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## Background

The approach and steps for the sufficiency of measures (SOM) analysis have been roughly outlined in the Terms of Reference for the SOM Platform (Document 2), approved by HOD 55-2018. A more detailed proposal has been developed in the HELCOM ACTION project, building on the work initiated by the HELCOM SPICE project.

This document describes the overall approach for and components of the SOM analysis, and the detailed proposal for the analysis from the ACTION project. The SOM Platform meeting is invited to consider relevant methodological issues and analytical steps pertaining to the analysis. The aim is to arrive at a joint understanding of the approach that will be presented for approval by GEAR 10-2019 and implemented by the SOM Platform and the ACTION project with contributions from HELCOM Workings Groups and Expert Groups.

The document furthermore describes the overarching organization of planned work and the timetable to contribute to the BSAP update to be used as basis for a more detailed planning of work for the SOM Platform.

## Action requested

- consider and further develop the proposed approach for analysing sufficiency of measures, taking into consideration the discussion points listed in the document (at the end of Section 2),
- arrive at a common understanding on the main features of the approach,
- propose how to organize the implementation of analyses for the respective topic to be covered by the SOM Platform.

## Proposal for the SOM approach

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## 1. Overall approach

The aim of the analysis of sufficiency of measures (SOM) is to assess whether existing policies are sufficient to achieve good environmental status (GES) in the Baltic Sea. It relies on estimating the status of the marine environment at some specific future point in time, given measures in existing policies, their implementation status, natural time lags, and possible development of human activities/pressures over time. This is called the 'business-as-usual (BAU) status' (Figure 1). If the analysis indicates that GES is not achieved, then existing measures are not sufficient and additional measures are needed.

The development of the BAU status entails describing how the state of the marine environment would change over time due to 1) the implementation of existing policies and measures therein impacting the marine environment and 2) possible changes in human activities/pressures. There are several important considerations and decisions that need to be made in order to operationalize the framework. These are listed at the end of the document under Discussion points.

SOM analysis includes the following components:

- information on existing measures and their level of implementation, and possible time lags in their effect (Steps 1-2),
- identifying main pathways for pressures based on links between activities and pressures (Step 3),
- estimating the effect of measures on pressures and state (Step 4),
- projections of the development of human activities/pressures (Step 5),
- estimation of the changes in the state of the marine environment due to changes in pressures (Step 6),
- using the information above to assess the projected status of the marine environment (BAU status) by a specific point in time (Step 7),
- comparison of the BAU status to GES and evaluating how far we are from reaching GES, i.e. the sufficiency of measures (Step 7).

The steps are described in detail in Section 2.

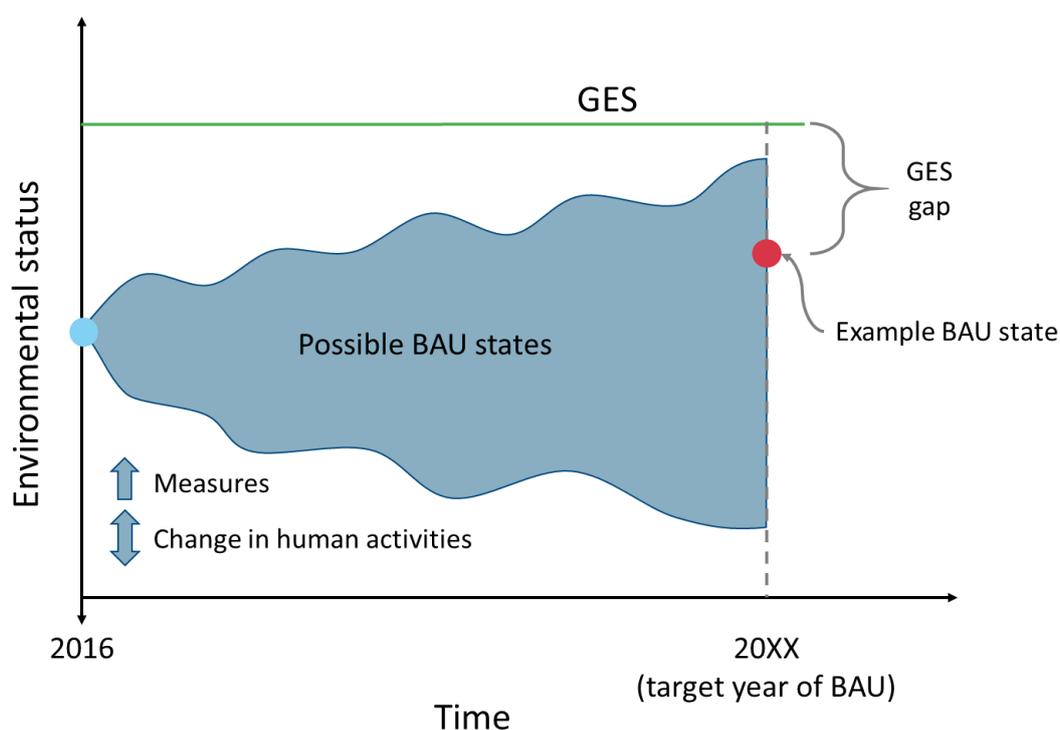


Figure 1. Illustration on the use of the BAU in the gap analysis. Source HELCOM (2018a).

## Time frame

The time frame of the BAU should be consistent with the relevant target years of the HELCOM BSAP and the EU MSFD. The time frame should stretch beyond 2020/2021 to allow for more complete impact of existing policies and measures, but it should not stretch too far into future to avoid uncertainties in changes in the climate and policies.

The meeting of the HELCOM expert network on economic and social analyses (Item 4.2 in the [Outcome of EN ESA 2-2018](#)) suggested to follow the MSFD cycles in deciding the time frame, i.e. having 2027 or 2033 as the end year. Another consideration is that HELCOM has agreed to align its work with the UN Sustainable Development Goals (SDGs), most of which have the target year of 2030.

In the choice of the time frame, it is important to account for other analytical and technical issues, such as time lags in the effect of measures on environmental status and increasing uncertainty as the time frame is lengthened. This aspect is further reflected in Section 2 Detailed approach, under Step 2.

Several alternative BAU scenarios could also be developed with different end years.

Although a specific end year is chosen for the BAU, the agreed target years for implementing existing measures should be acknowledged. This could affect assumptions made in the analysis on when the ongoing/planned measures will be implemented.

## Existing policies and measures

Measures that are included in the BAU status (existing measures) need to be clearly defined. For all existing relevant policies (e.g. current BSAP, MSFD, WFD, EU Biodiversity Strategy 2020), implemented, on-going (or partially implemented) and planned measures<sup>1</sup> are proposed to be included in the BAU, as suggested by EN ESA 2-2018 (Item 4.3 in the [Outcome of EN ESA 2-2018](#)). Thus, it would be assumed that all measures in existing policy frameworks are fully implemented in the time frame of the BAU, independent of their current implementation status, and their effect on reducing pressures would be realized fully in the time frame of the BAU.

It is also possible to conduct an alternative SOM analysis with a different set of measures, i.e. including only measures that have been fully implemented as of now. The difference between the BAU status with implemented measures and the BAU status with all measures in existing policies would show how the implementation of ongoing and planned measures affects the state of the sea.

It also needs to be decided what types of measures are considered in the analysis, i.e. whether to exclude measures that e.g. increase awareness, information and knowledge but have no direct impact on pressures and the state of the sea. Alternatively, their effectiveness can be estimated as low and uncertainty high.

## Environmental themes to cover

It is proposed that the SOM analysis will be carried out for the same environmental themes as in the State of the Baltic Sea report (Figure 2). For some themes a descriptor level evaluation could be appropriate, e.g. to compare the BAU state with the integrated status. For biodiversity, the analyses could be done by ecosystem component, groups of species (e.g. coastal fish) or in some cases by species (e.g. grey seal). For a majority of topics, the status threshold values are proposed to be used as the basis for the analyses. For eutrophication,

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<sup>1</sup> Note that the term *existing measures* covers implemented, partially implemented/ongoing and planned/not yet implemented measures in existing policies.

the analyses could rely on pressure targets as agreed in HELCOM. A reflection on this is provided under Section 2, Step 2.

For some topics there are no agreed GES threshold values or quantitative pressures targets (e.g. marine litter, underwater noise) in HELCOM, and thus proper gap analysis is not possible. For these topics, it is still possible to assess how much the existing measures will contribute to reducing a certain aspect of the pressure, e.g. the amount of litter on beaches.

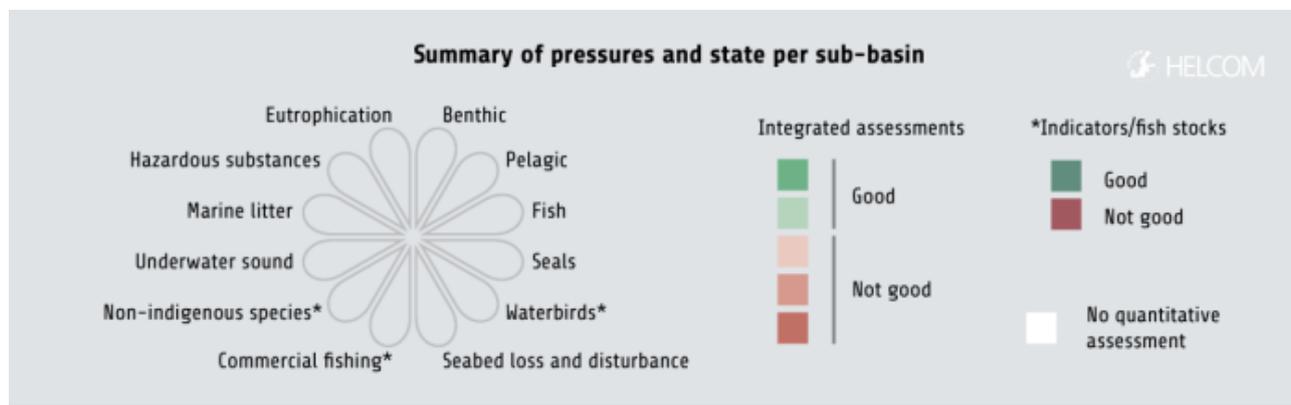


Figure 2. Proposed state components of the SOM analysis.

### Geographical scale of the analysis

The geographical scale of the SOM analysis is aimed at supporting decisions from a regional Baltic Sea perspective. Still, the SOM analysis could be carried out at a smaller scale if found relevant, e.g. by sub-basins or a set of sub-basins. The scale would not need to be identical across environmental themes/pressures and sub-basin scale analyses could be considered for themes/pressures with high spatial difference.

## 2. Detailed approach

The proposed approach to carry out the SOM analysis is described in seven steps and follows the overall structure presented above and in Figure 3. The main objective is to assess the sufficiency of measures to achieve GES. This is done by estimating how much existing measures will reduce anthropogenic pressures in the time frame of the BAU, the consequent change in each of the state components presented in Figure 2, and whether this will be sufficient to achieve GES for these components.

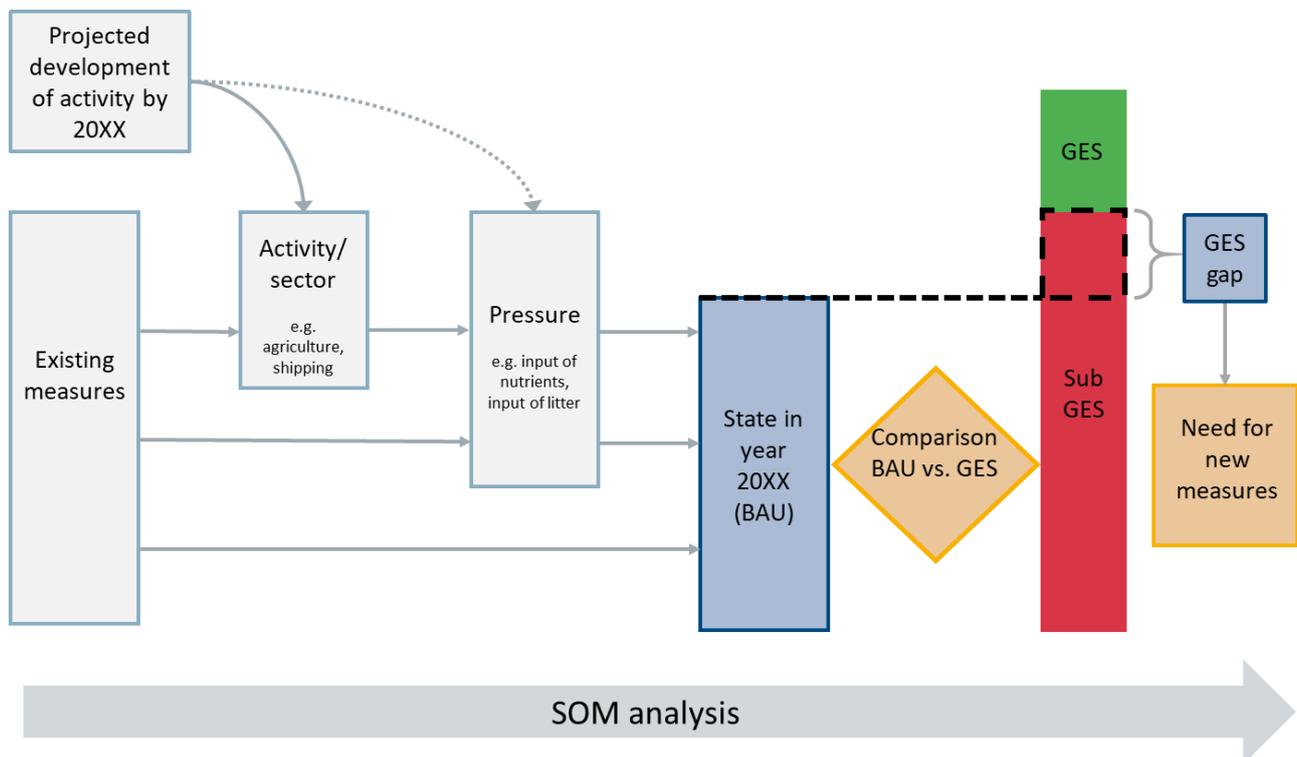


Figure 3. Structure of the SOM analysis: Linking measures with activities, pressures or state components; predicted changes in activities and pressures; comparison of the BAU state with GES; and estimation of the need for new measures.

### Step 1. Existing measures

This section gives detailed information on SOM components related to existing measures and their level of implementation.

1a. Identify measures under existing policies (i.e. existing measures) to assess their effect on the marine environment. This includes global conventions, EU directives and regulations, regional HELCOM actions and national measures.

1b. Categorize measures into common groups based on, for example, the general type of the measure (e.g. legal, technical, monitoring, knowledge and awareness), and the key type of the measure (KTM) (as in the EU WFD). The categorization will allow for simplifying the analysis (i.e. by aggregating similar type of measures) and linking them with activities and/or pressures (or in case of restoration measures, to state).

A majority of measures are linked with human activities, but some may be linked to pressures (e.g. long-range transboundary pollution) and a few are directly linked to state components (e.g. restoration, restocking) (Figure 3).

- If a measure is linked to an activity, i.e. the activity is restricted or changed, then one can follow the linkage framework and estimate the consequent reduction of pressures (Steps 3-4).
- If a measure is linked to a pressure or a state component (restoration measures), then the effect in Step 4 is directly estimated.

1c. Assess the implementation status of the measure, i.e. whether the measure 1) has been implemented, 2) has been partially implemented or implementation is ongoing, or 3) is planned to be implemented. The implementation status of the measures may differ by countries, which needs to be taken into account. The BSAP implementation status has been assessed already in previous HELCOM processes, but some other measures (e.g. national MSFD measures) may require such an assessment on the basis of EU Member State reports. This step informs especially Step 2.

Information needed	Data sources	Main contribution
List of measures	HELCOM Explorer HELCOM Recommendations EU MSFD Programmes of measures EU WFD Other EU policies/directives as agreed	ACTION project/secretariat
Implementation status (implemented, partially implemented/ongoing, planned)	As above + EU reports on implementation of PoMs	ACTION project/secretariat, complemented as needed by CPs
Type of measure (e.g. technical, monitoring, knowledge and awareness...)	As above	Initial sorting by secretariat/ACTION project, validation by SOM Platform
Whether a measure has an effect on activity, pressure or state	As above	Initial sorting by secretariat/ACTION project, validation by SOM Platform

## Step 2. Estimating time lags for measure effects

Even fully implemented measures do not always have an immediate effect on the state due to time lags which may be caused by environment's slow recovery after the pressure (e.g. benthic communities after trawling) or the slow decay of the pressure from the environment (e.g. contaminants in sediment). Based on Step 1c, one can estimate the time lags for fully implemented, partially implemented or planned measures.

- If a measure is fully implemented, then one needs to estimate whether there could be any time lag in its effect on environmental status. If no time lag is estimated to remain, then the effects of the measure should be visible in the current state of the marine environment and the measure can be left out of the further SOM analyses. Otherwise, the measure is included and one needs to estimate whether the effects will be seen by the BAU end year (Figure 1).
- If a measure is only partially implemented or planned to be implemented, then one needs to make an assumption that the full implementation will take place by the BAU end year (cf. the urge by Ministerial Declaration 2018 to implement the BSAP). Additionally, one needs to estimate whether the measure has time to affect the state before the BAU end year.
- The issue with time lags could also be resolved by focusing on pressure targets instead of state threshold values, especially for eutrophication where it is already known that the GES will not be reached with the time frames for the BAU discussed so far. The effect of measures on pressures could be assumed to be realized fully in the time frame of the BAU, while reaching GES could happen later than by the BAU end year.

Information needed	Data sources	Main contribution
Data on time lags of effect of measures on state	Literature	SOM synopses <sup>2</sup> , ACTION project

### Step 3. Identifying main pathways for pressures using activity-pressure-linkages

Assessing the effects of measures means describing how they affect pressures or state either directly or via activities. Thus, the links between activities and pressures need to be identified and quantified. Information on the linkages between activities and pressures is available, for instance, in the activity-pressure matrix of the [TAPAS project](#), and in more detail similar matrices of the [DEVOTES project](#). These can be used as a starting point to identify the main pathways. A key issue is that the links should be (semi)quantitative and, hence, allow for assessing the relative contribution of the activities to the pressure. This is important for assessing the proportion of the pressure reduction attributable to each activity and for identifying potential new measures.

Information needed	Data sources	Main contribution
Links between activities and pressures	Project results (e.g. HELCOM <a href="#">TAPAS linkage matrices</a> , DEVOTES linkage matrices)	ACTION project. Anticipated that existing results can be used
Information on relative contribution to pressures from different activities	HELCOM reports, literature	SOM synopses <sup>3</sup> , ACTION project
Possible prioritization of activity-pressure linkages	Literature	ACTION project/secretariat
	Expert evaluation/validation	Working Groups, Expert Groups, ACTION project, SOM Platform

### Step 4. Estimation of effects of measures

When the main pathways between activities and pressures have been identified, one will estimate how much measures will jointly reduce each pressure. In the case of restoration measures, this step will entail estimating how much measures will affect the state components. The information on effects of measures can be quantitative, semi-quantitative (e.g. percentage intervals) or qualitative (e.g. no effect, small improvement, large improvement). Several data sources and expert evaluation can be used to estimate these pressure reductions. Expert evaluation can also be used to survey for possible hidden/neglected pressures that were not identified in Step 3. The relative effects of measures on pressures and state are proposed to be defined as probability distributions that describe the probability of different reduction outcomes (e.g. using percentages (%)). The total effect of measures includes the effect of reduction in pressures on state and the direct effect on state.

Information needed	Data sources	Main contribution
Data on effects of measures	National data	Reporting by countries
	Research projects (e.g. BONUS, BLUE2) Scientific literature, studies and models	SOM synopses <sup>4</sup>

<sup>2,2,3</sup> SOM synopses refer to compilation of information to be carried through a Lead country approach as outlined in the ToR for the SOM Platform, see also document 4.

	EU MSFD Programmes of measures Sources listed in the SPICE project deliverable on Business-as-usual scenarios EC DG ENV databases (e.g. ARCADIS 2012)	
	Expert evaluation/validation	Working Groups, Expert Groups, ACTION project, SOM Platform

### Step 5. Projected development of human activities/pressures

The other component affecting the BAU state in addition to existing measures is the possible (external) change in activities and pressures due to changes in human behaviour in the time frame of the BAU. This may counteract the effect of existing measures if activities or pressures increase.

This step is proposed to be run as an additional scenario on top of the effectiveness of existing measures analysis. The analysis will be limited to the predominant activities and pressures. As this component would be considered as external to the rest of the framework, the BAU status could be developed by assuming 1) no change and 2) the most likely change in predominant activities/pressures. This would enable assessing how the future change in activities/pressures affects the BAU status.

At minimum, qualitative assessment describing the trend (increasing, decreasing, no change) in the activity/pressure should be made, but quantitative information should be used when available from existing studies. For developing the BAU, the information should be converted into numerical values, e.g. 10% increase in the activity, using expert evaluation when needed. If little information is available, it would be possible to assume something about the change in activities and see how the BAU status changes.

Information needed	Data sources	Main contribution
Information on the future development of activities (qualitative/quantitative)	Literature, sectorial future outlook reports Project outputs (e.g. BONUS) National data (e.g. on EU MSFD Initial Assessments, and MSPD)	secretariat/ACTION/SOM synopses
Converting the information into numerical values	Expert evaluation	Working Groups, Expert Groups, ACTION project, SOM Platform

### Step 6. Linking reduced pressures with state components

Assessing the BAU status requires estimating the effect of changes in pressures on state. This entails two steps.

6a. Selecting pressures for state components: In order to estimate the effect of reduced pressures for a state component, one needs to select the relevant pressures, i.e. those having a major impact on the state. Information of this can be collected from four partly complementary sources: Baltic Sea Impact Index (BSII) (i.e. ranking the most impactful pressures per state component), sensitivity of state components to pressures (i.e. ranking pressures having highest potential effect on species), core indicator reports (descriptive information) and validation by expert input from HELCOM Working Groups and Expert Groups. Some of these sources can also be used to estimate the relative contributions of the pressures for the given state

component which may inform step 6b. Output from this is a matrix of pressure-state linkages and relative contributions of pressures affecting the state (the latter to inform step 6b).

6b. The effects of selected pressures on the state components: There is no method available to establish quantitative relationship between all pressures and state components. From the state point of view, one can show that there is a gap to GES, but there are no quantitative estimates how much pressure(s) the GES gap implies. The effects of pressures on state components are estimated from scientific literature, reports, published models and expert input (HELCOM Working Groups, Expert Groups and networks, ACTION project, SOM Platform). This step will also explore and test the use of pressure state response curves to estimate the impacts of pressures on the state components (Figure 4).

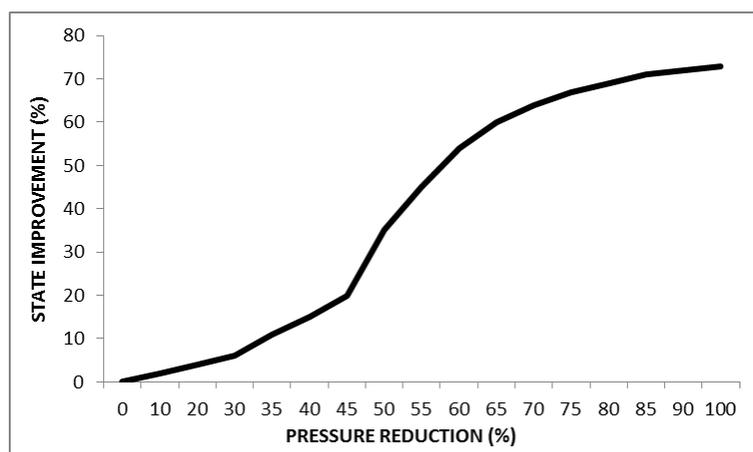


Figure 4. Conceptual pressure-state response curve. The curve illustrates the potential of pressure reduction to improve the state (expressed as the gap to GES).

Information needed	Data sources	Main contribution
Spatial data on pressures and impacts	HELCOM map and data service	Secretariat
Spatial data on state components	HELCOM map and data service	Secretariat
Information for selecting relevant pressures	Baltic Sea Impact Index (BSII) Core indicator reports	Secretariat/ACTION project
Responses of indicators/state components to changes in pressures	Previous research projects and reports Scientific literature Existing models	SOM synopses <sup>5</sup>
	Expert evaluation/validation	Working Groups, Expert Groups, ACTION project, SOM Platform

### Step 7. Comparison of BAU and GES and assessing sufficiency of measures

When the BAU status has been developed, it will be compared with GES to identify whether there is a gap and new measures are needed. The total effect of measures on state is calculated as the reduction of the GES gap based on the previous steps. In addition, the Step 5 results (projected development in human activities/pressures) will also affect the outcome of the SOM analysis. If a pressure is predicted to increase and no measures are in place to control that, the gap to GES may increase.

<sup>5</sup> SOM synopses refer to compilation of information to be carried through a Lead country approach as outlined in the ToR for the SOM Platform, see also document 4.

## Discussion points

### Overall

- What is the time frame of the analysis (end year of BAU)? Options:
  - o 2027
  - o 2030
  - o 2033
- What is the geographical scale of the analysis?
  - o Sub-basin level or entire Baltic Sea level?
  - o Same or different across environmental themes?

### State components and descriptors

- Will we use the same themes as in the State of the Baltic Sea (HOLAS II) report (see Figure 2)?
- Which targets and levels will be used when comparing BAU and GES?
  - o Pressure targets vs. state threshold values
  - o Descriptor (integrated status) vs. indicator level

### Measures

- Which measures are included in BAU? Options:
  - o 1) include all decided measures (implemented, ongoing and planned) in BAU;
  - o 2) include only implemented measures in BAU (accounting the possible time lag in their effect);
  - o 3) run the analysis for both alternatives 1) and 2)
- What types of measures should be included? Options:
  - o 1) only technical measures that have a concrete effect on activities/pressures/state;
  - o 2) all measures, including controlling measures and informational measures
- How to deal with the fact that most of the measures will have different implementation status in various countries?
- How to deal with time lags (of the effect of measures on state)? Will we assume that the effect of measures on pressures is realized fully by the BAU end year, and that the effect of pressure changes on state can take place later if there are time lags?

### Activity-pressure links

- Linkage frameworks to identify the pathways
  - o How to define the main activities related to each measure?
  - o How to define the main pressures related to each activity
  - o Are there existing linkage frameworks for Baltic Sea that quantify/rank the linkages between measure-activity-pressure?

### Pressure-state links

- How to estimate the impact of reduced pressures on the state?
- Is it possible to define new curves/functions/distributions to (combined) pressure-state responses based on available spatial data.

### Projected development of activities/pressures

- Will we develop BAU using two alternatives on projected development of human activities/pressures: 1) no change, 2) most likely change?

### 3. Organization of work

At the topical level, the HELCOM ACTION project will consider measures related to by-catch of mammals and birds, impacts on the seafloor, Marine Protected Areas (MPAs) as a conservation and protection measure, and eutrophication. The SOM Platform will focus its work on complementary topics to the ACTION project, i.e. hazardous substances, non-indigenous species, marine litter, underwater noise, and biodiversity aspects not covered by the ACTION project.

In terms of collecting data and information (for details see tables for each step of the approach), the ACTION project and the Secretariat will coordinate the collation of lists of measures and their implementation status for all topics and contribute to collating existing information on projections of development of human activities. The ACTION project will assess and collate other necessary information for the SOM analyses for the topics covered the project and thus, there is a need for the SOM Platform to complement with information for other topics. This has been indicated as tentative “SOM synopses” in the tables that indicate data and information needs for each step of the analyses. The preparation of synopses/syntheses is to be carried out primarily through a Lead country approach in accordance to the ToR from the SOM Platform (document 4). SYKE, as partner in ACTION project and contributor to the SOM Platform, will carry out the BAU state and gap analysis for all topics, provided that all necessary information is available.

#### Timetable for the work of the SOM Platform

Document 3 focuses on the approach for analysing sufficiency of measures to identify if there is a gap to GES if existing measures are implemented. This analysis is carried out to support the central component of the BSAP update process; to identify new HELCOM actions, or strengthening of existing HELCOM actions, to be included in the updated BSAP with the aim to reach GES in the Baltic Sea. The ToR for the SOM Platform further outlines the preparation of syntheses on potential new actions based on e.g. recent innovation and development projects or successful measures carried out on a national level (see Documents 2 and 4). Results from the HELCOM ACTION project will also inform the selection of new actions or strengthened actions. The aim is to finalize these analyses in the spring 2020 and compile them as a package of information for HELCOM Working Groups to consider as support for proposing new HELCOM actions, e.g. through organizing thematic workshops or similar.

The last step of ToR for the SOM Platform outlines analyses of cost-effectiveness to support the selection of new HELCOM actions. In the HELCOM ACTION project, analyses of cost-effectiveness will be carried out for the topics covered by the project under work package 6.2. Such analyses will take place after the preliminary proposal on new actions. An analysis will then be carried out to evaluate the joint effects of proposed new measures and the cost-effectiveness of proposed measures. Preliminary results of such analyses are anticipated to be ready in autumn 2020.

The more detailed planning of cost-effectiveness analyses is proposed to take place at a later stage, i.e. at the next meeting of the SOM Platform (timing to be agreed at the kick-off meeting). Additional considerations to be discussed before the selection of new actions takes place, as highlighted by Contracting Parties, are e.g. to identify which measures are relevant to implement at the regional level, the sustainability of proposed measures, and to consider the potential to analyse the costs and benefits of the updated BSAP as a whole.

Table 1 outlines some of the central steps of planned work for the SOM Platform and tentative timing of required contributions from HELCOM Working Groups and Expert Groups to support the work. The table is intended to support the planning of work under the SOM Platform. HOD will inherently be informed on the progress and tentative proposals at each upcoming meeting. Observers are invited to participate in activities according to normal procedure and workshops and a dedicated stakeholder conference is planned for in 2020 (cf Work plan for the BSAP update).

Table 1. Tentative time-table for the SOM analyses and proposals new or strengthened HELCOM actions. Green indicates steps where the ACTION project and the SOM Platform will work jointly. WG = Working Group, EG = Expert Group.

YEAR	2019				2020			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
<b>Indicative steps</b>								
<b>Approach</b>	ACTION/ SOM proposal	GEAR agreement						
<b>Collation of data and information input to analyses<sup>6</sup></b>		SOM Platform/ ACTION	SOM Platform/ ACTION					
<b>Synopses on potential new measures</b>		SOM Platform	SOM Platform	SOM Platform				
<b>Expert-based input to SOM analyses<sup>7</sup>. review of synopses</b>			WGs, EGs	WGs, EGs				
<b>Running BAU on existing measures</b>				SOM Platform/ ACTION				
<b>Thematic workshops, to discuss results and propose potential new actions</b>					WGs, EGs, experts	WGs, EGs, experts		
<b>Assess status with potential new HELCOM actions</b>						SOM Platform/ ACTION	SOM Platform/ ACTION	
<b>Cost-efficiency estimates</b>							SOM Platform/ ACTION	
<b>Continued elaboration and endorsement of new/strengthened HELCOM actions</b>							WGs	WGs
<b>[Benefits of the BSAP as a whole]</b>								SOM Platform/ ACTION

<sup>6</sup> e.g. list of measures, effectiveness of measures, relative contribution of activities to pressures, projections on development of human activities

<sup>7</sup> e.g. estimating effectiveness of measures when gaps, validating activity-pressure linkages, response in state to pressure-reductions, etc. See e.g. steps 3, 4, 5 and 6.

## References

ARCADIS (2012) Economic assessment of policy measures for the implementation of the MSFD. Final report and Excel database of a study for the EC DG ENV (Project No 11601). Available at <http://ec.europa.eu/environment/enveco/water/pdf/report.pdf>

EC project “BLUE2” on a database of policy measures for protection of inland and marine waters in Europe (available at [http://ec.europa.eu/environment/blue2\\_en.htm](http://ec.europa.eu/environment/blue2_en.htm))

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HELCOM 2016. TAPAS Theme 1 Deliverable: Baltic Sea pressure and impact indices (BSPI/BSII) Available at: <http://www.helcom.fi/Documents/HELCOM%20at%20work/Projects/Completed%20projects/TAPAS/TAPAS%20Theme%201%20Deliverable.pdf> (see Annex 6 for the TAPAS linkage framework between activities and pressures)