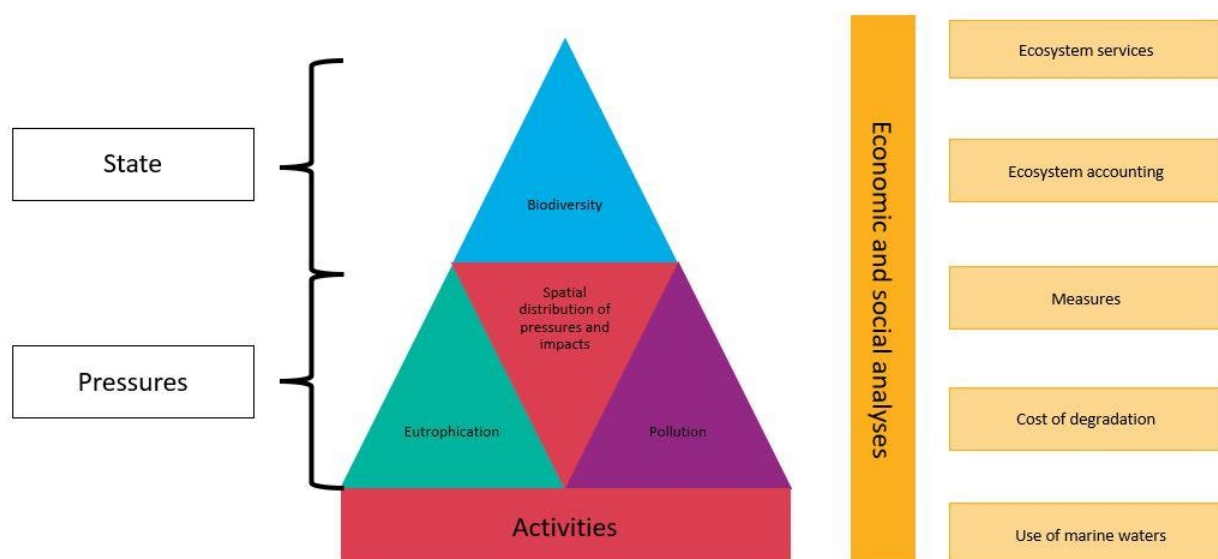
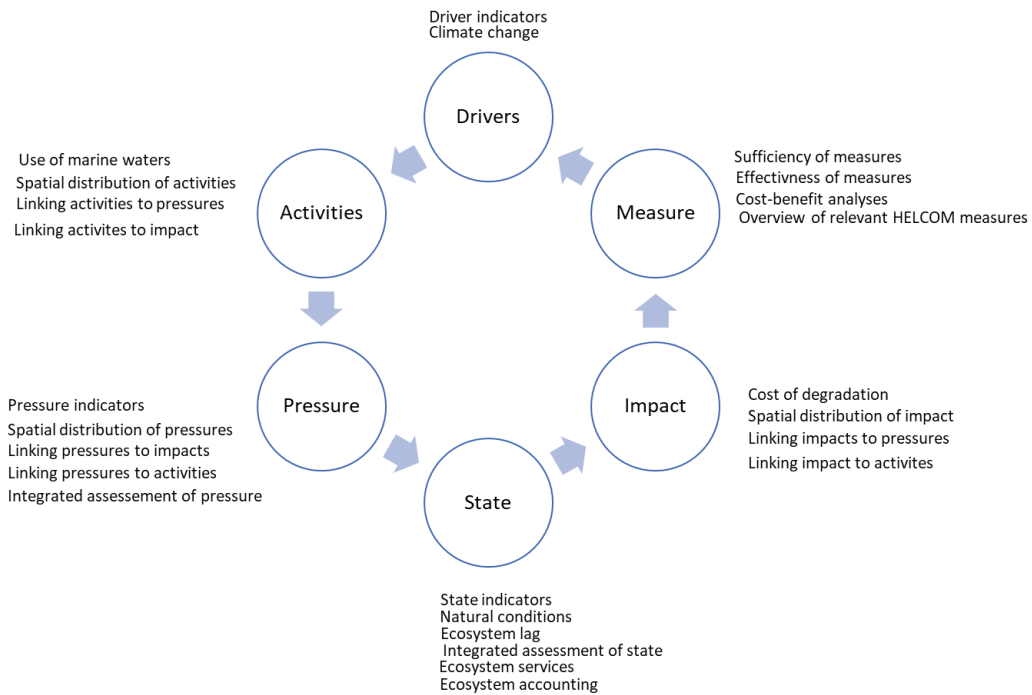


Figure 1. A conceptual representation of the division and internal logic across topics covered by the thematic assessments planned under HOLAS III. In this figure the activities underpin the pressures, which in turn affect the state of biodiversity. The economic and social analyses are by their nature horizontal, with the various aspects under this thematic assessment providing supporting information to each of the topics under the four other thematic assessments.

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<sup>1</sup> The “HELCOM Biodiversity, Litter, Underwater noise and Effective regional measures for the Baltic Sea” (HELCOM BLUES) project is led by HELCOM and co-funded by the European Union. More information at <https://blues.helcom.fi>



**Figure 2. Initial representation of how the various topics planned for inclusion in HOLAS III are divided across the DAPSIM assessment framework. The aim is to integrate the as many of the steps of the cycle as possible under each topic in the State of the Baltic sea report, thus improving the holistic aspects of the assessment. Note the placement of cost-benefit analysis as an integral part of the measures component.**

The HELCOM BLUES project, co-financed by the European Union, runs in 2021–2023. The project covers topics related to biodiversity, litter, underwater noise and effective regional measures and aims at supporting HOLAS III and the implementation of the BSAP and the MSFD for those Contracting Parties that are member states of the EU. BLUES Activity 1 focuses on analyses to support effective regional measures and policies. It further develops the approaches and data for socio-economic analyses previously conducted as part of HELCOM TAPAS, SPICE and ACTION projects that supported HOLAS II and the BSAP update.

One of the tasks in Activity 1 of BLUES is to develop an approach for regional cost-benefit analysis (CBA) of improved status of the marine environment and carry out the analysis for 1-2 selected environmental topics. The analysis can be used in HOLAS III and the next round of initial assessments by those Contracting Parties that are EU Member States. The work builds on the sufficiency, effectiveness and cost-effectiveness of measures analyses first performed in ACTION, as well as the approaches for the regional valuation of environmental benefits developed as part of [TAPAS](#) and [SPICE](#) for HOLAS II. The approaches and data for the assessment are further developed in BLUES. The cost-benefit analysis in BLUES will be conducted in 2022-2023.

The proposed approach was supported by EN ESA 15-2021 for inclusion in HOLAS III (Outcome EN ESA 15-2021, para. 2.16).

### Action requested

The Meeting is invited to:

- consider and endorse the approach for and inclusion of cost-benefit analysis of measures for the HOLAS III assessment, where relevant.

## Cost-benefit analysis of measures

Cost-benefit analysis (CBA) aims at evaluating the economic efficiency of projects or policies from the society's perspective. It provides a systematic and transparent approach for identifying the benefits and costs of policies and assessing their monetary values for the lifetime of the policy (OECD 2018). The benefits are defined as increases in human well-being (or utility) and costs as reductions in human well-being. For a policy to pass the evaluation, its benefits must exceed its costs.

CBA can be seen as a tool for measuring the policy's economic efficiency or contribution to social welfare (Boardman et al. 2017.) It is one of the possible decision procedures to be used together with other criteria (Posner & Adler 1999). Thus, the results of carefully conducted CBAs can provide supporting information for science-based policy decisions.

There are nine general steps in a CBA (Boardman et al. 2017):

1. Specify the set of alternative projects
2. Decide whose benefits and costs count
3. Identify the impact categories, catalogue them and select measurement indicators
4. Predict the impacts quantitatively over the life of the project
5. Monetize all impacts
6. Discount benefits and costs to obtain present value
7. Compute the net present value (NPV) of each alternative
8. Perform sensitivity analysis
9. Make a recommendation

The CBA conducted as part of HELCOM BLUES will evaluate the (monetary) costs and benefits of measures to improve the state of the marine environment to support the further development and implementation of the updated BSAP. The work builds on the assessment framework developed in HELCOM ACTION for effectiveness and sufficiency of measures and cost-effectiveness analysis, adding consideration of the economic benefits of measures to the analysis and further refinements and improvements in the methodology and data on effectiveness and costs (Figure 1).

The aim of the work in BLUES is to develop a practical approach for regional CBA for the Baltic Sea, as well as illustrate the approach and results with selected examples. The focus of the CBA can be in evaluating the costs and benefits of the updated BSAP (compared to the "old" BSAP), or the costs and benefits of achieving GES (compared to a baseline). To support practical applications and future work on assessing the costs and benefits of measures in the Baltic Sea region, BLUES work will 1) describe the general approach for an environmental CBA in a marine region, 2) compile the existing data on the effects, costs and benefits of measures into a database with documentation on sources and use, 3) demonstrate the use of the data with an example for a specific topic and policy scenario, and 4) discuss the quality and quantity of the data for CBA applications. The specific environmental topic and policy scenario for the demonstration depend on the data availability, policy relevance, and existence of previous research, and will be chosen later after step 2) has been completed. The overall approach will be designed to be flexible and adaptable to a wider range of topics.

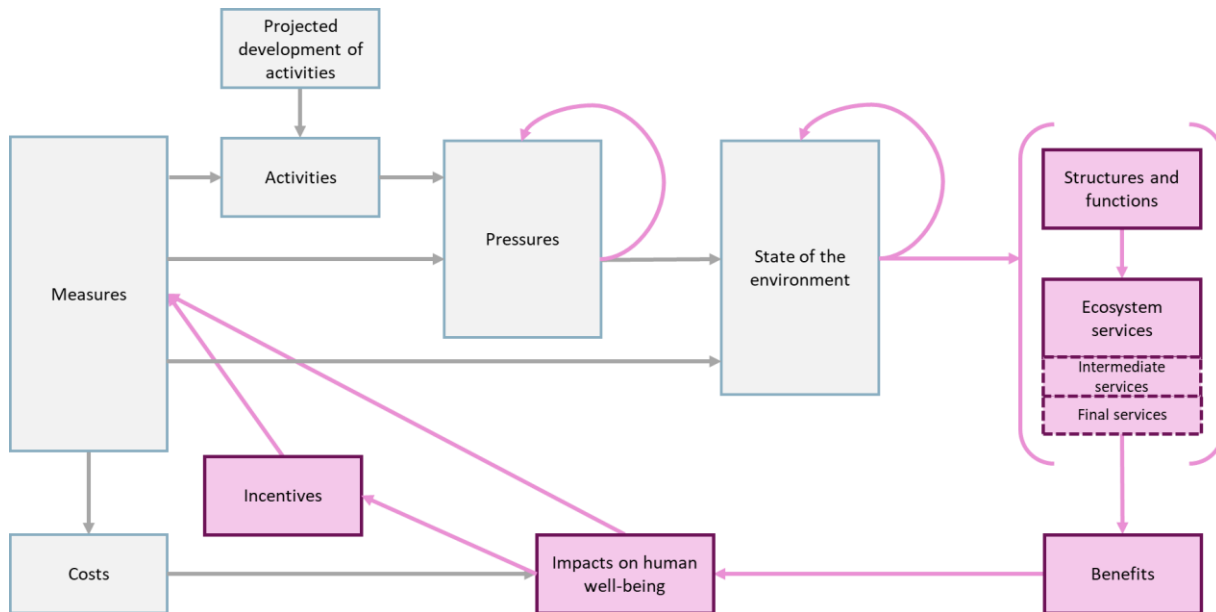


Figure 1. Development of the conceptual assessment framework to include ecosystem services, benefits and costs. Purple boxes indicate new outputs from BLUES. Grey boxes were originally assessed as part of ACTION, and will be further developed in BLUES.

### Cost-effectiveness of measures

Cost-effectiveness analysis (CEA) is a systematic method for evaluating the costs and effects of measures or policies. It can be used to identify the optimal (cost-effective) combination of measures to reach agreed environmental goals, which allows for achieving the goal with the least costs. Further, it enables assessing the total costs of policies (for examples, see e.g. Hyytiäinen & Ahlvik 2015, Oinonen et al. 2016).

#### ACTION work on cost-effectiveness of measures

The ACTION project took the first steps in analysing the costs and effectiveness of measures at the Baltic Sea region scale. It compiled information and assessed the approximate costs and effects of the proposed new measures for the updated BSAP (for details, see Cost effectiveness of proposed new measures for the Baltic Sea Action Plan 2021, [doc. 4J-61](#)). In addition, it provided some preliminary comparisons of measures with respect to their costs and effectiveness, and the total costs of proposed new measures.

The effectiveness of proposed new measures was estimated based on existing literature (incl. the synopses) and measure type effectiveness estimates from the SOM analysis of existing measures (Methodology for the sufficiency of measures analysis report, [doc. 4J-61](#)). As in the SOM analysis, the effectiveness estimates show the percent (%) reduction in the pressure from human activities, percent change in the pressure or percent increase in the probability to achieve state improvements from implementing the measures.

The cost estimates were collected from synopses, literature reviews, ACTION WP2 and Contracting Parties through EN ESA (Estonia, Finland, Latvia, Lithuania, and Sweden). The estimates were adjusted to annual values and to the year 2019, and regional estimates were calculated based on cost transfers that accounted for differences in currencies and purchasing power parities. Both the costs and effects were estimated for the entire Baltic Sea region.

Very limited information was available on the application extent of the proposed new measures at the time of the analysis. As the application extent is crucial for determining both the effects and costs of measures, assumptions had to be made on the application extent (such as geographical area, number of installations)

of the proposed new measures. Three scenarios were made for the application extent (low, moderate, high). These specified the extent of the proposed new measures, e.g. in square kilometers. The moderate scenario used the application extent from the original source study. The application extents were assumed to be equally distributed across countries, sub-basins and shares of the catchments where the measures were implemented.

During the analysis, the lack of data on the application extent, effectiveness and costs of the proposed new measures became apparent. Due to that, as well as other uncertainties and limitations in the SOM assessment framework, the quantitative results of the cost-effectiveness analysis can be considered only indicative. These were also the main reasons why optimization (indicating the cost-effective set of measures) was not included in this analysis.

#### BLUES work on cost-effectiveness of measures

BLUES aims to develop the cost-effectiveness analysis further to reduce uncertainties and enable its use in the cost-benefit analysis.

First, additional data on the effects and costs of measures will be usable in BLUES, the utilization of existing literature and model-based data will be improved and additional data on the effectiveness and costs of measures collected, e.g. from national MSFD PoMs. Cost and effectiveness data are proposed to be compiled from national PoMs with the help of EN ESA. This will reduce the reliance on expert-based data and enable the inclusion of additional measures in the analysis.

Second, the updated BSAP will be accepted by the time the cost-effectiveness analysis is made. This will provide the final list of measures for the CEA, and it should also provide more accurate information on the application extent of the measures.

Finally, all general improvements in the SOM assessment framework and effectiveness analysis (see [doc. 4J-62](#)) will also benefit the CEA, as it utilizes the same model framework.

#### Benefit estimation

An important addition to the economic analyses conducted as part of ACTION are the societal benefits from improvements in the status of the marine environment. Their inclusion in the analysis enables a more encompassing analysis of the efficiency of policies. Existing information of the benefits of implementing measures and achieving environmental objectives is collected via a literature review of economic valuation studies of the Baltic Sea environment and ecosystem services. When necessary, the benefit estimates are adjusted and transferred to unstudied countries and contexts to obtain regional benefit estimates, following the approach developed for HOLAS II (HELCOM 2018).

The literature review and benefit estimation are conducted following these steps:

1. Define the focus and scope of the literature review. The review is limited to studies:
  - Concerning Baltic Sea countries and marine region
  - Concerning ecosystem services and environmental topics
  - Using monetary or non-monetary valuation
  - Published in 2010 or later
  - Published in peer-reviewed journals or grey literature
2. Compile relevant benefit information from existing studies via a literature review
  - a. Identify studies based on previous literature reviews, including BONUS ROSEMARIE (2020), Sagebiel et al. (2016), Ahtiainen and Vanhatalo (2012), Heckwolf et al. (2021), Mehvar et al. (2018), Martin et al. (2016), Torres and Hanley (2016), and Rodrigues et al. (2017)
  - b. Search for recent studies (2019 =>) via a similar literature search as in BONUS ROSEMARIE
  - c. Request recent national studies as well as grey literature from EN ESA

3. Record relevant information from each study to an excel dataset
4. Produce benefit estimates for use in the CBA
  - a. Use value transfer to arrive at regional estimates similar to the HOLAS II approach developed in the TAPAS and SPICE projects
  - b. If possible, make further adjustments in the benefit estimates for different levels of changes in environmental state to enable flexible analyses of various scales of improvement and improve the validity of the use of the benefit estimates in the CBA

The benefit estimates are usable both in the cost-benefit analysis and cost of degradation analysis. The work will also provide improved knowledge for applying the ecosystem services approach for policy analyses of the marine environment, together with the MetDev project.

At present, steps 1 and 2 have been completed. Screening of relevant studies is ongoing, and the next step will be recording information from each study to an excel dataset (step 3).

### Planned timetable for the work

In the BLUES project, the cost-benefit analysis has been planned for 2022–2023, when the improvements in the model framework have been implemented and the necessary data compiled. Full description of the methodology of the CBA will be ready in the spring 2022, due to the timing of the analysis in the project.

EN ESA has been and will continue to be consulted for all ESA work conducted by BLUES. Additionally, BLUES is aware of ongoing work by the HELCOM MetDev and HELCOM Data Flow projects and is maintaining contact with these projects to identify synergies.

Table 1. Planned timetable for the BLUES work related to the CBA

Task	Timing
<b>General development of the assessment framework</b>	January 2021 - December 2021
<b>Improved data on effectiveness and costs of measures</b>	January 2021 - January 2022
<b>Literature review and producing benefit estimates</b>	March 2021 - March 2022
<b>General approach for the cost-benefit analysis</b>	January 2022 - April 2022
<b>Carrying out the cost-benefit analysis for selected topics</b>	March 2022 - January 2023

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