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Background

In addition to analysing the sufficiency of *existing* measures, the work plan for the BSAP update includes assessing the costs and effectiveness of potential *new* HELCOM actions for the updated BSAP, carried out by the HELCOM ACTION project and SOM Platform. The ACTION project has developed a template for collecting cost estimates which should indicate potential gaps in information. GEAR 22-2020 invited EN ESA to support the collection of the national information on the costs of measures to fill said gaps ([Outcome](#), para 4.31).

This document describes the methodology for the cost-effectiveness analysis of new measures, including the approach and template for collecting the cost data.

Method for analyzing the cost-effectiveness of new measures

Cost-effectiveness analysis of new measures

The cost-effectiveness analysis of new measures builds on the assessment of sufficiency of existing measures to reach good environmental state in Baltic Sea. If the existing measures are not sufficient to close the gap between the current and the good state, then new measures are required, and information on their cost-effectiveness can support the BSAP UP process. The cost-effectiveness analysis studies and compares how effective new measures are in closing the gap between the BAU scenario(s) estimated in the SOM analysis and the good state, when also the costs of the new measures are taken into account. In principle, cost-effectiveness analysis can be used to define a set of measures that is adequate to reach a certain environmental objective with the lowest costs, or to define a set of measures that performs best in reaching an environmental objective, given a budget-constraint on the maximum costs. Cost-effectiveness of new measures will be analyzed following the steps and methods described by Kontogianni et al. (2015), Oinonen et al. (2016) and Saikkonen (2018) and in this document they are applied to the BSAP UP process.

This document outlines also guidance for identification of cost types related to new measures and for providing available cost data on these costs types and proposed new measures to support the cost-effectiveness analyses. These data can then be used in a way that allows the comparison of costs for variety of measures, when different types of costs are included in the analysis. The types of costs related to a measure can be identified by defining causal pathways on whom the measures affect and how. Further expert consultation may be required to complement the cost data, and especially to assess the uncertainties of measure costs. For example In SOM Platform 3-202 it was discussed that ACTION can provide background material for upcoming BSAP workshops to get missing details on the synopsis descriptions to assess the costs of measures. Tentative cost data contributors include EN ESA network, ACTION WPs, SOM topic groups, and all the same parties who have taken part in filling in the synopses on measures. Also, experts responsible for the cost-effectiveness analyses for national MSFD POMs are encouraged to contribute, since there can be synergies between national and regional work. In addition to all these parties, topic teams can provide valuable information on the causal pathways of measures.

The cost-effectiveness analysis is focused on the costs (and effectiveness) for the whole Baltic Sea region and not the costs of individual countries. However, information on costs from different countries will be utilized to estimate the regional costs, and cost estimates may be transferred across countries if needed with appropriate adjustments.

The data on the effectiveness of new measures will be collected mainly through ACTION WPs, SOM topic teams, and some available estimates may also come from the synopses on potential new actions. Further, surveyed data on the measure type effectiveness that is used in the SOM analysis can be applied also to estimate the effectiveness of new measures. Joint effects, aka synergistic or antagonistic effects of measures will be identified and assessed using the activity-pressure-state linkage chains.

The cost-effectiveness analysis builds on the same model as the analysis of existing measures and thus the results are produced either for the HELCOM sub-basins or for the Baltic Sea level. The analysis can in principal be conducted regionally, by sub basin, or nationally and thus it can also support the update of national programmes of measures. However, the use of different spatial levels may require aggregation of data for a regional, Baltic-wide, analysis, or that aggregated data weighted by, for example, sizes of national marine areas is used for more disaggregated spatial areas. These issues have to be taken into account especially when interpreting or comparing the results of cost-effectiveness analyses.

Approach and steps for the cost-effectiveness analysis

a) Identification of potential new measures (from the synopses).

b) Evaluation of effectiveness of new measures: Building on the method framework for the sufficiency of measures analysis, the effectiveness of new measures is defined in a similar way as for the SOM analysis (i.e. reduction % of a pressure from an activity).

Information on effectiveness of potential new measures will be collected from the following sources: (1) synopses of the new measures, (2) peer-reviewed literature (ACTION WP6), (3) grey literature such as project reports (ACTION WP6), (4) ACTION project outcomes and (5) expert-based data collected for the SOM model, when new measures can be linked to the measure types in the expert surveys. The effectiveness will be estimated as % change in pressures or state and it can be expressed on a probability scale.

Timetable: The ACTION WP6 objective is to primarily collect the data for the proposed measures in April-June and this will support also the BSAP UP workshops in August-September. It is suggested that the BSAP UP workshops could also contribute to the effectiveness estimates. ACTION WP6 will, however, continue to fill gaps and strengthen the effectiveness data until summer, because no other data collection processes have been set for the effectiveness of new measures.

c) Joint effects of new measures: The joint effects of new measures will be estimated by evaluating three kinds of overlap:

- Thematic overlap in measure types due to their existence on different policy levels (global, EU, HELCOM, national) or overlapping content (e.g. MPAs in general vs. fishing closures in a specific area).
- Chain effects of measure types in reducing pressures. When multiple pressures affect a pressure from an activity, the %-effectiveness to reduce initial pressure for an individual measure is decreased, because other measures are also affecting the pressure.
- Other additive, synergistic or antagonistic joint impacts will be explored and potentially included.

More detailed method presentation of the joint effects in the SOM analysis is given in SOM Platform 3-2020 Document 2-1.

d) Estimation of costs for the new measures: See next chapter.

e) Finding optimal sets of new measures: Cost-effectiveness analysis will be run for the proposed measures. The cost-effectiveness results are primarily given as optimal sets of new measures but cost-effectiveness of individual measures excluding the joint effects can also be produced. The method in Oinonen et al. (2016) is used as the basis, but inspiration is sought from Kontogianni et al. (2015), Saikkonen. (2018) and on-going and recent projects. New potential measures are assessed in terms of their cost-effectiveness with respect to reaching good environmental state and possible budget constraints, certainty and other relevant aspects.

Cost estimation for proposed new measures

Background on cost estimation for new measures

The purpose of this chapter is to provide provide background information of cost estimation on proposed/new BSAP measures. The guidelines for collecting information on cost data on proposed new BSAP measures was presented already in SOM Platform 2-2019 and it was further developed in ACTION WP6 meeting in February 2020. SOM Platform 3-2020 reconfirmed that the costs will be estimated for the Baltic Sea scale but noted that information on costs from different countries will be utilized to estimate the regional costs, and cost estimates

may be transferred across countries if needed with appropriate adjustments. GEAR 22-2020 took note of the methodology for conducting the cost-effectiveness analysis of new measures and the steps involved, and invited EN ESA to support the collection of the national information to fill said gaps. The Meeting noted that the information on the cost estimates is also valuable for the national work on the EU Marine Strategy Framework Directive. The Meeting highlighted that evaluation of new measures could be supported by considering the benefits of proposed measures to the environment and society, and welcomed the offer by the Secretariat to explore the possibility of conducting a benefit assessment in autumn 2020.

ACTION WP6 has developed a database template (see Appendix) to support the collection of cost estimates and to use these estimates to assess the costs of new measures. All the collected data will be stored in the database.

Cost data collection

The collected cost data can include anything from the description of different agents and institutions that are affected by the implementation of the measure to the actual measure cost estimates (also qualitative and relative cost estimates, in addition to monetary). ACTION WP6 has already collected cost data from the following sources (in parentheses details on the progress and timing):

- 1) the cost descriptions in the synopses of the new measures (finished)
- 2) references listed in the synopses (ongoing)

Following sources and approaches have been planned to collect further cost data:

- 1) The literature that have been reviewed for the effectiveness of existing and new measures (includes notes if cost data exists) (after the literature review for existing measures is finished).
- 2) searching relevant databases of scientific and other literature with the economic terms (e.g., “cost” or “value”) likely combining them with the search strings and terms that have been used for effectiveness of measures. Conducting joint searches for the effectiveness and costs of new measures. (after the literature review for existing measures is finished).
- 3) Reviewing the cost estimates and relevant studies conducted for the Finnish Water Framework Directive (ongoing)
- 4) checking the peer reviewed cost estimation studies that have been included in the systematic literature reviews in the ROSEMARIE BONUS project and going through grey literature that was collected in the same project but excluded from the reviews (starting, the database including all the literature collected for ROSEMARIE project will made publicly available soon)
- 5) Conducting specific literature searches for proposed measures where the causal pathways were described concretely enough in the synopses to define cost items. The data on the causal pathways could be complemented in the BSAP workshops.
- 6) Finding synergies with the Finnish cost-benefit analysis for MSFD POMs. Such synergies may also exist with other contracting parties.
- 7) Data call for national and other estimates from other project partners, contracting parties and HELCOM EN ESA members! (IMPORTANT)

Request for data on cost estimates

As pointed out in the point 7) of previous section, ACTION WP6 is interested in the available cost estimates that have been used in the previous analyses for MSFD, BSAP, WFD and other relevant policies. Thus, contracting parties are invited to contribute to providing such documents. Any references to such documents are appreciated, regardless of the language of the document. It is suggested that the provided references could be

recorded in this simplified excel template ([Annex 1](#)) and send it to tin-yu.lai@ymparisto.fi, so ACTION WP6 can collect them in the database template to be used in the estimation of costs for new measures (template described in the Appendix). The collected data will be shared and can be used also for national and other cost-based analyses. It would be ideal, that possible contributors provide as disaggregated cost data as possible for each measure following the simplified template, but also plain references to any documents reporting cost data are valuable.

In principle, the costs and effects of measures are separate inputs to the cost-effectiveness analysis, but ACTION WP6 is also interested in existing models and studies, and their results that take both costs and effects (or benefits) into account (for example the [Displace model](#)). Therefore, it is asked that possible contributors do not start estimating any new cost values for the cost effectiveness analysis of new BSAP measures without discussing it first with ACTION WP6 participants. Thus, if a contributor wishes to take part in the cost estimation, please consult ACTION WP6 to ensure that the methodology applied for cost estimation is compatible with the approach.

Steps to cost estimation

The collected cost data for new measures can be used in the cost-effectiveness analysis as such or as an input for cost calculation. The cost data used in the analysis may further be validated by expert evaluation, and cost categories may be used (eg. From low, medium, high). To harmonize the analysis among measures the partners of WP6 will choose what types of costs related to measures are included in the analysis and what collected cost estimates are used to assess them.

ACTION WP6 meeting in February 2020 recommended six concrete steps which guide towards cost estimations for the proposed new measures (Table 1). The important message from these steps is that before starting the estimation of costs based on the collected cost estimates, it is important to understand whom the measures affect and how, and how these effects are translated to different cost items and types.

TABLE 1. CONCRETE STEPS TO ESTIMATE COSTS OF PROPOSED NEW MEASURES
1. List the proposed new measures that will be included in the analysis.
2. Create causal pathways for implementation of the proposed new measures included in the analysis to understand who are affected by the measures and how (from expert workshops, synopses, descriptions of existing measures, reports...).
3. Identify the types of costs for proposed new measures based on causal pathways (from CEA reports, cost-guidance).
4. Considering the cost types for proposed new measures, review available cost estimates and existing data sources that can be used to define the costs of proposed new measures. [can be start at the same time as Step 1]
5. Cost transfer: how to use existing cost estimates and data for the cost types of proposed new measures. This step also includes a proposal to use categorical costs instead of monetary values. The proposal is that national cost estimates are categorized into common categories which reflect the national 'low costs' or 'high costs'. This categorization will reflect the obvious need to have intervals for the costs but also to ensure comparability among the Contracting Parties and help to deal with uncertainties with the cost estimates. The categories could be 'very low', 'low', 'moderate', 'high' and 'very high' and they would be more clearly defined to support their use.
6. Data validation and data gaps in existing cost data. Additional actions: expert opinion etc.

References

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Oinonen, S., Hyytiäinen, K., Ahlvik, L., Laamanen, M., Lehtoranta, V., Salojärvi, J., & Virtanen, J. (2016). Cost-effective marine protection-a pragmatic approach. *PloS one*, 11(1), e0147085.

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Appendix 1.

Table 1 Template of "Input Info" sheet to report all the collected cost data in the cost database

No*	Name of (sub)measure	Description of measure	Cost item - description	Affected actors	Cost type	Cost type – description ^[1]	Reference	Assessment	Time aspects	Notes and methodology	Notes on uncertainty in the cost assessment	Additional data on taxes, subsidies and other economic incentives	ID of the proposed measure ^[2]
	Item A in the guidelines	Item A in the guidelines	Item B in the guidelines	Item B in the guidelines	Item C in the guidelines	Item C in the guidelines	Item D in the guidelines	Item E in the guidelines	Item F in the guidelines	Item G in the guidelines	Item E in the guidelines	Item H in the guidelines	
1.1.1	[Measure 1] [sub-M1]	[for M1]	[Item 1]										
1.2.1	[Measure 1] [sub-M2]	[for M1]	[Item 1]										
1.2.2	[Measure 1] [sub-M2]	[for M1]	[Item 2]										
2.1.1	[Measure 2]	[for M2]	[Item 1]										
2.1.2	[Measure 2]	[for M2]	[Item 2]										
3.1.1	[Measure 3]	[for M3]	[Item 1]										
3.1.2	[Measure 3]	[for M3]	[Item 2]										
3.1.3	[Measure 3]	[for M3]	[Item 3]										

* Numbering for filled in measures to allow easier review, since more than 1 row can be filled in for the same measure. Also, the number can be used as reference in the "Database" sheet. 3 digital ID are used. First number: Synopses. Same synopses have same ID. Second number: Options or sub-measures to achieve synopses. If there are multiple options to reach the synopses and the options will not happen simultaneously, the second number should be different. Third number: Under the same option, but the type of cost, affected actors, and the studies are different.

[1] Describing the cost type. Providing comments on whether Indirect costs are relevant and whether they are included in the estimate/assessment. For capital costs providing also lifetime and discount rate used for calculating the annual costs.

[2] The proposed measure for which this information can be used for estimating the costs (according IDs in the "Database" sheet).

The costs of measures can be defined from different perspectives. From the perspective of a whole economy, the economic costs are assessed based on the impact on total welfare of a society, whereas the costs for an individual agent (e.g. firm), an institution (e.g. body responsible for implementing a measure) or a sector (e.g. agriculture) do not include the economic effects encountered by others. The cost type used in the is template include:

- Financial – Capital costs of a measure, fixed one-off expenses incurred by the purchase of some tangible or intangible goods that can be used over a longer time period. For example, a capital cost can be the cost to purchase a boat for fishing monitoring.
- Financial – Operation and maintenance (O&M) costs of a measure, for the institution that is implementing the measure and for the sector/agent that the measure is targeted to. For the implementing institution, financial costs include direct costs, such as labor costs of monitoring and fish stock assessment.
- Financial – increase in daily business/operation costs, referring to the increase of original daily business cost due to the implementation of new measures. For example, increasing transportation cost to go further as original fishing grounds are transfer to no fishing areas.
- Financial - Indirect costs of implementing a measure, such as overhead costs of the whole institution or the depreciation costs of general multipurpose monitoring equipment when implementing the new measures.
- Financial – Other costs
- Opportunity costs – foregone revenues, for example, a measure that restricts fishing in a certain area can decrease the profitability of the fishing sector, and this economic loss is an opportunity cost resulting from such a measure.
- Benefit – Decrease (save) in daily business/operation costs, referring to cost saving from the daily business due to the implement of measures.

The assessment of cost included in the database can be: (1) Quantitative estimate (any type e.g. point or interval value, absolute or relative value e.g. %-tage from actor's revenues). Provide the estimate, currency and time unit (per year or other), and any other relevant information concerning the estimate (e.g. cost unit). (2) Semi-quantitative assessment (categories with quantitative intervals). (3) Qualitative assessment (categories e.g. low, high).

“Database” sheet

The “Database” sheet aims: (1) to put together relevant background information for developing cost estimates for new measures, and (2) to support calculations and provide the developed cost estimates, which are used afterwards in the cost-effectiveness analysis of new measures. In this sheet, each estimation is divided in five sections:

1. Characterisation of measures: Using the same list of measures as for the effectiveness assessment, but it might be needed to separate sub-measures (separate rows in the database) to facilitate cost estimation. This section provides the basic information of the measure:

(1) Characterisation of measures					
ID number	Name of measure	Description of measure	Type of measure	Activity	Pressure or State component

2. Used input information on costs (e.g. estimates, source(s), certainty): This section summarises the input information related to costs which is used for deriving the cost assessment/estimates for the CEA. This section is filled for each measure based on collected input information in the sheet “Input Info”.

(2) Used input information on costs					
Source No(s)	Description of Assessment(s)	Temporal scope	Geographic scale	Year of Assessment(s)	Assessment(s)
Type of information source	Reference	URL	Certainty assessment/estimate on cost?	Certainty assessment	Source/approach of certainty assessment

3. Affected actors – assessment: Columns with the main groups of actors.

(3) Affected actors - assessment						
Private actors	Managing authority/-ies	Controlling authority/-ies	Municipal/local authority/-ies	NGOs	Other	Comments

4. Types of the costs – assessment: This section includes the developed assessments/estimates and related explanatory information concerning types of the costs. The aim here is to derive and provide quantitative estimates (as far as possible). The estimation may require some calculation from the original cost data from the sheet “input info”, thus the approach and other variables used to derive the estimation need to be clearly documented. If the costs are not quantified for a measure, they can be described in other way in column “Description”. This section is further divided by cost types described in the section of “Input Info” sheet. Each cost type has same item need to be filled as below:

(4) Types of costs - assessment / Financial - CAPITAL costs of a measure					
Relevance	Description	Quantitative estimate (EUR/year, for 2020, for whole Baltic Sea)	Lifetime (for capital costs)	Other relevant input variables	Approach

5. Total costs – assessment: This section focuses on the derived quantitative estimate of the total costs based on assessment of each type of cost in the previous section (where it was possible; filling NA if not estimated). The results of this total cost assessment will be used or cost-effectiveness assessment.

(5) Total costs – assessment			
Quantitative point estimate (EUR/year, 2020, whole Baltic Sea)	QUANT Lower bound	QUANT Upper bound	Comments

Certainty – Assessment	Certainty – Comments	Cost categories – assessment