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This document has been prepared by the Pan Baltic Scope project activity leads within its WP1.2.

Background

The Pan Baltic Scope project (2018-2019) has as one of its objectives to support the advancement of the ecosystem-based approach in maritime spatial planning. Application of the ecosystem-based approach is also a continued overarching objective in Baltic Sea marine policy.

Among other things, implementation of the ecosystem-based approach requires that the relationships between marine ecosystems and socio-economic systems are acknowledged in assessment and management.

This document identifies a potential analytical framework for implementation of the ecosystem-based approach in MSP, focusing on connections between ecological and socio-economic systems. It also analyses how these aspects are being assessed in the Pan Baltic Scope project.

The document suggests ways to further advance the operationalization of the ecosystem-based approach in management of relevance for the Baltic marine environment. It is presented to the Meeting for information and possibility to provide comments, and for consideration regarding applicability in the further work of HELCOM-VASAB MSP WG.

Action requested

The meeting is invited to

- take note of the document, and
- provide comments in order to support of the further work of the Pan Baltic Scope.

Pan Baltic Scope

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An Analytical Framework to advance the Ecosystem-Based Approach in MSP

Key messages

- A shared analytical framework will support coherence in planning and management with respect to different policy objectives, and hence support synergies and coherence in their outcomes
- The causal linkages between parts of the framework have to be explored and developed in order to deepen the understanding on the socio-economic-ecological system.
- More studies are needed to assess marine ecosystem structure and functions (forming marine green infrastructure) and its contribution to ecosystems' health and resilience as well as human well-being
- Economic and social analyses are needed in regional monitoring and assessment systems. This will support the ecosystem-based approach by that interdependencies between societal and ecosystem aspects can be evaluated
- Pan Baltic Scope includes a number of activities aiming at the strengthening the ecosystem-based approach in MSP as part of this analytical EBA-framework.

Introduction

The sustainable use and conservation of marine resources requires integrated marine management and acknowledging the relationships between ecosystems and socio-economic systems. The ecosystem-based approach (EBA) is an interdisciplinary method for considering the complexity of ecosystems and their interactions with social and economic systems. The approach relies on the management of human activities to meet conservation goals and ensure the sustainable use of marine goods and services by present and future generations. EBA is globally advocated as the primary framework of the Convention of Biological Diversity[1], which outlines the approach's 12 Malawi principles.

[1] CBD Secretariat (2004). CBD Guidelines for the Ecosystem Approach, Montreal. https://www.cbd.int/doc/publications/ea-text-en.pdf

Swedish Agency for Marine and Water Management
BSH Bundesamt für Seeschiffahrt und Hydrographie
Ministry of Environmental Protection and Regional Development of the Republic of Latvia
Danish Maritime Authority
VASAB
Republic of Estonia Ministry of Finance
Satakuntaliitto The Regional Council of Satakunta
SYKE
Nordregio
Ålands landskapsregering

The ecosystem-based approach is also embraced in marine policies of key relevance for the Baltic Sea region. Importantly, HELCOM is committed to applying and implementing EBA through the Baltic Sea Action Plan (BSAP) to restore a healthy Baltic marine environment. Further, the implementation of the EU Marine Strategy Framework Directive (MSFD, 2008/56/EC) and the EU Marine Spatial Planning Directive (MSPD, 2014/89/EU) should rely on EBA.

The HELCOM/VASAB guideline for the implementation of ecosystem-based approach in Maritime Spatial Planning was decided in 2016[2]. It is a first step towards a common understanding on how the ecosystem-based approach can be applied in drawing up a spatial plan for a sea area in accordance with spatial planning legislation in force in the Baltic Sea countries. The guideline highlights a number of EBA key elements and outlines an EBA-planning process.

The key elements highlighted by the HELCOM/VASAB guidlines are:

best available knowledge and practice, precaution, alternative development, identification of ecosystem services, mitigation, relational understanding, participation and communication, subsidarity and coherence, and adaptation.

The guideline in addition stresses that the aim is to ensure that the collective pressure of all human activities is kept within levels compatible with a good environmental status and that the capacity of the ecosystem to respond to human-induced changes is not compromised while enabling the use of marine goods and services by present and future generations.

Challenges and needs

Although EBA plays a major role in marine policies, advancing its operationalization presents challenges. Among other things, further advancement of EBA would require a comprehensive framework to assess the interlinkages between, or even merge, ecological and socio-economic systems.

- Such a framework should address the current extent of human activities, the pressures they give rise to, the state of the ecosystem, the role of ecosystem services, and ultimately implications for human welfare as well as the contributions of human activities to human welfare.

[2] http://www.helcom.fi/Documents/Action%20areas/Maritime%20spatial%20planning/Guideline%20for%20the%20implementation%20of%20ecosystem-based%20approach%20in%20MSP%20in%20the%20Baltic%20Sea%20area_June%202016.pdf

- Importantly, in order to be operationally useful in environmental management, the framework should outline feedback loops to show how applied measures would affect the system.
- Last, the framework should apply a holistic perspective. For example, it should recognize that there are interlinkages between different parts of the ecosystem and that the effects of different human activities are connected to each other.

A shared framework for analyzing these interlinkages is expected to improve the coherence in how data and methods are applied in relation to different policy contexts and serve to increase coherence in their management outcomes.

The development of an analytical EBA framework

A suggested analytical framework for addressing linkages between ecological and socio-economic aspects is shown below (Figure 1). The figure outlines the different types of relationships that can occur between human activities, pressures, the status of species and habitats, ecosystem services and human wellbeing, connecting to the DPSIR framework commonly applied in management.

Ecosystem services are included in the model, and are here understood as contributions of the ecosystem properties (*i.e.* its structure and functions) to human well-being via the flow of the services. Thus, framework corresponds to the well-known ecosystem service cascade model proposed by Haines-Young and Potschin[3] and further interpreted by La Notte *et al*.[4]. According to the cascade model, the ecosystem structure and functions (represented in the box "status") are understood as *intermediate or supporting services* which underpin the flow of *final services* (including provisioning, regulating and cultural). The flow of final services provides a variety of tangible and intangible goods and benefits that are of value to humans, such as social (health, food, amenities and recreation) and economic well-being (jobs, income and progress).

The figure also shows different adaptive responses which can occur when there is a need to change the situation. For example, measures can be directed towards

[3] Haines-Young, R., Potschin M., 2010. The links between biodiversity, ecosystem services and human well-being. In: Raffaelli, D.G & C.L.J. Frid (eds.): Ecosystem Ecology: A New Synthesis. Cambridge University Press, British Ecological Society, pp. 110-139.

[4] La Notte et al., 2017. Ecosystem services classification: A systems ecology perspective of the cascade framework. Ecological Indicators, 74:392–402

regulating an activity, reducing pressure levels, or restoring a habitat for a species, in order to improve the state of the sea. The adaptive responses can potentially also involve expenses to compensate society (or parts of society) for a loss of ecosystem services or well-being.

Hence, the figure suggests key aspects for enabling a systemic, holistic analysis. When fully applied, the framework should enable analyses of human impacts, the long-term sustainability of marine uses, and the resulting ability of the ecosystem to provide goods and benefits in the long term. Different planning or management options can be compared with respect to how well they align with criteria for sustainable use and in relation to what aspects within each of the compartments are benefitted.

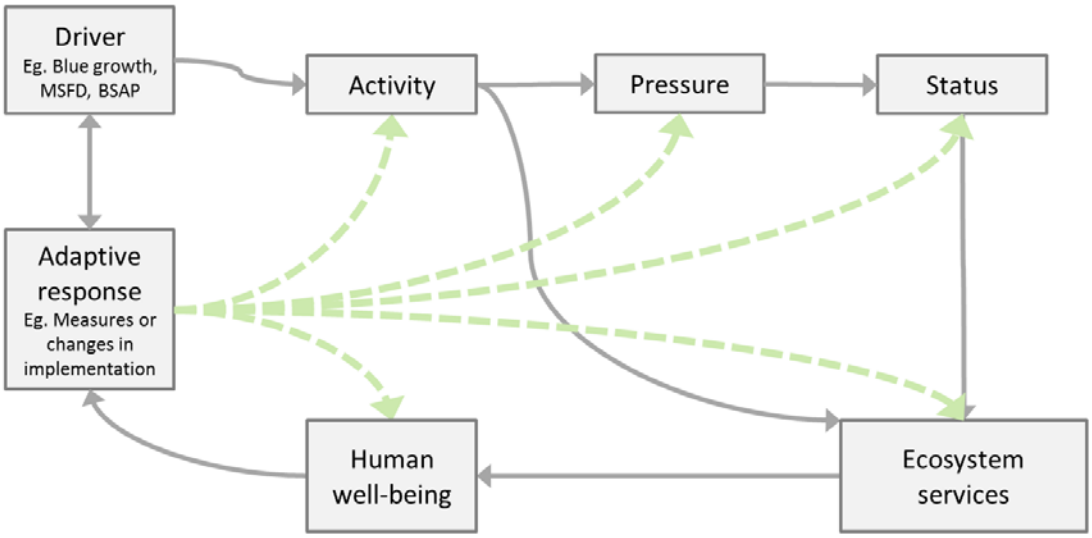

Figure 1. Systematic framework to support the implementation of the ecosystem-based approach. Drivers of the process define the objectives. The upper boxes represent: our use of the sea (*activities*), the *pressures* that may be caused by these uses, and the *status* of the environment, representing the distribution of species and habitats and their status. The status of the environment is important for ecosystem structure and function, including connections between species in the food web. These, in turn, contribute to *ecosystem services* under interaction with human activities, and ultimately to *human well-being*. Each of the boxes include several key components, which are the bases for linking boxes with each other in analyses.

The framework presented in figure 1 supports analyses to inform planning and management: Causal linkages between the components are evaluated qualitatively in a data poor situation, and by quantitative analyses when information on the strength of different linkages is available. Hence, the framework helps us learn about the

system as a basis for decision-making, identify knowledge gaps, and incorporate new information when it is available.

The framework can be stimulated by different types of drivers depending on the policy/management context. In figure 1, Blue growth and the environmental objectives of the MSFD and the BSAP are included as drivers with defined objectives. Other examples of drivers include global development objectives and objectives for adapting to climate change.

The different management contexts may also have several other differences. One important aspect is that the spatial scale of relevance may vary. Importantly, they often vary in mandate, so that there are borders to their possibilities. As one example, MSP is affected by several aspects but has a mandate to affect only parts of these.

Having a shared framework can be valuable for enhancing coherence, for example supporting the interactions between MSP and environmental management. Implementation of a shared framework can also support local and national planning, and Baltic wide cooperation and management.

Relation to the work of Pan Baltic Scope

Additionally, the analyses should be spatially explicit in order to be relevant for management. Spatial information is required in environmental management, for example in order to identify areas for restoration measures or for reducing pressure levels, and it is at the core when doing maritime spatial planning.

Figure 2 below repeats the figure above, and additionally shows how the different aspects are linked to different policy instruments and approaches for supporting EBA to planning and management of marine waters, which are addressed in the work of Pan Baltic Scope. More detailed information on the different activities is presented in the end of the document.

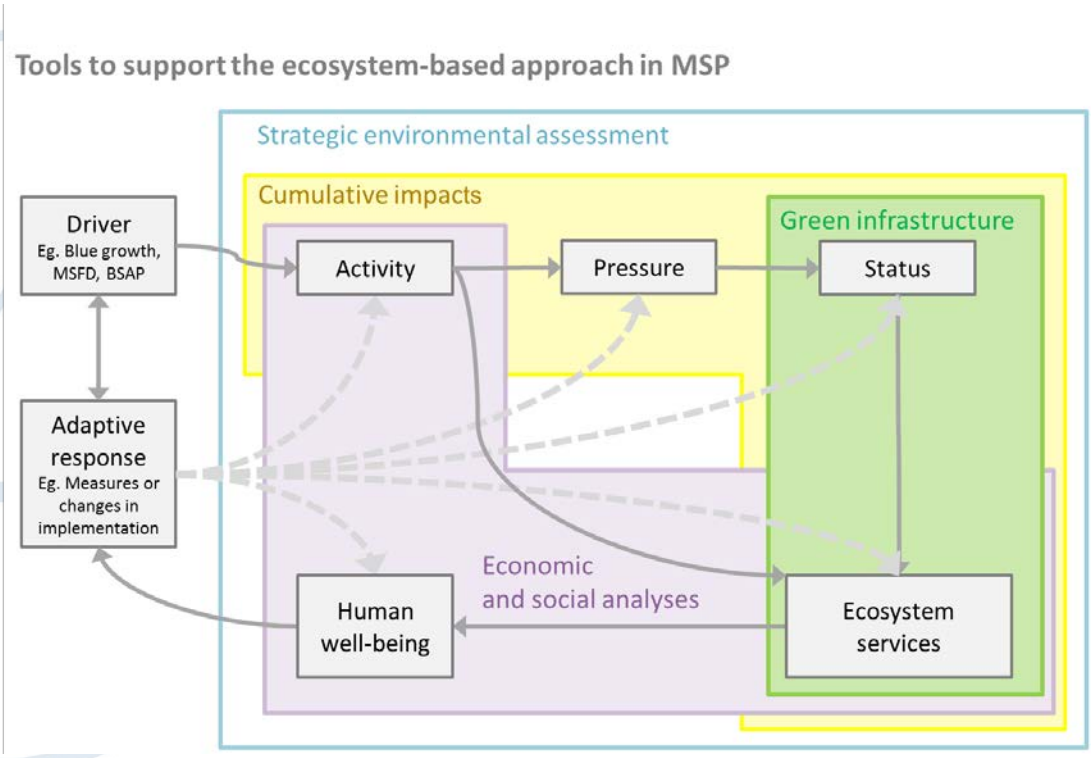

Figure 2. Overview of how aspects in the analytical framework are linked to different policy instruments and approaches to support the move towards an ecosystem-based approach, including the Strategic environmental assessment, Cumulative impacts on the environment, the concept of Green infrastructure, and approaches to Economic and social analyses.

Current applicability

It should be recognized that the availability of data and knowledge on the components and linkages in the framework (Figure 1) is in many cases limited. Even though the work of HELCOM countries has contributed to significant recent progress in data management and assessment systems, several important knowledge gaps remain.

Currently, the framework can be supported by quantitative or semi-quantitative analyses for some of the linkages. For example, even though there is a continued need for improving the underlying knowledge base, regional data are available to explore the connections between key pressures on the marine environment and the most commonly occurring species and habitats in the Baltic Sea. Similarly, there is some level, albeit partial, on the connection between human activities and pressures and on the role of some species and habitats to ecosystem services. Other linkages are considerably less explored (see below).

However, the model is expected to provide a structure also for qualitative assessments in data poor situations, and support their alignment with any available quantitative assessments.

The framework can also provide a setting for systematic gathering of more knowledge. Discussing and evaluating existing knowledge will help us learn about the system and identify key knowledge gaps while simultaneously helping us to incorporate new knowledge and adapt management in support of a sustainable use.

Knowledge gaps

A comprehensive analysis in line with the framework needs to be supported by data and knowledge, at least for key components represented in each of the boxes. Such an analysis is the core of the integrated marine planning and management to address management objectives from the holistic and cross-sectorial perspective.

To some extent, data needed to populate such analyses already exist. There are several recent large projects that can support the identification and quantification of linkages between activities and pressures (such as HOLAS II, BalticBOOST, TAPAS, DEVOTES), and provide estimates of the value of environmental or ecosystem service benefits to humans (such as BONUS BALTICAPP and BONUS BASMATI). In addition, results from other research projects can be evaluated in relation to the needs.

However, there is still a continuous need to improve the underlying knowledge base, to challenge and refine the current view and incorporate new knowledge on changes in the ecosystem or human sea use. Such a continued need for incremental knowledge is seen, for example, regarding the evergreen questions identified in Box 1.

Box 1. Evergreen issues for the science-policy interface

1. How and to what extent do different human activities lead to pressures in the marine environment?
2. How do we expect that changes in the extent and intensity of pressures will affect the status of different species, habitats, and ecosystem services?
3. How will changes in environmental status and ecosystem services (deteriorations and improvements) affect our well-being today, and with respect to future benefits?
4. How are adaptive management responses, such as conservation, regulation of human activities, pressure reductions, or restoration of biodiversity expected to influence on environmental status and ecosystem services?

Bottlenecks

Some main issues can also be identified where there is minimal or no current regional data.

- For example, there is little data on how pressures on the environment and the state of the environment affects ecosystem services, and hence human well-being as well as what is the contribution of the regulating services (e.g. filtration, sequestration, storage and accumulation of nutrients and hazardous substances) to improvement of the environmental status of marine waters.
- In addition, sufficient spatial data, as needed to support marine spatial planning, are often missing for ecosystem components (species and habitats) and ecosystem services.
- There is also a need to explore tools for socio-economic analysis. Ecosystem accounting is an example of a possible facilitator of operationalizing the ecosystem-based approach. Ecosystem accounting is inherently spatial and can be easily adapted to different spatial scales (local, national, watershed). Codified in the System of Environmental-Economic Accounting – Experimental Ecosystem Accounting (SEEA-EEA), significant progress has been made to the point that an official update has been ordered with the intention that it achieve statistical standard status by 2020. SEEA-EEA integrates the perspectives of national accounting, economics, and natural sciences to track, value, and account for environmental status to generate accounts that reflect both the environmental status and flow of ecosystem services to society. This gives an ability to operate across the divide between marine ecosystems and the socio-economic system.

Current work in Pan Baltic Scope

The text below outlines how the issues identified above are explored in the Pan Baltic Scope project.

Activity 1.2.1 Ecosystem-Based Toolbox

The activity aims to contribute to a coherent implementation of ecosystem-based approach in national MSP in the Baltic Sea Region. The aim is to share experience on practical implementation of EBA in partner countries, including implementation of the SEA-framework, and to test the HELCOM-VASAB Guideline and the tools for the implementation of EBA in MSP.

- The activity is working on developing EBA in MSP through stocktaking of current practices, scientific evaluation and discussion on needs for development. Working closely together with activity 1.2.2 for achieving synergies and coherence, the main joint steps in the activities work are: a Baltic Sea wide questionnaire, workshops and the development of a study.
- The activity aims at keeping a holistic view on EBA including all Key Elements of the HELCOM-VASAB guidelines and all parts of the EBA analytical framework.
- Knowledge and other gaps addressed in the activity include evaluation of current practices and exploring the actual bottlenecks for coherent EBA implementation in MSP.
- The activity should provide recommendations on potential development of the HELCOM-VASAB Guideline and the EBA toolbox (checklists) developed in the Baltic SCOPE project. Further deliverables will be developed jointly with activity 1.2.2 including a handbook aiming at the MSP-planners.

Activity 1.2.2 Implementation of EBA in sub-basin SEA, Germany

The activity aims to develop as best as possible transboundary coherent SEA using a coherent approach and assumptions for the southern Baltic as test case for methodologies and guidance developed previously (in projects as well as in national and international fora).

- The activity is working mainly on identification and understanding of similarities and differences in the SEA processes in the Baltic Sea region and a concept to facilitate the implementation of the EBA. Working closely together with activity 1.2.1 for achieving synergies and project-internal coherence, the main steps in the activities work are: a Baltic-wide questionnaire, workshops and the development of a study.
- The activity contributes to all Key Elements of the HELCOM-VASAB guidelines, as it is working on their facilitation. Subsidiarity and coherence, the relational understanding and the precautionary principle can be highlighted as they are important parts of the work on SEA as well.
- The activity aims to support the filling of the gaps on SEA coherence in the Baltic Sea by developing mutual understanding and comparability. Transparence and involvement are some of the main aspects. Another gap is the closer integration of MSP and MSFD. The activity works on practical advice for maritime spatial planners. A major gap lies between the EBA concept and its implementation in MSP. The reduction of the complexity of the EBA concept for planners is a major aim, to help the implementation.
- The deliverables will be prepared in close cooperation with Activity 1.2.1. There will be one background report including the results of the questionnaire and others, a praxis-oriented handbook for planers about SEA in a transboundary perspective and the implementation of the EBA and at last a set of recommendations on the implementation of the EBA.

Activity 1.2.3 Cumulative impacts assessment

The aim of the activity is to improve coherence among countries around the Baltic Sea regarding how cumulative impacts are assessed when doing MSP.

- To achieve its aim, the activity focuses on sharing information and experiences, as well working together using currently available tools and data in order to: *i)* Increase the capacity and expert knowledge for addressing cumulative impacts, including the sharing of assessment tools, *ii)* Test how cumulative impacts assessments can be used to evaluate implications of the plan on core ecological values, including green infrastructure and ecosystem services, and consider how cumulative impacts assessments can be used to evaluate environmental effects of development plans, and *iii)* Identify key outputs from the assessment, and how they should be evaluated.
- The activity contributes to several key elements for operationalisation of the EBA, as defined by the HELCOM/VASAB EBA MSP guidelines, such as “best available knowledge and practice , “precaution”, “alternative development” and “relational understandning”, reflecting that cumulative impacts assessments are important in MSP for understanding current and potential environmental effects of human activities on the environment.
- The expected deliverables are a report on cumulative impacts assessments when doing MSP, including desricptions of regional case studies, and a CEA tool which enables analyses based on regionally shared and own data.

Activity 1.2.4 Green infrastructure

The aim of the activity is to develop a proposal how the green infrastructure (GI) concept can be applied in marine context. The specific objectives of the activity include outlining of the GI concept based of existing knowledge, testing it by utilization of the available data at the Baltic Sea scale as well as obtaining feedback from the HELCOM-VASAB MSP WG and HELCOM State and Conservation WG.

- The project team has developed a proposal for a methodology for mapping of marine GI, which includes two aspects: *i)* mapping of the areas of high ecological value as well as *ii)* mapping potential supply of ecosystem services, by using spatial data sets from HELCOM HOLAS II on ecosystem components. An in-depth approach is applied to develop Baltic-wide maps of Essential Fish Habitats. Based on results of these mapping activities the core areas of marine GI shall be identified, which do not always require legal protection status, but shall be respected in allocation and development of human uses.
- The activity mainly contributes to two key elements for operationalisation of the EBA, as defined by the HELCOM/VASAB EBA MSP guidelines – applying the “best available knowledge and practice” in relation to marine ecosystem as well as “identification of ecosystem services”. Thus, it improves understanding on contribution of the marine ecosystem structure (or its status) to human well-being assessed through potential supply of ecosystem services.

- The expected deliverables of the activity are a report for practitioners on GI concept, including results of the GI mapping, as well as a brochure to promote the concept for a wider public and policy maker.

Activity 1.2.5 Economic and social analyses

The activity aims to establish a shared basis for inclusion of social and economic analyses in MSP.

- The activity considers existing knowledge regarding ESA applied in MSP at the Baltic Sea regional scale and evaluates how remaining knowledge gaps could be filled. Potential approaches that can serve the further development of linkages in the framework include: ecosystem accounting, cost-benefit analysis, assessment of ecosystem services, valuation of environmental benefits/ecosystem services. The work is based on literature review and workshops. The work also connects to territorial monitoring and includes developing of an economic model to connect to the evaluation of environmental impacts.'
- The activity mainly contributes to the following key elements for operationalisation of the EBA, as defined by the HELCOM/VASAB EBA MSP guidelines – applying the "best available knowledge and practice", "identification of ecosystem services" and "relational understanding".
- One final deliverable of the activity is recommendations on developing a framework for economic and social analyses in MSP.

General references

HELCOM 2016. Guideline for the implementation of ecosystem-based approach in Maritime Spatial Planning (MSP) in the Baltic Sea area. http://www.helcom.fi/Documents/Action%20areas/Maritime%20spatial%20planning/Guideline%20for%20the%20implementation%20of%20ecosystem-based%20approach%20in%20MSP%20in%20the%20Baltic%20Sea%20area_June%202016.pdf

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