BASMATI

Baltic Sea Maritime Spatial Planning for Sustainable Ecosystem Services

Specifications for case study designs

Deliverable 6.2

BONUS
SCIENCE FOR A BETTER FUTURE OF THE BALTIC SEA REGION

BONUS BASMATI

Specifications for case study designs

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Contents

BONUS BASMATI project in short

BONUS call 2015:
Blue Baltic

Project coordinator:
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Project partners:
Aalborg University, Denmark (AAU)
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Theme 4.3 Maritime spatial planning from local to Baltic Sea region scale

Subthemes:
Theme 2.3 Integrated approaches to coastal management and Theme 4.1 Governance structures, policy performance and policy instruments

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Abstract:
Maritime Spatial Planning (MSP) requires a spatially explicit framework for decision-making, and on that background the overall objective of BONUS BASMATI is to develop integrated and innovative solutions for MSP from the local to the Baltic Sea Region scale. Based on the results of former MSP projects, the BONUS BASMATI project sets out to analyse governance systems and their information needs regarding MSP in the Baltic Sea region in order to develop an operational, transnational model for MSP, while maintaining compliance with existing governance systems. It also develops methods and tools for assessments of different plan-proposals, while including spatially explicit pressures and effects on marine ecosystem services in order to create a spatial decision support system (SDSS) for the Baltic Sea region to facilitate broad access to information. During the project running until 2020, new data will be produced and tested in assessments corresponding to policy goals. The data will support the combined analysis of the three groups of ecosystem services: provisioning, regulating and cultural services. A central aim of the project is to facilitate cross-border collaboration, and the project is carried out in close cooperation with relevant stakeholders in the Baltic Sea Region. The impact of the project will be facilitated and assessed in transnational case studies, where integrated solutions are required. The local scale will consist of case study areas in the South-West Baltic, the Latvian territorial and EEZ waters including the open part of the Baltic Sea and the Gulf of Riga, and across the region, a Pan-Baltic case study will be performed.

1 Introduction

Development of ecosystem-based Maritime Spatial Planning (MSP) comprises a number of tasks, including identification of the planning needs, pre-planning and stakeholder engagement, defining and analysing existing and future conditions, preparing and approving the spatial management plan, implementation of the plan, and finally, monitoring and evaluating the performance (Ehler & Douvere 2009). Therefore, an ecosystem oriented maritime spatial planning support tool needs to respond to a number of challenges of integrated planning and management, including the assessment of effects of several coincident or alternative economic and other activities in the maritime space, as well as discussing benefits, conflicts and trade-offs of different alternatives with stakeholders in all planning phases.

Through the development of case studies, various maritime spatial planning situations will be explored – designation of new marine protected areas (MPAs), identification of suitable aquaculture sites and Pan-Baltic tourism and shipping issues. The case studies will identify, collect, produce and supply data and maps concerning ecosystem services and human activities as a basis for the assessment and visualisation of alternative scenarios and their effects on ecosystem service provision. Case studies will also extensively involve stakeholders to understand their needs and expectations, and make the MSP process participatory and interactive (Figure 1).

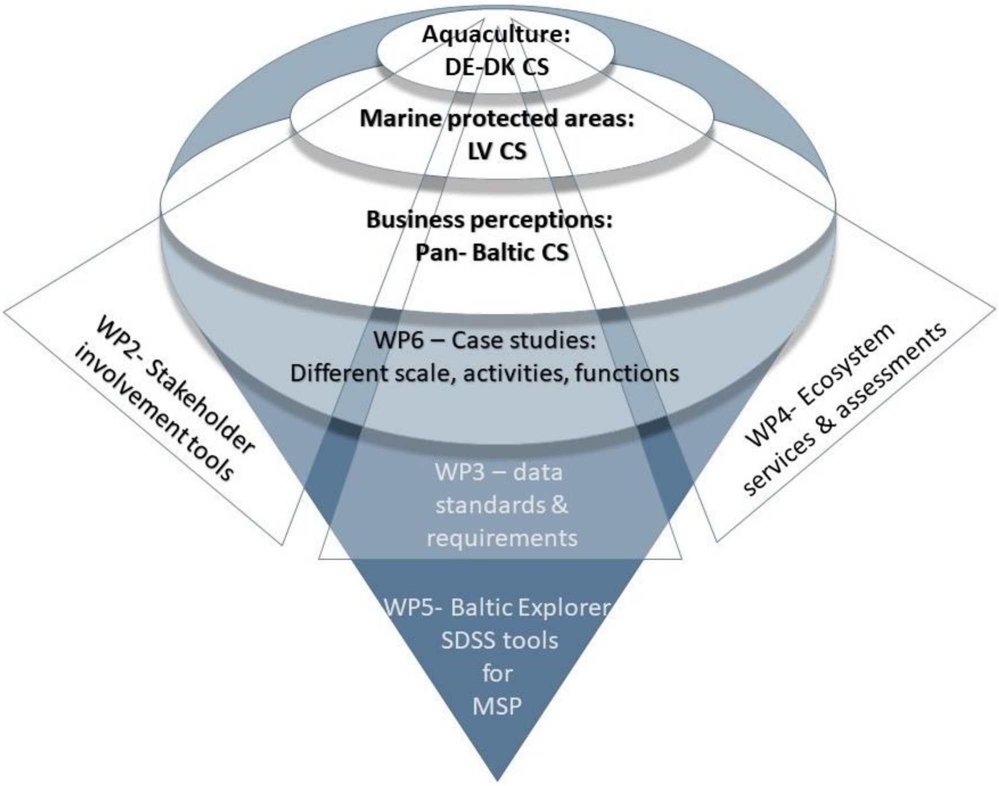

Figure 1
The case studies and work packages integration

The Latvian case study aims to support the MPAs designation process that, besides meeting the conservation goals, would consider social and economic issues to ensure that MPA sites are, as far as possible, chosen to maximize ecological, social and economic benefits while minimizing associated costs. The Danish-German case study on aquaculture investigates mussel farming opportunities in the south-western Baltic Sea. In both cases different potential sites will be compared against each other based on the level of ecosystem services provision. The case studies will apply the ecosystem service framework developed in WP4 and adapt it in order to be relevant for the MPAs (Latvian case) or mussel farms (Danish-German case). An important part of the any case study is the collation of data and the translation into information on ecosystem services, which will be done in close collaboration with WP3. The case studies will serve as a test bed for the development of the Baltic Explorer in WP5 with a focus on the site selection process and modelling of the ecosystem service. In the design and research phase of the case study mainly experts will be involved and at a later stage, in collaboration with WP5 and WP2, it is anticipated that preliminary results of the case studies will be tested in stakeholder settings.

The Pan-Baltic case study addresses the business perspective by focusing on two Baltic-wide business sectors – maritime transport and marine and coastal tourism. The study explores the perceptions and experiences of the business stakeholders on the involvement in MSP processes, especially related to transboundary planning, as well as their knowledge and views on the ecosystem services. These issues are mainly examined by questionnaires and interviews. The work on stakeholder involvement and interaction is strongly benefited by close collaboration with WP2. WP3 provides background data and modelling results to the stakeholder discussions, and WP4 introduces the knowledge framework regarding the ecosystem services. The case study results, in turn, provide input for the development of MSP decision support framework in WP5.

The case studies will create the backbone of the Baltic Explorer by addressing the specific problems on a smaller scale while allowing benefit from developed tools and solutions on a larger scale of the entire Baltic Sea. The Baltic Explorer will be a highly interactive web-based spatial decision support system (SDSS) for MSP with functionalities that include geospatial data exploration, real-time cumulative impact assessment, co-location, and suitability analysis. The application will engage stakeholders in collaborative planning through an intuitive and easy-to-use user interface, designed to be used with touch gestures. At the end of the project the Baltic Explorer will be published as open source software.

2 Case studies design in BONUS BASMATI project

2.1 Case study 1: Latvia

Over the last decades the sea area exploitation intensity has experienced considerable growth and, in combination with impacts from land-based activities, it has endangered several marine species and habitats, decreasing the ecological value of marine territories. MPAs are an important management instrument to achieve marine biodiversity conservation targets. However, the establishment of MPAs is often controversial as it can impose limitations to human activities in the sea and can have associated negative impacts on economic sectors (e.g. fishing, wind energy production, mining). MPA designations solely based on ecological criteria, although perhaps effective from a conservation perspective, often fail to achieve the support of the people affected by the establishment of the protected area (Hattam et al. 2014, Pollnac & Seara 2011, Walmsley & White 2003). Moreover, various social and economic development goals that depend on the use of the sea need to be achieved while ensuring compliance with the ecological targets. In order to achieve a balance between the ecological conservation and socioeconomic needs, the MPAs can be established by using biological principles as primary design criteria (Roberts et al. 2003) but also including relevant socioeconomic aspects to ensure community support, and meeting socioeconomic needs (Klein et al. 2008, Ruiz-Frau et al. 2015, Walmsley & White 2003).

In MSP it is also important to assess impacts of sea use scenarios on the MPAs. The Latvian planning authorities and stakeholders have indicated a need for a decision support tool that would allow the assessment of environmental and socioeconomic impacts of alternative sea use options, including the impacts on MPAs.[1]

[1] Results of stakeholder discussions organised as part of the project on October 25, 2017 in Riga.

I. Goal

The Latvian case study aims to support the MPAs designation process that, besides meeting the conservation goals, would consider social and economic issues to ensure that MPA sites are, as far as possible, chosen to maximize ecological, social and economic benefits while minimizing associated costs.

The objective of the Latvian case study is to provide the basis for the development of a tool (within WP5) that would allow the identification of efficient locations of MPAs (both coastal and offshore) and the evaluation of impacts of alternative sea use options on MPAs in the MSP context. It is planned to apply a Spatial Multi-Criteria Decision Analysis (MCDA) where environmental impacts, costs and benefits of alternative sea uses (e.g. MPAs, wind farms, aquaculture sites) will be evaluated within the Multi-Criteria Analysis (MCA) framework and involve interaction with stakeholders.

The tool will build on the Baltic Explorer, which will be developed as part of the project. The case study specific data and assessments will be developed for the tool to be applicable on local scale (which may require, for instance, higher resolution data) and suitable for the specified purpose (evaluation of alternative sea uses and efficient location of MPAs).

The main conceptual elements of the tool include: (i) spatial data system, organised in the DPSI (Ecosystem Services) framework, (ii) assessment of cumulative impacts from sea uses on components of the marine ecosystem (related to benthic habitats) and their provided ecosystem services, (iii) sea use conflict analysis to locate conflict areas, (iv) ecosystem services capacity assessment from the marine benthic habitats, (v) socioeconomic assessment of the ecosystem services and alternative sea uses, and (vi) spatial multi-criteria analysis of alternative sea use options and efficient location of the MPAs.

General analytical steps of the case study include (see Figure 2): (2) defining siting criteria specific to goal (environmental factors), (3) data collection and analysis (environmental), (4) identifying eliminating criteria and environmentally suitable territories for potential MPAs, (5) current situation; elaborating alternative scenarios of sea uses; GIS data (biological, physical, socioeconomic), (6) assessing environmental and socioeconomic impacts of alternative sea use scenarios, (7) evaluating the scenarios and ranking of sites. The analysis will result in efficient MPA and sea use locations.

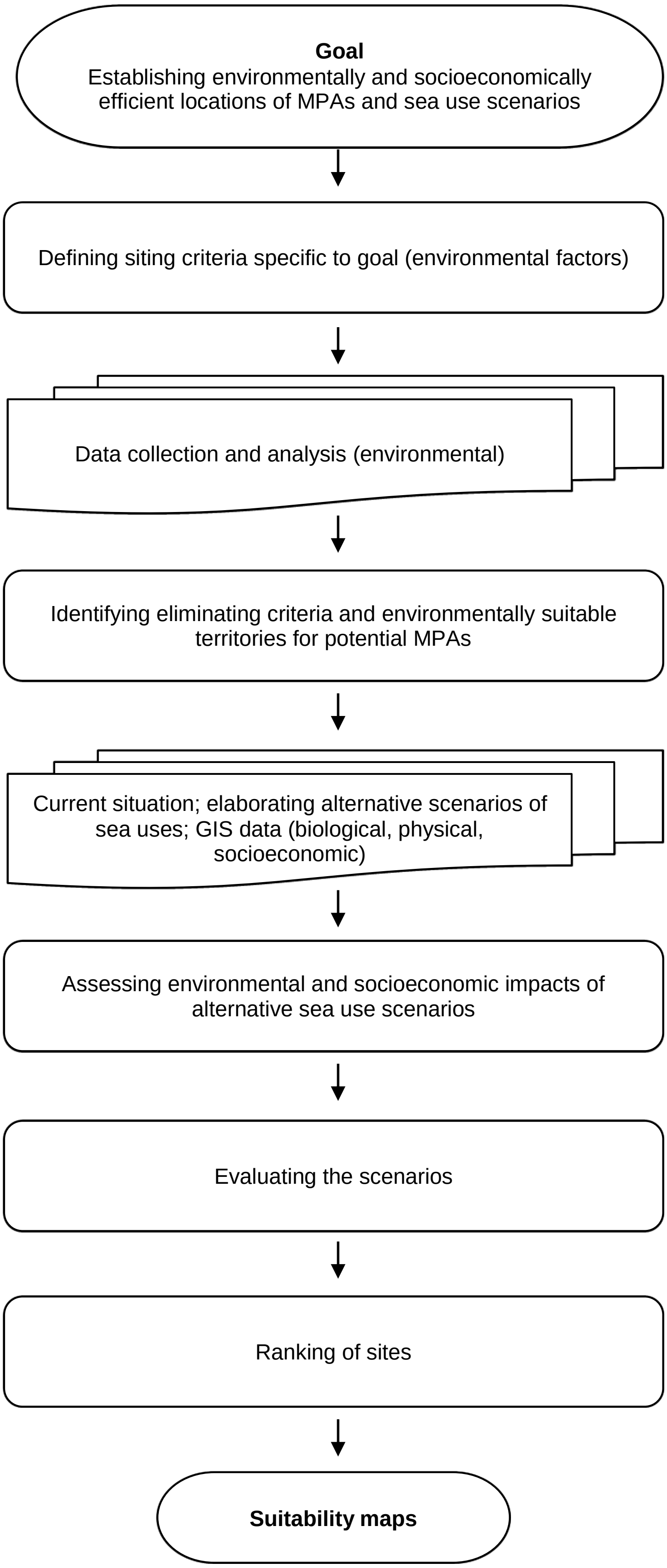

Figure 2
General analytical steps of the Latvian case study

II. Defining siting criteria specific to goal (environmental factors)

The first step requires identifying relevant environmental criteria according to which areas, suitable for MPAs purposes, can be identified and mapping areas potentially suitable for the MPAs.

The MPAs are being established to enforce protection status for species or habitats of interest to the community. The abiotic and biotic characteristics of MPAs should be such that they provide the best possible conditions for these species or habitats. Therefore, parameters describing these characteristics are used to identify boundaries of potential MPAs. In the Latvian case study, the most important are bottom sediment geological characteristics. The entire marine area, both the territorial and exclusive economic zone, will be considered, however, specific attention will be given to the territories already designated as MPAs and those that are listed as candidate territories (Figure 3).

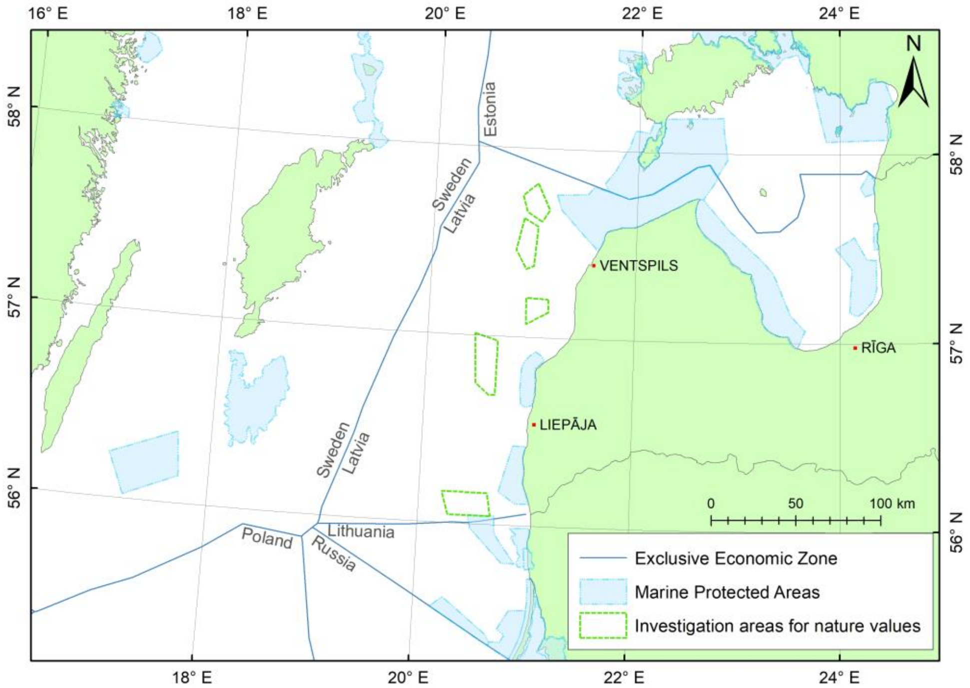

Figure 3
Latvian case study area – marine waters under Latvian jurisdiction (inland sea waters, territorial sea and exclusive economic zone waters)

III. Data collection and analysis (environment)

Spatial data (geological features of sea bottom) will be collected from accessible data sources. Only those data that are considered of sufficient quality will be used. Thereafter, GIS layers will be elaborated and analysed to identify sites suitable for the MPAs.

Benthic habitats located on hard substrates in euphotic and aphotic zone will be considered. The available geological maps will be cross-checked with the substrate and habitat maps of existing MPA and candidate sites as well as other territories outside of protected areas. The suitable areas for hard bottom benthic habitats will be mapped.

IV. Identification of eliminating criteria and defining of suitable territories

In addition, eliminating criteria need to be identified since some of the areas meeting environmental criteria might be already used for purposes that exclude the establishment of MPAs, like national security. In those cases, the use has a higher priority and these areas, although they might prove suitable for conservation purposes, are excluded from further evaluation. This step includes discussions with relevant stakeholders on whether it is possible to reallocate already existing activities to another area. If this proves to be possible, the area in question is not excluded from further analyses. After this analysis environmentally suitable territories for potential MPAs can be mapped.

V. Current situation, elaborating alternative scenarios of sea uses, GIS data (biological, physical, socioeconomic)

Existing data systems (e.g. HELCOM Map and Data Service, EMODnet), where countries provide national information regularly, are highly important information sources for sea region scale information systems and modelling tools. It needs to be ensured that the data is updated and therefore available over time. Therefore, the case study will aim to utilise such data as much as possible. Oceanographic data, seafloor characteristics, and physical-chemical data layers are needed in the identification of suitable benthic habitat locations. Biological information will be gathered to identify the ecosystem services provided by the benthic habitats. Where possible, the ecosystem services will be quantified and the values and benefits estimated. In addition to the observation datasets, the case study will also make use of modelled data, especially, when assessing the environmental impacts in the expected hydrographic conditions of the coming years.

VI. Assessing environmental and socioeconomic impacts of alternative sea use scenarios

The sea use practices result in pressures that, to a higher or lesser degree, leave impact on the environment. In some cases, the impact of pressure can be directly linked to the pressure through a pressure-response curve. In these cases, the pressure-response curve will be used to assess the level of environmental change if alternative sea use is considered. In some other cases, the environmental response relates to a secondary or even tertiary pressure, so a more elaborated approach will be needed to assess the level of environmental change. For each combination of sea use activities, a scenario will be created. These scenarios will be evaluated and compared in the next step.

An economic analysis will be conducted for assessing the socioeconomic impacts of the scenarios. Aim of the economic assessment is to describe changes in wellbeing, accruing to different stakeholder groups, as a result of different planning scenarios (Ivarsson et al. 2017). The socioeconomic impacts of the analysed scenarios relate to benefits from the ecosystem services provided by the benthic habitats (e.g. fish for food, recreational services, nutrient regulation) and benefits from the sea uses that can affect them (e.g. wind energy production, aquaculture farms), which form benefits and costs of the alternative sea use scenarios. The analysis will include gathering information on the values and benefits derived from the ecosystem services and assessing spatial distribution of those values such that they could be incorporated into the spatial planning. Various monetary and other quantitative (non-monetary) data on the values and benefits will be collected from available economic valuation studies, statistical data sources and literature. The benefits from the sea uses will be assessed based on their economic and social impacts using macro-economic and other quantitative indicators. Use of stakeholder value mapping approaches is also considered to capture a variety of societal values and preferences (Pascual et al. 2017, Ruiz-Frau et al. 2015, Etxano et al. 2015, Klain et al. 2012, Ruiz-Frau et al. 2011). In addition, distributional impacts of alternative sea use scenarios (e.g. spread of benefits and costs across affected groups of society and geographical areas) will be assessed to be incorporated in the MCDA (Saarikoski et al. 2016).

VII. Evaluating the scenarios and ranking of sites

Spatial Multi-Criteria Decision Analysis will be used for evaluating, comparing and prioritising alternative sea use scenarios. Multi-Criteria Decision Analysis (MCDA) can be employed as a method to simultaneously embrace, combine and structure a diversity of often incommensurable information (e.g. qualitative and quantitative data, as well as associated uncertainty), of opinions (also among experts), of actors' perspectives, and of decision making criteria (Etxano et al. 2015, Pascual et al. 2017, Saarikoski et al. 2016). It is a useful method for analysing and demonstrating trade-offs between environmental and other societal objectives and between competing objectives (Kelble et al. 2013, Saarikoski et al. 2016).

Relevant evaluation criteria (as well as their weights) will be defined in collaboration with stakeholders. They will relate to the environmental impact of a scenario (on the relevant ecosystem components and their provided ecosystem services), efficiency (concerns societal costs and benefits of the scenario), equity (where welfare benefits or costs fall, e.g. on particular sectors of industry, certain social classes, certain geographical areas, etc.). Thereafter, the MCA will be applied to compare scenarios among themselves and based on results of analyses ranked list of scenarios will be elaborated. The ranking process and its outcome will be discussed with stakeholders.

2.2 Case study 2: Denmark-Germany

The Danish-German case study investigates opportunities for aquaculture in the south-western Baltic Sea. With eutrophication being one of the main environmental issues in the Baltic Sea, nutrient input and outtake needs to be monitored carefully. Opportunities for aquaculture are limited unless nutrient input is mitigated. Taking advantage of the filtering capacity of mussels, mussel farms can be one option to mitigate eutrophication effects. In addition, mussel farms may also mitigate the environmental impacts of fish farms. The focus of the case study is on finding suitable sites for mussel farming and evaluating these sites based on ecosystem services.

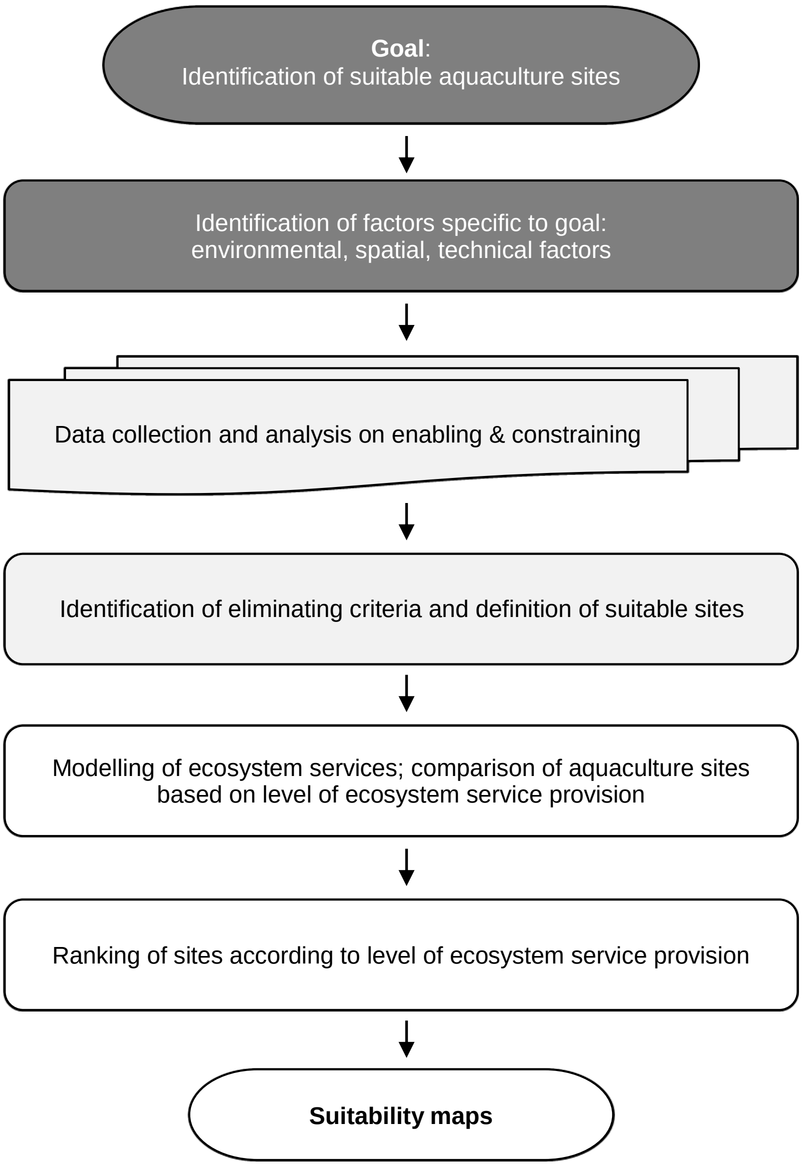

Figure 4
Design of the aquaculture case study (dark grey: steps accomplished; light grey: steps are under work, white: steps have yet to be done)

Zoning for aquaculture, in particular mussel farming, will be investigated, based on spatial analysis regarding environmental conditions, human activities and farming specific requirements. Alternative locations will be evaluated in terms of effects on ecosystem services (regulating, provisioning and cultural services) in order to identify most suitable areas. The evaluation of potential sites based on ecosystem services is an integral part of the case study and will be accomplished by modelling and quantifying ecosystem services.

The different steps of the case study are presented in Figure 4. The colours indicate which steps have already been accomplished.

I. Goal

The goal of the case study is to identify suitable mussel farming sites in the south-western Baltic Sea.

II. Identification of factors specific to goal

There are three main aspects which have to be considered when selecting suitable sites:

a. Environmental suitability: Where is it possible for the respective species to thrive in terms of environmental conditions?

b. Spatial suitability: Where is it spatially possible with regard to other human activities and designated areas at sea?

c. Technical suitability: What are farming specific requirements (e.g. the maximum distance to shore)?

In addition, another aspect has been considered: in which areas mussel farms could be used to mitigate the environmental impacts of fish farms. According to the Ministry of Environment and Food of Denmark there is one fish farming company, which has applied for permits in the Baltic Sea (to the South of Falster and Møn) and is now awaiting business[2]. The geographical focus of the case study will be on this area (Figure 5). It provides a real case, where the location of the fish farms will be enquired from the company and will be taken into account in the site selection process.

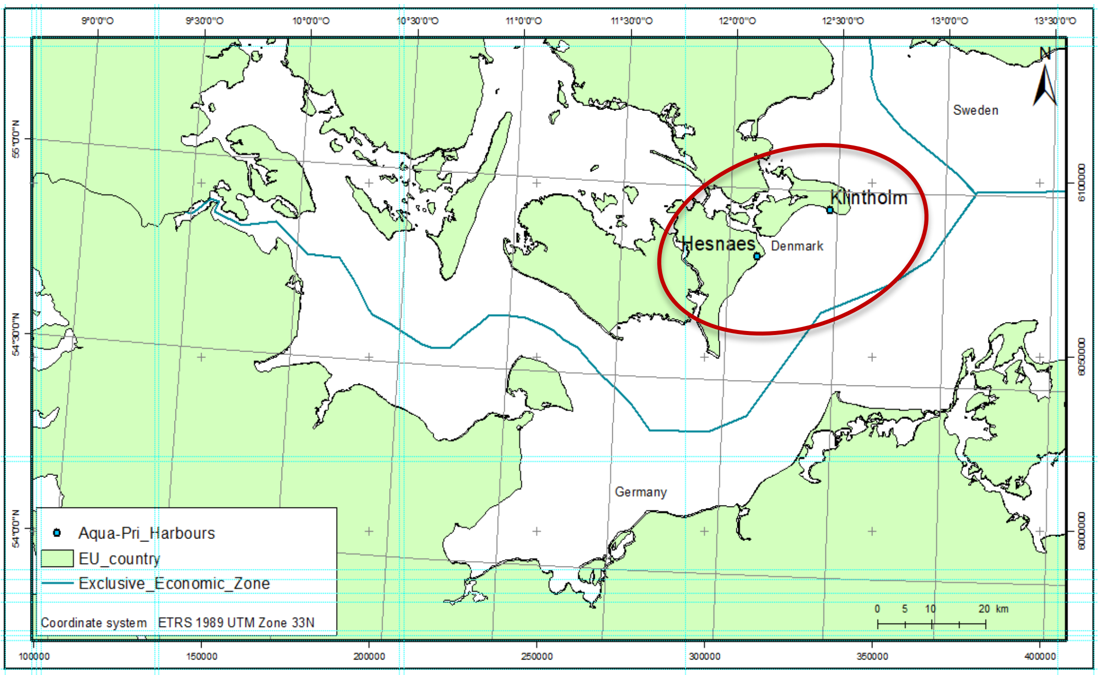

Figure 5
Denmark–Germany case study area (within the red circle)

[2] Miljø- og fødevareudvalget 2016-17 (MOF Alm.del endeligt svar på spørgsmål 962)

III. Data collection and analysis

Data will be collected according to the environmental, spatial, and technical suitability. For the environmental suitability the following parameters are important: Salinity, temperature, depth, chlorophyll, dissolved oxygen and currents. For the spatial suitability areas that are set aside for other uses will be considered, e.g. gravel extraction sites, wind farms, military & munition sites, shipping routes and nature protection areas. Also recreational boating, bathing areas, harbours & piers, slipways, anchoring points, camping sites, fishery grounds, fishery installations, underwater cables and pipelines will restrict the areas where mussel farming is possible. With regard to the technical suitability there are some farming specific requirements that need to be taken into account. The mussel farm must have a minimum size to be economically feasible, it cannot be located too far away from the landing harbour and some other farming specific requirements may also play role. For the environmental and spatial suitability spatial data needs to be gathered in the appropriate scale and resolution to be applicable for the case study area. Relevant databases, such as the HELCOM Map and Data Service and internal databases held at the IOW (Leibniz-Institute for Baltic Sea Research) and Aarhus University, will be searched in order to accomplish this step. The data will be mapped and analysed in ArcGIS.

IV. Identification of eliminating criteria and defining suitable territories

The outcome of the previous step will be maps, showing the environmental conditions and human activities in the case study area. In this step, it will be further analysed which environmental conditions are especially favourable for mussel growth and which human activities could coexist with mussel farms. The list with environmental parameters will be assessed by contacting researchers from the BONUS Optimus project, which have a test mussel farm in Greifswald Bay, Germany. From the test farm new data on mussel growth can be obtained and might provide some insight into environmental conditions that are exceptionally good or restraining on mussel growth. In the analysis those environmental conditions that in particular support mussel growth, will be given a higher weigh as well as those human activities that can coexist with mussel farms. With the help of GIS, human activities that are not compatible with mussel farms will be surrounded by a buffer zone, indicating that mussel farms are not possible in these areas. After intersecting all the environmental layers with the human activities and technical requirements, it is expected that a number of areas will be suitable for mussel farming.

Among those areas three sites will be chosen. The sites will be selected according to the prevailing conditions (e.g. exposed vs. sheltered, low salinity vs. high salinity, low vs. high nutrient loads). It is expected that the nutrient flows from the fish farm can pinpoint to locations that represent areas with high nutrient loads, where mussel farming can be used to mitigate the effects. In order to receive information on the planned location of the fish farm, the aquaculture company will be contacted. Furthermore, the modelling of nutrient flows will be required to determine in what distance and angle to the fish farm the mussel farm is optimally placed. One or two sites will be determined by the location of the fish farm. The sites, however, should differ in some other aspects (e.g. one located closer to shore, one more offshore). The other site could be chosen based on characteristics that are not yet covered by the other two locations. It is expected that the three sites will have different levels of ecosystem service provision due to their different locations, which could serve as an example for other areas with similar environmental conditions.

In addition to the aquaculture company, stakeholder involvement will also include national MSP planners. Enquiries will aim at elucidating their views on the evaluation of alternative aquaculture sites based on ecosystem services - if that is something they would include in their decision-making. Whether or not regional or local stakeholders will also be involved, will be decided at a later stage – when it is clear in which distance to the coast the potential mussel farms are located. If the farms are located within 1 NM from the coast, they fall under the responsibility of the local municipalities; beyond 1 NM they fall under national authority.

V. Complex data collection and analysis of suitable territories

In the next step the potential areas will be further assessed. In the aquaculture case study, the sites will be compared based on their level of ecosystem service provision. To this end, environmental modelling will be used.

Environmental modelling will provide data for the ecosystem services that are either provided or affected by the mussel farms. For the hydrodynamic model the Flexsem (http://marweb.dmu.dk/Flexsem/) model will be used, along with a dynamic energy budget (DEB) model for the growth of the aquaculture species and a coupled benthic-pelagic model. Flexsem is a marine modelling framework that has specifically been designed to solve scientific and management challenges with regard to the complex biogeochemical processes in coastal ecosystems. The DEB model and coupled benthic-pelagic model has successfully been applied in Limfjorden, Denmark, to model the influence of biogeochemical processes on the growth of blue mussels (Maar et al. 2010). The modelling efforts require a large amount of biogeochemical data related to concentrations of different forms of nitrogen and phosphorus in water and sediments, as well as other information on the biogeochemistry of the case study area.

To assess the impacts of aquaculture on ecosystem services provided in the respective areas, data on relevant indicators for provisioning, regulating, and cultural services are necessary. The ecosystem service framework, developed in WP4, will be specified to represent those ecosystem services that play a role in the case of mussel farming. The indicators for the services should be able to reflect the ecosystem state and changes therein. The aim is to provide a quantification of the services, and on this basis the three sites will be compared.

VI. Ranking of territories

Depending on their level of ecosystem service provision the sites will be ranked. The site with the highest level of ecosystem service provision will present the optimal location for mussel farming. Each site will be evaluated in terms of how high the level of provisioning, regulating and cultural services is. Table 1 shows in a simplified way how this will look like. Instead of a simple score (+ or -) the aim is to provide quantifications of the services as much as possible. In the example provided in the table, site 3 would represent the optimal solution as both the level of regulating and cultural services is exceptionally high. Site 1 and site 2, on the other hand, perform equally well as they have an exceptional high level for one ecosystem service category, a high level for another category and a low level for the remaining category (respectively).

Table 1
The evaluation of sites based on ecosystem services (a simplified example).

	Site 1	Site 2	Site 3
Provisioning services	++	+	-
Regulating services	-	++	++
Cultural services	+	-	++

VII. Suitability maps
Based on the steps explained above, suitability maps will be generated. In particular, they will show:
a. where mussel farms are possible with regard to environmental conditions, other human activities, and farming specific requirements
b. the three sites that have been chosen for the evaluation based on ecosystem services
c. the ranking of those sites, with the optimal solution (in terms of ecosystem service provision) indicated.

2.3 Case study 3: Pan-Baltic case study

The Pan-Baltic case study produces information about stakeholder perceptions and requirements concerning their involvement in the MSP process. The case explores functionalities which serve stakeholder interactions in economic and other activities in the Baltic Sea space in a transboundary context. This study focuses on international and offshore activities by addressing the issues of maritime transport and tourism, which both are Baltic-wide business sectors. Tourism and maritime transport differ in terms of spatial requirements and exploitation of ecosystem services. Both business sectors have synergies and conflicts with other activities within the sea and ecosystem services. Knowledge of ecosystem services affects the MSP process and outcomes, enhancing the planning process (e.g. McKenzie et al. 2014, White et al. 2012, Arkema et al. 2015).

It is stated that stakeholder engagement is crucial for the MSP process (e.g. Gilliland & Laffoley 2008, Pomeroy & Douvere 2008). Consequently, stakeholder involvement has been explored and discussed by many studies and projects. Even though the MSP schemes have been studied and developed actively in the Baltic Sea region, the understanding about MSP approaches by business stakeholders and their influence on MSP should be further developed. Projects concerning MSP in the Baltic Sea show the challenges and recommendations with regard to stakeholder involvement in MSP (e.g., BalticScope 2017, Saunders et al. 2016, Matczak et al. 2014). Many ports and shipping companies, for instance, have been stated to lack interest in participation in cross-border MSP discussions (PartiSEApate 2014). Therefore, this study investigates stakeholder perceptions and requirements concerning the transboundary and cross-border aspects of the MSP process and the related decision support system frameworks by focusing on two less explored themes related to MSP stakeholder involvement, namely ecosystem services and non-participation.

The perceptions, knowledge and experiences of business stakeholders on ecosystem services will be explored. The Pan-Baltic case study focuses on maritime transport and tourism as business sectors, but the perception of planning authorities as well as the selected representatives of NGO's, is also involved to include expectations arising from outside the economic realm. The case aims to evaluate the current understanding of business stakeholders about the concepts of MSP and ecosystem services; how the business sectors perceive the benefits provided by ecosystems services and the influence of human pressures on these services. Also perceptions on the future changes and needs for adaptation measures related to ecosystem services, such as climate change induced shifts in environmental conditions, will be addressed.

Another overarching theme is related to non-participation in the MSP stakeholder process. Recent critical views on MSP stakeholder engagement and its exclusivity highlight the challenges in stakeholder involvement (Flannery et al. 2018). Questions about the effectiveness of the participation processes and the true influence of stakeholders on MSP have been raised (Ounanian et al. 2012, Reilly et al. 2016, Flannery et al. 2018). Therefore, the issues of inclusion versus exclusion and participation versus non-participation among business sector representatives will be investigated. The case study evaluates the perceptions of feasibility and motivation of the business sectors to participate, including the transboundary and cross-border aspects of MSP. The transboundary aspects include different geographies, administrative borders, as well as cross-sectoral issues. Land-sea interactions and borders are another challenge in this case study, especially concerning coastal and maritime tourism. The emphasis of the Pan-Baltic case is on the activities that are directly connected to or affect coastal and sea waters.

New knowledge is acquired with questionnaires and interviews, which also serves stakeholder involvement and interaction in the Baltic Sea area in a transboundary context. The data needs of the Pan-Baltic case study are mostly related to background data provided for the respondents and interviewees. Mainly existing data sets on the biotic and abiotic environment, features and development of the business sectors and other human activities are utilized, as well as the modelling results and knowledge frameworks of other work packages of the BONUS BASMATI project (WPs 2, 3, and 4). In addition, the Pan-Baltic case study could benefit from big data resources, such as shipping data tracked by the automatic identification system (AIS) or mobile positioning data describing the movements of tourists.

The Pan-Baltic case is implemented in sequential phases (see Figure 6). First, the planning authorities and experts of MSP are questioned regarding their perceptions and expectations on the business involvement in MSP. During the second phase, business representatives are asked about their views and attitudes in relation to MSP, ecosystem services and stakeholder involvement, with special focus on the transboundary issues. Lastly, the views of the representatives of other interest groups, such as NGO's, are explored regarding their perceptions and expectations on businesses. The results of each phase produce input to the next phase and all the phases also serve stakeholder involvement and interaction in a transboundary context. The Pan-Baltic case may focus on certain sub-regions and sub-themes in order to elaborate the above mentioned issues in more detail. In addition, after phases 1–3, an end-user workshop is arranged to test the ideas achieved during the Pan-Baltic case study. Throughout the process, the case study results provide input for the development of a MSP decision support framework (WP5). The main outcomes of the Pan-Baltic case study will be published in international science journals.

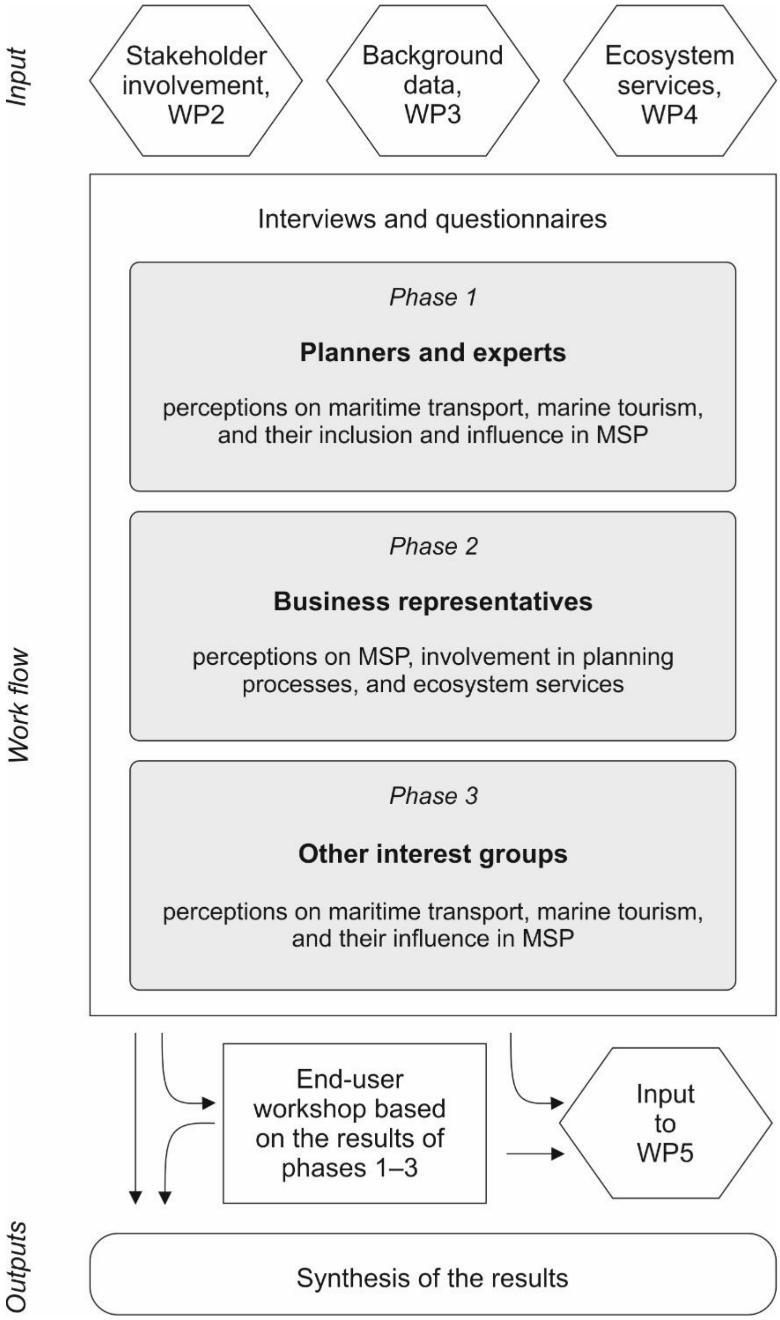

Figure 6
The stakeholder queries are organized in three phases, each focusing on a different stakeholder group. The case study utilises the data and expertise of the BONUS BASMATI work packages 2-4. Lessons learnt during the case study work can be further utilised in the development of the Baltic Explorer in work package 5.

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