European Commission

Toolbox for monitoring, evaluation and revision of MSP

Final Report

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EUROPEAN COMMISSION

European Climate, Infrastructure and Environment Executive Agency
Unit D.3.1 — Sustainable Blue Economy

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Toolbox for monitoring, evaluation and revision of MSP

The European Marine Strategy Framework Directive (MSFD; Directive 2008/56/EC) stipulates that Member States should consider economic, social and environmental aspects to support sustainable development and growth in the maritime sector, by applying an *ecosystem-based approach to MSP*. As marine and coastal activities are often closely interrelated, maritime spatial plans should also take into account *land-sea interactions. Capacity building for MSP* can help Member States to monitor, evaluate and revise their planning process.

Ecosystem-based Maritime Spatial Planning | Land-Sea Interactions | Capacity building

	Monitoring	Evaluation	Revision
Integrated methods	MSP monitoring & evaluation Criteria & indicators	MSP monitoring & evaluation Integrated socio-economic & environmental analysis	Decision support systems Criteria & indicators Laws' resilience and adaptive capacity analysis
Methods on social impact	Criteria & indicators Social impact assessment	Stakeholder participation assessment Stakeholder perceptions and interests analysis Social impact assessment	Participatory processes Social impact assessment Serious game
Methods on environmental impact	Criteria & indicators		Ecosystem services assessment Strategic environmental assessment
Methods on economic impact	Criteria & indicators		Input-output analysis Ecosystem services assessment
Methods taking spatial approach	Remote sensing Spatial data infrastructure	Remote sensing Spatial data infrastructure	Remote sensing Spatial data infrastructure

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1. ECOSYSTEM-BASED MARITIME SPATIAL PLANNING

Name (Common name/names of method/tool):

Ecosystem-based Maritime Spatial Planning (EB-MSP).

Purpose (What does the method/tool aim to achieve?):

The European Marine Strategy Framework Directive (MSFD; Directive 2008/56/EC) has adopted ecosystem-based management (EBM) as a central part of its objectives (Article 1). The MSFD obliges to reach and maintain Good Environmental Status (GES). In order to promote the sustainable growth of maritime economies, the sustainable development of marine areas and the sustainable use of marine resources, MSP should apply an ecosystem-based approach of which the aim is, "ensuring that the collective pressure of all activities is kept within levels compatible with the achievement of good environmental status and that the capacity of marine ecosystems to respond to human-induced changes is not compromised, while contributing to the sustainable use of marine goods and services by present and future generations" (Article 1(3) of Directive 2008/56/EC).

The EU-funded ODEMM project explained the purpose of this approach as follows:

> *"Ecosystem-based management (EBM) and the ecosystem approach (EA) allow for all the complexities of the system to be taken into account, moving away from a reductionist approach, which focuses on individual ecological components, pressures or sectors, to a holistic view that includes humans and their activities, and the ecosystem services that ecosystems provide to humans as an integral part of the ecosystem."*

The Executive Agency for SMEs (EASME), on behalf of DG MARE of the European Commission, has established a service contract for a study on the concrete application of EBA in MSP. Its main objective is to assess the state of play in the practical application of EBA in MSP and to develop a practical method and toolbox that can support the application, monitoring and evaluation of EBA in MSP.

Outcome (What information does the method/tool provide?):

Ecosystem-based Maritime Spatial Planning (EB-MSP) contributes to:

1. Healthy ecosystems and delivery of ecosystem services, through:
   - Resilient and productive ecosystems with diversity of species and habitats;
   - Strong environmental quality that supports ecosystem functioning; and
   - Delivery of ecosystem services.

2. Sustainable human uses, through:
   - Ecologically sustainable use of coastal and marine spaces and resources; and
   - Sustainable communities and economic well-being.

3. Integrated management and governance, through:
   - Effective governance structures and processes;
   - Capacity building among stakeholders; and
   - Knowledge building to support integrated management.

Applicability (When and where can the method/tool be applied?):

Adopting an ecosystem-based approach to MSP is a requirement under the MSFD. In principle, EB-MSP can be applied anywhere, as long as the following elements are defined:

- Boundaries of the ecosystem to be managed;
- Ocean spaces with special ecological or biological value within the ecosystem;
- Ocean spaces with special economic value and potential;
- Ocean spaces where the effects of human activities interact positively or negatively with ecological functions and processes; and
- Areas where conflicts do or may occur (uses vs. uses; uses vs. environment).

Operationalization (How does the method/tool work?):

Given the limited relevant knowledge, information and data in addition to unforeseen changes in the marine environment and ecosystem, there is a need for EB-MSP process that is iterative, continuous, and adaptive. At each stage of the process, there should be an evaluation to ensure that set procedures are followed to inform the next stages. To make EB-MSP operational, the process needs to be continuous – i.e. the first planning cycle should end in a monitoring and evaluation step and results and lessons learnt should be adapted into the next planning cycles (see Figure 1 below).

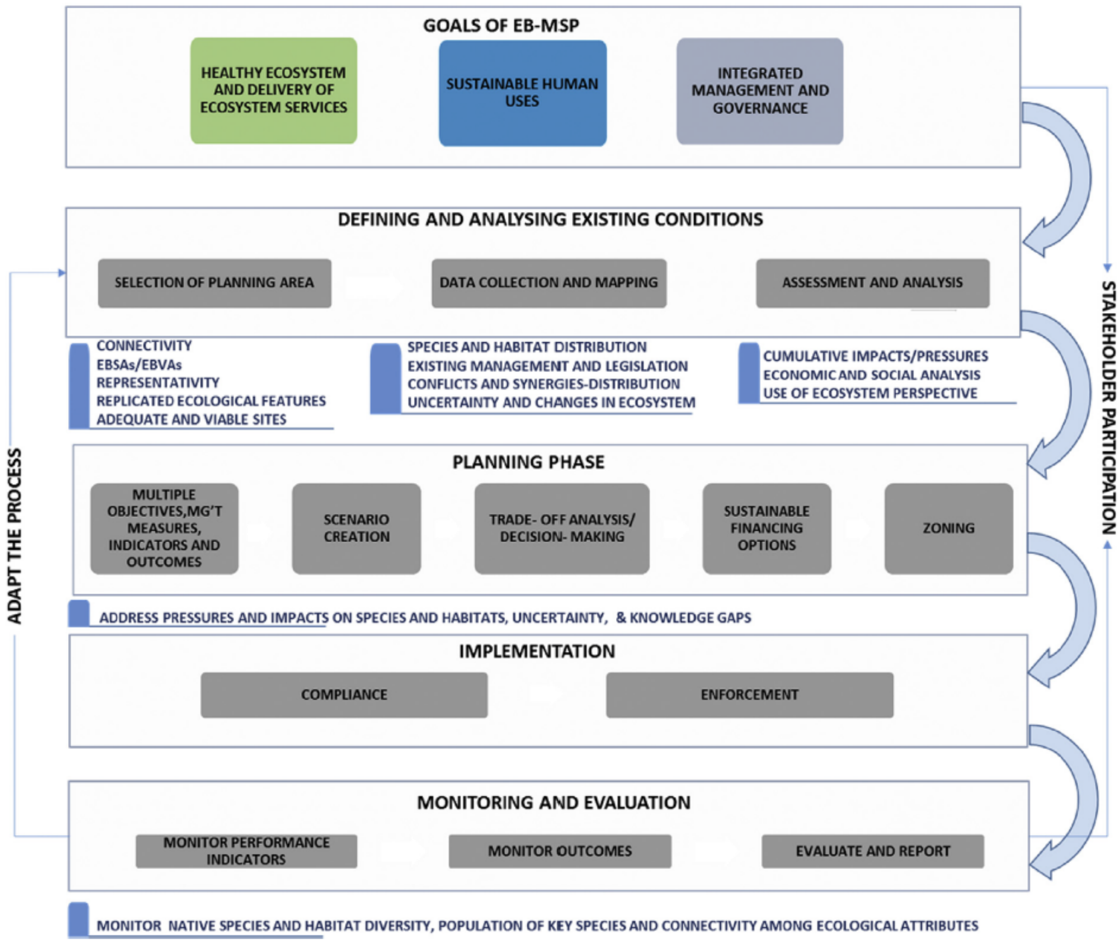

Figure 1: EB-MSP framework and methodology (source: Ansong et al., 2017)

Results from this research showed that the monitoring stage of EB-MSP should include the following:

- Monitoring the state of the system: focuses on, for example, the status of biodiversity in the marine area, the quality of water, or the overall health of a particular system;
- Performance monitoring: measuring the actual performance of management, for example: 'are the boundaries of the protected area sufficient to conserve the special habitat?'
- Time and rate of implementation: measuring the time and rate of implementation of the management measures to assess if the plan is being followed according to the ecosystem-based objectives.

For the monitoring process to be easy and effective with meaningful results monitoring should be based on indicators referred to at the setting of goals and objectives stage above. This calls for objectives of the EB-MSP to be specific, measurable, action-oriented and time-bound. The indicators for monitoring should also be readily measurable, cost effective, concrete, interpretable, grounded on scientific theory, sensitive, responsive and specific (Ansong et al., 2017: p. 74; Koehn et al., 2013).

Evaluation should be a continuous process in which indicators of performance are defined and systematically compared with programme goals and objectives. Reporting of the information from evaluation would serve as a basis to adapt the EB-MSP process.

In turn, adaptive management in MSP can be achieved by (Ehler & Douvere, 2007):

- Modifying MSP goals and objectives (for example, if monitoring and evaluation results show that the costs of achieving them outweigh the benefits to society or the environment);
- Modifying desired MSP outcomes (for example, the level of protection over a large marine protected area could be changed if the desired outcome is not achieved);
- Modifying MSP management measures (for example, alternative combinations of management measures, incentives and institutional arrangements could be suggested if initial strategies are considered ineffective, too expensive, or inequitable).

In order to ensure the implementation of an EB-MSP, a framework for monitoring and evaluating spatially managed areas must explicitly consider interactions between ecosystem components, management sectors, institutions and key actors, as well as the cumulative impacts of human activities. Stelzenmüller et al. (2013) prove a useful 7 step framework for monitoring and evaluation of MSP, based on existing concepts of adaptive management and considers a number of practical examples. For a more detailed description of the entire EB-MSP process, including setting goals, analysing existing conditions and the planning phase, see Ansong et al. (2017).

Practical experiences in the application of ecosystem-based approaches (EBA) in MSP are growing but are not yet well documented. In this context, the Executive Agency for SMEs (EASME), on behalf of DG MARE of the European Commission, has established a service contract for a study on the concrete application of EBA in MSP. Its main objective is to assess the state of play in the practical application of EBA in MSP and to develop a practical method and toolbox that can support the application, monitoring and evaluation of EBA in MSP. The preparation of the practical method and toolbox is also supported by five case studies of work to integrate EBA into MSP.

Needs (What resources are required for applying the method?):

Time: Monitoring and evaluation should be part of any ecosystem-based MSP cycle, so in that sense, this method does not require additional time. However, the process of translating findings from evaluations of the integration of EBA into adaptive management of the MSP (i.e. modifying objectives or measures) may take substantial time and effort.

Data: Data requirements for EB-MSP are substantial, given the need for ecological, economic, environmental and oceanographic conditions as well as human use information and data.

Costs: Dependent on the level of detail in data collection and processing, as well as the level of interaction with stakeholders deemed necessary.

Skills: Knowledge and skills from a wide range of areas of expertise are needed. Understanding of the concepts ecosystem-based management (EBM), ecological knowledge to understand relation between ecosystem components and services provided, and evaluation and result interpretation skills are needed.

Pros and cons (What are the strengths and challenges of the method/tool?):

Strengths:

- Comprehensive method that integrates an understanding of environmental, ethical, social and economic processes.
- Detailed description based on rich literature and case studies (empirical evidence).

Weaknesses:

- Without specifically looking at how to finance the protection of the ecosystem during the planning process, EB-MSP cannot be truly operationalized and ecosystem (functions, services and values) cannot be maintained.

Further information (Any particular website or case study that is useful?):

- The Study on Integrating an Ecosystem-based Approach into Maritime Spatial Planning will run through May 2021. Its final report will offer practical guidance on integrating EBA into MSP, including how different tools can support this.
- The ODEMM website presents a quick guide to the tools and techniques developed during the EU-funded ODEMM project. ODEMM focuses on the structure, tools and resources required to choose and evaluate management options that are based on the principles of Ecosystem-Based Management (EBM). The approach proposed is one which can translate policy driver objectives to an operational process of creating, appraising and choosing management options to inform decision makers.
- HELCOM Guideline for the implementation of ecosystem-based approach in Maritime Spatial Planning (MSP) in the Baltic Sea area.
- Synthesis Report on the Ecosystem Approach to Maritime Spatial Planning, Pan Baltic Scope.

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2. LAND-SEA INTERACTIONS

Name (Common name/names of method/tool):

Land-Sea Interactions (in Maritime Spatial Planning)

Purpose (What does the method/tool aim to achieve?):

Land-sea interactions (LSI) are closely related to many of the issues for ocean governance and maritime spatial planning (MSP). The importance of LSI is recognized by the European Marine Strategy Framework Directive (MSFD; Directive 2008/56/EC).

> *"Marine and coastal activities are often closely interrelated. In order to promote the sustainable use of maritime space, maritime spatial planning should take into account land-sea interactions."*

Outcome (What information does the method/tool provide?):

The analysis of land-sea interactions (LSI) informs MSP processes through the identification of the key elements linking the land and marine components of the coast that need to be taken into account when planning the sea space (PAP/RAC, 2018: p.4).

Applicability (When and where can the method/tool be applied?):

To take into account land-sea interactions is one of the minimum requirements for MSP, according to Article 6 of the MSFD. LSI can be addressed in a variety of ways and at a variety of scales of governance (Kidd, 2018: p.145). These include:

- Local areas, such as ICM partnerships and economically-driven initiatives, involving municipalities and other local interests;
- Sub-national planning territories, such as maritime plan areas, involving MSP authorities working in collaboration with coastal authorities and maritime stakeholders;
- National territories, where a national strategy or plan, covering the whole of the nation's waters, and possibly its land area as well, may guide LSI efforts; and
- Sea-basins / transnational regions, where transnational cooperation may produce a strategy or protocol for guiding national LSI efforts and ensuring ongoing cross-border cooperation.

These scales are not mutually exclusive. For example, there are cases where sea-basin strategies are being implemented or supplemented at a sub-national or local level through other instruments for addressing LSI.

Operationalization (How does the method/tool work?):

The framework in Figure 3 illustrates that interactions between the land and sea include those driven by natural bio-geo-chemical processes, such as agricultural run-off resulting in eutrophication of coastal waters (Kidd, 2018: p. 143). Although developments close to the coast are likely to have the most direct natural process interactions, it should be recognised that development even very distant from the coast can impact ocean ecology, for example by polluting rivers which discharge into the sea.

A number of European Union funded projects and national studies have sought to investigate natural process related LSI interactions and their impact on the marine environment and to examine and develop best practices and guidelines which can be used by those involved in ocean governance to manage LSI. Examples include work undertaken for the Danish National Environmental Research Institute and as part of the Celtic Seas Partnership project.

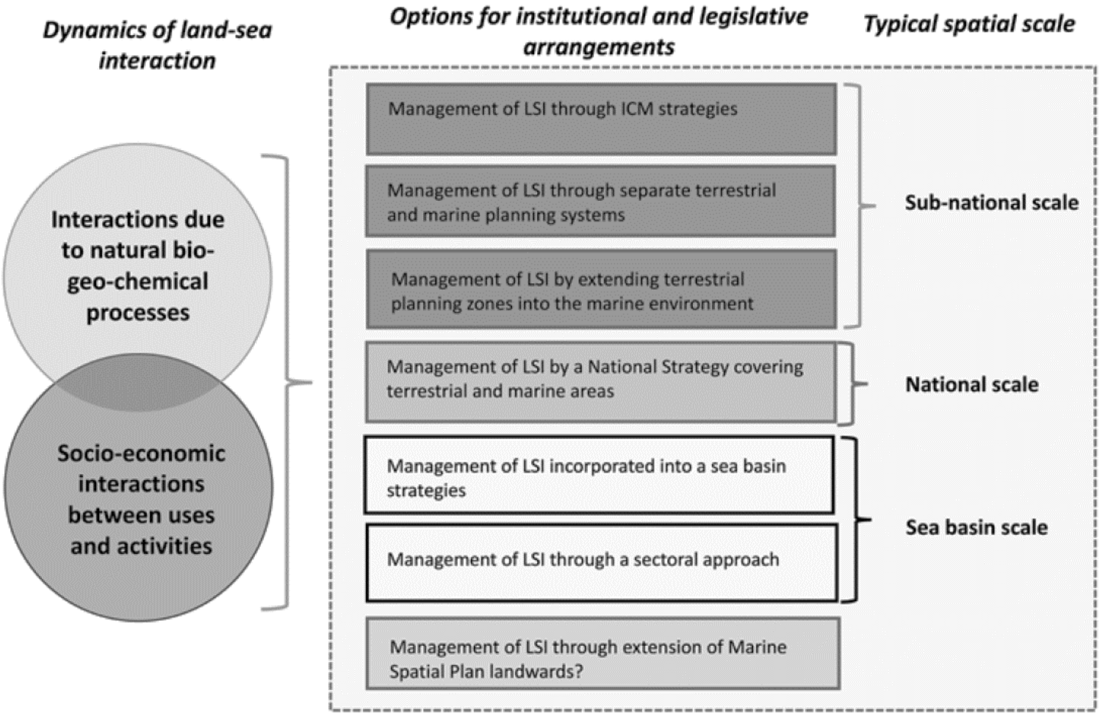

Figure 2: A General Framework for Addressing Land-Sea Interaction (Source: Kidd, 2018)

There are also important LSI between socio-economic activities (see Figure 2). For example, many maritime uses need support installations on land, while some uses existing mostly on land (e.g., tourism, recreation, and ports) expand their activities into the sea as well. These interactions need to be understood as part of ocean governance activities, in order to monitor and address their individual and cumulative impacts and potential conflicts and synergies.

Such interactions have also been studied on national and regional scales by national governments and by European Union funded projects. European Seas Territorial Development Opportunities and Risks (ESTaDOR) was one such project which formed part of the European Spatial Observation Network (ESPON) 2013 programme. ESTaDOR sought to explore both the development opportunities and risks for Europe's maritime regions by understanding land-sea interactions as an integrated whole. The project created a typology map of European Seas and associated inland areas demonstrating (through analysis of data related to transport flows, the socio-economic significance of the maritime economy and environmental pressures) where land-sea interactions are at their most intense.

Alongside bio-geo-chemical processes and socio-economic interrelationships associated with the dynamics of LSI, Kidd's (2018) framework set out in Figure 2 outlines a range of options for institutional and legislative arrangements to address LSI. The examples provided by Kidd (2018: p.145) are drawn from reflections on the European ocean governance experience. This reveals that LSI interactions may be managed through Integrated Coastal Management (ICM) initiatives. Alternatively, some European countries have chosen to maintain separate terrestrial and marine planning systems whilst still ensuring land-sea interactions are taken into consideration. There are also countries which have extended the remit of local and regional scale territorial plans into the marine environment with a view to addressing land-sea interactions. Another approach is to manage LSI through the creation of a single national strategy which encompasses both the terrestrial and the marine environment. Management of LSI can also be undertaken on a larger, sea basin scale (see, for example, VASAB). Finally, examples of LSI being managed within sectors themselves include the EU funded CO-EVOLVe project which is analysing and promoting the co-evolution of human activities and natural systems in coastal tourism areas in the Mediterranean.

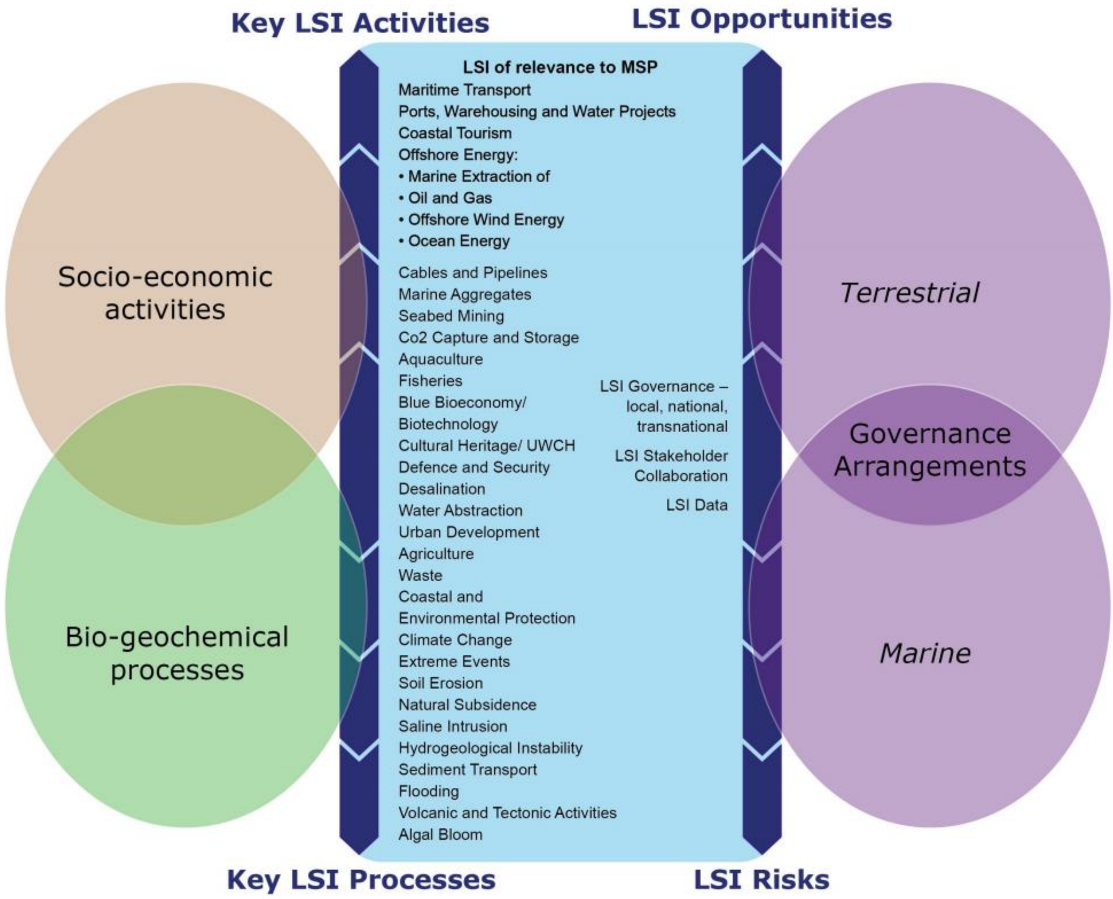

Figure 3: MSP-LSI Framework for Considering LSI in MSP (Source: ESPON/Kidd et al., 2020)

Figure 3 illustrates that LSI entail deeply complex and dynamic phenomena but provides a means of stepping into this complexity in a structured way. It shows that LSI involve the intricate and constantly shifting interconnection between socio-economic activities both in the sea and on land with natural processes that span the land-sea interface. The experience in both these dimensions is also influenced directly and indirectly by governance arrangements related to marine and terrestrial areas. These form part of the framework conditions that affect the realisation of LSI opportunities and management of LSI risks.

Needs (What resources are required for applying the method?):

Time: The process of translating findings from evaluations of LSI into adaptive management of the MSP (i.e. modifying objectives or measures) may take substantial time and effort.

Data: Specific data requirements depend on the choice of LSI activities that are included in the monitoring and evaluation phase. This may include data related to transport flows, the socio-economic significance of the maritime economy and environmental pressures in areas where land-sea interactions are at their most intense. LSI Core Areas can be defined to set boundaries for data gathering where LSI might be anticipated to be most evident (see EPSON 2020 final report).

Costs: Dependent on the level of detail in data collection and processing, as well as the level of interaction with stakeholders deemed necessary.

Skills: Knowledge and skills from different fields of expertise and methods are useful, including: stakeholder engagement, governance analysis, value chain analysis, mapping (to define boundaries of core area and to visualise findings), knowledge of policy framework, spatial management, and result interpretation skills.

Pros and cons (What are the strengths and challenges of the method/tool?):

Strengths:

- A focus on LSI directly contributes to an ecosystem-based approach to MSP, as consideration of LSI presents a useful lens through which to explore the implications of the ecosystem approach (EA) principles in ocean as well as terrestrial governance contexts.

Challenges:

- Taking account of LSI in MSP in line with the 2014 MSP Directive recitals presents significant challenges due to the complex socio-economic, bio-geochemical and governance interrelationships involved.

Considerations (What issues should be considered when using the method/tool)?

- "The European experience indicates that there is no 'one size fits all' solution to establishing governance arrangements that address LSI. It is clear that context matters and what is appropriate and deliverable in any situation will be influenced by variations in physical and human geography and will need to respond to different administrative and legislative histories and cultural norms and practices.
- "Equally, it is evident that different governance approaches will have their own strengths and challenges from an LSI and an EA perspective and a combination of approaches is likely to be beneficial" (Kidd, 2018: p. 157).

Further information (Any particular website or case study that is useful?):

- The website of the ESPON project (2020) presents a Report on LSI for MSP. The Report "MSP-LSI – Maritime Spatial Planning and Land-Sea Interactions" presents insights from 5 pilot case studies (Slovenia, the Gulf of Gdańsk, the Croatia Coast and Islands, The Dutch North Sea Coast and The Pomeranian Bight) covering different LSI contexts and scales of analysis, and provides practical recommendations for management of LSI in MSP.
- European MSP Platform: MSP Conference – Addressing Land-Sea Interactions (2017).
- UNESCO (Intergovernmental Oceanographic Commission) on Land-Sea Interaction (2020).
- European Commission website on Integrated Coastal Zone Management and Land-Sea Interactions.

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3. CAPACITY BUILDING

Name (Common name/names of method/tool):

Capacity building (for Maritime Spatial Planning)

Purpose (What does the method/tool aim to achieve?):

Maritime Spatial Planning (MSP) still remains a novel and complex process which involves various disciplines, procedures as well as engagement with multiple interests within differing governance arrangements and legal settings at different spatial scales. MSP, therefore, requires practitioners and their institutions to be adequately equipped to address all of these challenges.

> *"Capacity building in relation to MSP can be defined as the process through which the abilities of individuals, institutions and their networks are developed and enhanced to make effective and sustainable decisions about the temporal and spatial ordering of human activities in the marine space" (Ansong et al., 2019: p. 2).*

The Joint Roadmap (UNESCO/DMARE, 2017) to accelerate MSP processes worldwide identifies 'Capacity building' as a priority area. "In order to accelerate MSP implementation around the world, a demand-driven training programme on MSP is required taking into account regional and socio-cultural contexts as well as existing training activities from other UN agencies" (IOC UNESCO & DGMARE, 2017)

Outcome (What information does the method/tool provide?):

It is important that maritime planners and their teams are trained and educated in MSP to improve their skills, knowledge and behaviours in support of a successful MSP process. As the MSP process requires the contribution of professionals form diverse backgrounds, it is essential that there are synergies between these to respond to the transdisciplinary nature of MSP. Institutions need operational capabilities including to effectively coordinate with and between stakeholders, sectors and institutions. Capacity building in MSP is required at all levels and should strengthen legal, administrative, financial, technical, and human resource to address various multifaceted issues that make the MSP process complex (Ansong et al., 2019: p. 2-3).

Applicability (When and where can the method/tool be applied?):

Capacity building is an integral part of adaptive MSP, which means it can be applied anywhere, as long as there is an ambition to learn and improve the planning process.

Operationalization (How does the method/tool work?):

Priority area 4 of the 'Joint Roadmap' identifies two major actions for capacity building: training for planners and pilot projects to build capacity for MSP.

Training for planners includes the publication of educational material such as MSP guides and manuals by organizations like the IOC of UNESCO. One example is the widely-used manual "Marine Spatial Planning: A Step-by-Step Approach towards Ecosystem-based Management".

Different MSP authorities in Europe have been set up with the objective of capacity building. More than twenty coastal EU Member States have set up competent authorities for MSP so far. Experience shows that MSP capacity extends well beyond any dedicated MSP authority to encompass what might be considered the wider 'MSP community' (see Figure 4 below). The development of an MSP learning community can also be achieved through proactive initiatives such as academia establishing relevant courses and consultancies growing or adapting their capability and other initiatives to build cooperation among these MSP institutions.

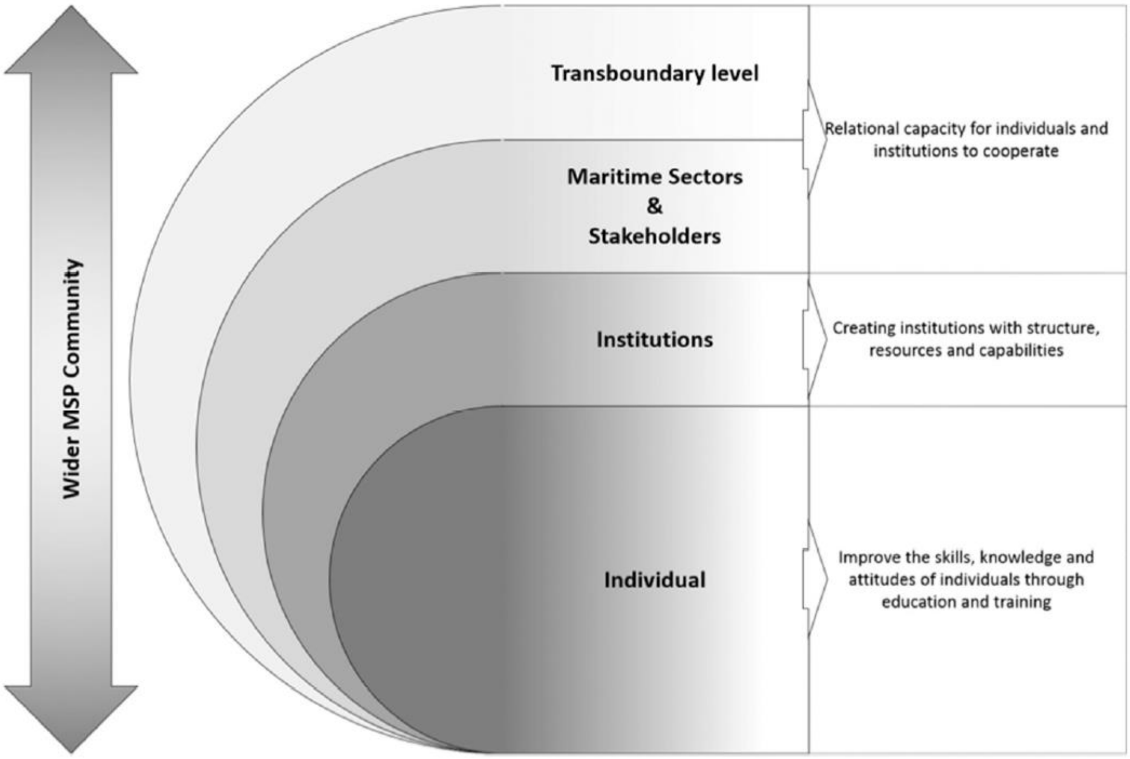

Figure 4: Multifaceted Approach to Capacity Building for MSP (Source: Ansong et al., 2019)

In addition, the relational/network dimension of capacity building for MSP has mainly been undertaken through cross-border consortia and projects where capacity for partnership, effective communication and cooperation between these institutions have considered disciplinary boundaries to share information and tailor common approaches that can be applied in MSP.

For example, Plan Bothnia was one of the first cross-border projects to test transboundary MSP, generating experience in international cooperation and knowledge of different planning methods and cultures. The MASPNOSE project included a process focused on the Dogger Bank Natura 2000 site designated by Germany, UK and the Netherlands which enhanced interaction between stakeholders and authorities to develop fisheries management proposals. The ADRIPLAN project which was the first of its kind in the Mediterranean region, building on existing scientific and research cooperation in the Adriatic, to explore and advance a methodology for MSP implementation in the region (Ansong et al. 2019, p. 5).

Lastly, capacity building can and should be tailored to specific competencies and activities for MSP, as it is critical that a marine spatial planner or team have the competencies to be able to function within the complex environment of MSP. Table1 below lists some examples of competencies considered necessary based on the MSP activities and experience briefly discussed above. For a more detailed explanation, see: Ansong et al. (2019: p. 4-6).

Table 1: Competencies of a maritime planner based on MSP activities (Source: Ansong et al., 2019)

MSP Process/Activities	Competences: Skills and Knowledge
• **Defining/Selecting the planning area**	Existing jurisdictional boundaries, bio regions, dialogue skills,
• **Planning process and programme of activities**	Programme/project management, systems thinking and management processes
• **Visions, Aims and Objectives**	Policy Analysis, Logical Framework Analysis
• **Gathering Evidence/Stock Taking**	Data Collection methods, spatial database management, existing governance system
• **Stakeholder Engagement**	Stakeholder Engagement Tools, Facilitation, Negotiation skills, communication skills
• **Analysis of current and future conditions – issues, spatial conflicts, options/alternatives, scenarios**	GIS skills, Scenario analysis, Sector Assessment, Synthesising information, Spatial Analysis; Socio-Economic analysis, Environmental analysis, intuitive reasoning
• **Development of plan policies/measures**	Existing sectoral policies, activity planning, analysis of existing governance system, writing clearly, consensus building
• **Plan approval and adoption**	Knowledge on policies and legislation
• **Plan Implementation**	Project/Organisational management
• **Monitoring and Evaluation**	Understanding a 'logic model' and indicators; knowledge of existing monitoring programmes

Needs (What resources are required for applying the method?):

Time: Capacity building requires a significant investment in time from maritime planning practitioners and their institutions.

Data: No specific data requirements have been identified for this method.

Costs: Most educational material for MSP is publicly available. However, there are costs associated with organising training and education, workshops, etc.

Skills: Skills to consider in capacity building include, but are not limited to: thinking strategically, communicating effectively, analysis and judgement, objective decision-making, project management, stakeholder engagement, research & problem-solving skills, facilitation, and negotiation and mediating.

Pros and cons (What are the strengths and challenges of the method/tool?):

Strengths:

Capacity building and knowledge exchange contributes to an adaptive MSP process.

- In addition, capacity building can contribute to a more holistic approach for coordinating sectoral policies, facilitating transboundary cooperation and optimising planning advantages.

Challenges:

- An overarching challenge is that capacity needs to be developed across a range of institutions, from a dedicated planning body to other contributing partners, across interested parties and stakeholders e.g. developers and their consultants, NGOs, and in the wider MSP community. Inevitably, this takes time and resources and may require priority setting.
- A specific challenge is the transdisciplinary nature of MSP, the complexity and size of the task, and inevitable limitations in resources to respond to these. MSP is generally well-established within in the environmental management community but there remain gaps, e.g. the involvement of social scientists and provision of socio-economic expertise.

Considerations (What issues should be considered when using the method/tool)?

- "MSP education/training should address the transdisciplinary nature of MSP by ensuring that course modules and content cuts across the core attributes of MSP including environmental and socio-economic aspects.
- "Modules such as hands-on workshops, field trips and case studies which emphasise the practical aspect of MSP should be integral to MSP training.
- "The diversification of MSP training and education to include more short courses, webinars, in-house training, workshops and MSP literacy campaigns should be encouraged" (Ansong et al., 2019: p. 6).

Further information (Any particular website or case study that is useful?):

- UNESCO's Intergovernmental Oceanographic Commission (IOC-UNESCO) and the European Commission adopted in March 2017 a Joint Roadmap to accelerate Maritime/Marine Spatial Planning processes worldwide. As a result of this fruitful partnership, the International MSP Forum and the MSPglobal Initiative were established one year later.
- The European Maritime Day (EMD) Conference is the annual two-day event during which Europe's maritime community meet to network, discuss and forge joint action on maritime affairs and sustainable blue economy.
- A study by Gissi and Vivero (2016), in the context of the Erasmus Mundus Master Course on Maritime Spatial Planning (EMMCMSP), analysed the existing educational provisions for MSP, identifying a multiplicity of combinations on contents and methods.
- Case study: This publication by Borberg et al. (2013) reveals the results of the assessment of knowledge, capacity, and needs related to MSP in the context of the US' National Oceanic and Amotspheric Administration (NOAA).

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4. CRITERIA AND INDICATORS

Name (Common name/names of method/tool):

Criteria and indicators

Purpose (What does the method/tool aim to achieve?):

Indicators support the process of following up on achievements made on the objectives of an MSP. As quantifiable measurements of occurrences of phenomena, they enable an objective and independent evaluation of change. Indicators lay the foundation for monitoring and reviewing MSPs by describing what factors are quantified in order to evaluate progress.

As the IOC/UNESCO guide to Evaluating Marine Spatial Plans explains:

> *"At least two types of monitoring are relevant to marine spatial planning: (1) monitoring that assesses the* state of the system*, e.g., "What is the status of current general conditions in the marine management area?"; and (2) monitoring that measures the* performance of management actions*, i.e., "Are the management actions we have taken producing the outcomes we desire?" These two types of monitoring are closely related—and both are important."*

Outcome (What information does the method/tool provide?):

The outcome is a set of evaluation criteria and indicators that structure the collection and analysis of data as well as the overall evaluation of the MSP.

Criteria and indicators alone do not provide information but need to be filled and supported by other tools (including many of the other tools in this toolbox). However, in structuring the collection and monitoring of data as well as focus points for review, they provide indications on the prioritisation of objectives. Hence, they need to be selected carefully and designed well.

Thus, the outcome will be the backbone of a performance monitoring system for the MSP that supports the improvement at review stages and allows for reporting on the developments.

Applicability (When and where can the method/tool be applied?):

The method can – and should – be applied in any MSP process. Importantly, criteria and indicators should be set in the early stages of MSP design to also collect and review the process itself.

In addition, the indicators need to be clearly linked to the objectives of the MSP, and its establishment process should have relating indicators to allow consistent evaluation and review.

Operationalization (How does the method/tool work?):

The instructions created by the Maritime Spatial Planning Programme on evaluating performance (see http://msp.ioc-unesco.org/msp-good-practices/evaluating-performance/), provide a stepwise approach to setting indicators for evaluation. The setting of criteria and indicators needs to be guided by the objectives of the MSP and its process.

As a first step, the objectives need to be confirmed or re-confirmed in the case of a review. Based on these, the selection of criteria and indicators needs to take place at the beginning of a planning process in order to provide input at all stages into the process.

The second step is the setting of criteria as further concretisation of the objectives. Criteria define the general characteristics that the process and the outcome of the planning should create and ensure. They define what needs to be measured by the indicators. The criteria should comprise different steps of the process and expectations towards the outcomes. The range of criteria can start with the inputs covering data availability and quality. For the planning process, criteria on the communication and engagement of stakeholders are relevant. As output of the planning, the MSP itself is a relevant criterion that needs to be evaluated. Finally, the outcome needs to be monitored in the criteria, such as achieving the objectives, creating wider benefits or unlocking resources for the implementation.

Thirdly, indicators need to be identified that can indicate the development for each criterion in order to be able to measure and map the achievements. Each indicator needs to support this purpose and therefore requires certain characteristics (see Table 2).

Table 2: Characteristics of good indicators (source: Maritime Spatial Planning Programme, http://msp.ioc-unesco.org/msp-good-practices/evaluating-performance/)

Characteristics of good indicators	
Readily Measurable	On the time scales needed to support MSP, using existing instruments, monitoring programs, and available analytical tools
Cost-effective	Monitoring resources are usually limited; how can effective monitoring be accomplished at least cost?
Concrete	Indicators that are directly observable and measurable rather than those reflecting abstract properties are desirable because they are more readily interpretable and accepted by diverse stakeholder groups
Interpretable	Indicators should reflect properties of concern to stakeholders; their meaning should be understood by as wide a range of stakeholders as possible
Grounded in Theory	Indicators should be based on well-accepted scientific theory, rather than on inadequately defined or poorly validated theoretical links
Sensitive	Indicators should be sensitive to changes in the properties being monitored, e.g., able to detect trends in the properties or impacts
Responsive	Indicators should be able to measure the effects of management actions to provide rapid and reliable feedback on their performance and consequences
Specific	Indicators should respond to the properties they are intended to measure rather than to other factors – i.e., it should be possible to distinguish the effects of other factors from the observed response

Reflecting on these criteria, also the indicators target different parts of the process and the objectives. Generally, three types of indicators are differentiated – i.e. governance, socio-economic and ecological/environmental indicators. Table 3 lists these, together with examples to illustrate their scope and feature.

Table 3: Types of indicators (source: Maritime Spatial Planning Programme, http://msp.ioc-unesco.org/msp-good-practices/evaluating-performance/)

Type	Definition	Examples
Governance indicators	Measure the performance of phases of the MSP process, e.g. the status of marine spatial management planning and implementation, stakeholder participation, compliance and enforcement, as well as the progress and quality of management actions and of the marine spatial management plan itself. Governance indicators are particularly important at the beginning of the MSP process before real outcomes can be measured.	• Effective authority for MSP established • Required funding for MSP provided • Number of publications (reports, press releases etc.) for wider public information • Representativeness-ratio of participating versus potential stakeholders as identified by stakeholder analysis
Socio-economic indicators	Reflect the state of the human component of coastal and marine ecosystems, e.g. level of economic activity, and are an essential element in the development of MSP plans. They help measure the extent to which MSP is successful in managing the pressures of human activities in a way that results not only in an improved natural environment, but also in improved quality of life in coastal and marine areas or number of jobs gained or lost, as well as in sustainable socio-economic benefits.	• Recreation opportunities enhanced or maintained • Equity within social structures and between social groups improved and fair • Public understanding of environmental and social 'sustainability' improved • Household occupational and income structure stabilized or diversified through reduced marine resource dependency
Ecological or environmental indicators	Reflect trends in characteristics of the marine environment. They are descriptive in nature if they describe the state of the environment in relation to a particular issue, e.g. eutrophication, loss of biodiversity or overfishing.	• Resident ecosystems, communities, habitats, species, and gene pools adequately represented and protected • Focal species abundance increased or maintained • Populations of target species for extractive or non-extractive use restored to or maintained at desired reference points

An important fourth step is to establish a baseline for each indicator against which the change can be mapped to evaluate the achievements and potential need for revision. The baseline is the situation before a marine spatial management plan begins; it is the starting point for performance monitoring and evaluation of each performance indicator.

The resulting framework combining objectives, criteria and indicators enables a structured evaluation of the steps along the way of the MSP process and the outcomes it sets out to achieve.

Needs (What resources are required for applying the method?):

Time: Due to the important role in the evaluation and review process, the selection of criteria and indicators should be undertaken thoroughly and with sufficient time to allow for an understanding of the appropriateness of each criteria and indicator, its implication and the completeness of the set.

Data: The setting of indicators and criteria in itself does not require large data resources. However, the choice of criteria and indicators will strongly impact the need for data to be collected to quantify the indicators and their change over time.

Costs: Similarly, the costs of setting criteria and indicators is low, but has an influence on later costs to collect data on the indicators. This should be considered in the choice of indicators and criteria.

Skills: No particular skills are required. A thorough understanding of the MSP process is necessary.

Pros and cons (What are the strengths and challenges of the method/tool?):

Strengths:

- Without well aligned criteria and indicators in line with the objective, measuring the progress and communicating the achievements is much more difficult.
- The importance of identifying criteria and indicators at the early stages of the planning process help structure the thoughts about further steps.

Weaknesses:

- None reported

Considerations (What issues should be considered when using the method/tool)?

There is no given set of criteria or indicators that will suit all MSP revisions. Individual circumstances and objectives need to be considered and reflected.

The identified indicators will need to be quantified and supported by data. Therefore, the availability of data and the possibility to collect data during the development need to be considered. Additionally, the Maritime Spatial Planning Programme suggests that the number of indicators should be limited, ideally to one indicator per action point. This reduces complexity and costs and enables focus on the main parameter that indicates the progress.

Further information (Any particular website or case study that is useful?):

Maritime Spatial Planning Programme of the IOC and UNESCO, Evaluating performance: http://msp.ioc-unesco.org/msp-good-practices/evaluating-performance/.

Extensive guide to evaluating MSPs, created by the IOC and UNESCO: https://www.openchannels.org/msp-eval-guide/homepage.

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5. CAPACITY BUILDING

Name (Common name/names of method/tool):

Capacity building (for Maritime Spatial Planning)

Purpose (What does the method/tool aim to achieve?):

Maritime Spatial Planning (MSP) still remains a novel and complex process which involves various disciplines, procedures as well as engagement with multiple interests within differing governance arrangements and legal settings at different spatial scales. MSP, therefore, requires practitioners and their institutions to be adequately equipped to address all of these challenges.

"Capacity building in relation to MSP can be defined as the process through which the abilities of individuals, institutions and their networks are developed and enhanced to make effective and sustainable decisions about the temporal and spatial ordering of human activities in the marine space" (Ansong et al., 2019: p.2).

The Joint Roadmap (UNESCO/DMARE, 2017) to accelerate MSP processes worldwide identifies 'Capacity building' as a priority area. "In order to accelerate MSP implementation around the world, a demand-driven training programme on MSP is required taking into account regional and socio-cultural contexts as well as existing training activities from other UN agencies" (IOC UNESCO & DGMARE, 2017)

Outcome (What information does the method/tool provide?):

It is important that maritime planners and their teams are trained and educated in MSP to improve their skills, knowledge and behaviours in support of a successful MSP process. As the MSP process requires the contribution of professionals form diverse backgrounds, it is essential that there are synergies between these to respond to the transdisciplinary nature of MSP. Institutions need operational capabilities including to effectively coordinate with and between stakeholders, sectors and institutions. Capacity building in MSP is required at all levels and should strengthen legal, administrative, financial, technical, and human resource to address various multifaceted issues that make the MSP process complex (Ansong et al., 2019: p.2-3).

Applicability (When and where can the method/tool be applied?):

Capacity building is an integral part of adaptive MSP, which means it can be applied anywhere, as long as there is an ambition to learn and improve the planning process.

Operationalization (How does the method/tool work?):

Priority area 4 of the 'Joint Roadmap' identifies two major actions for capacity building: training for planners and (pilot) projects to build capacity for MSP.

Training for planners includes the publication of educational material such as MSP guides and manuals by organizations like the IOC of UNESCO. One example is the widely-used manual "Marine Spatial Planning: A Step-by-Step Approach towards Ecosystem-based Management".

Different MSP authorities in Europe have been set-up with the objective of capacity building. More than twenty coastal EU Member States have set-up competent authorities for MSP so far. Experience shows that MSP capacity extends well beyond any dedicated MSP authority to encompass what might be considered the wider 'MSP community' (see Figure 5 below). The development of an MSP learning community can also be achieved through proactive initiatives such as academia establishing relevant courses and consultancies growing or adapting their capability and other initiatives to build cooperation among these MSP institutions.

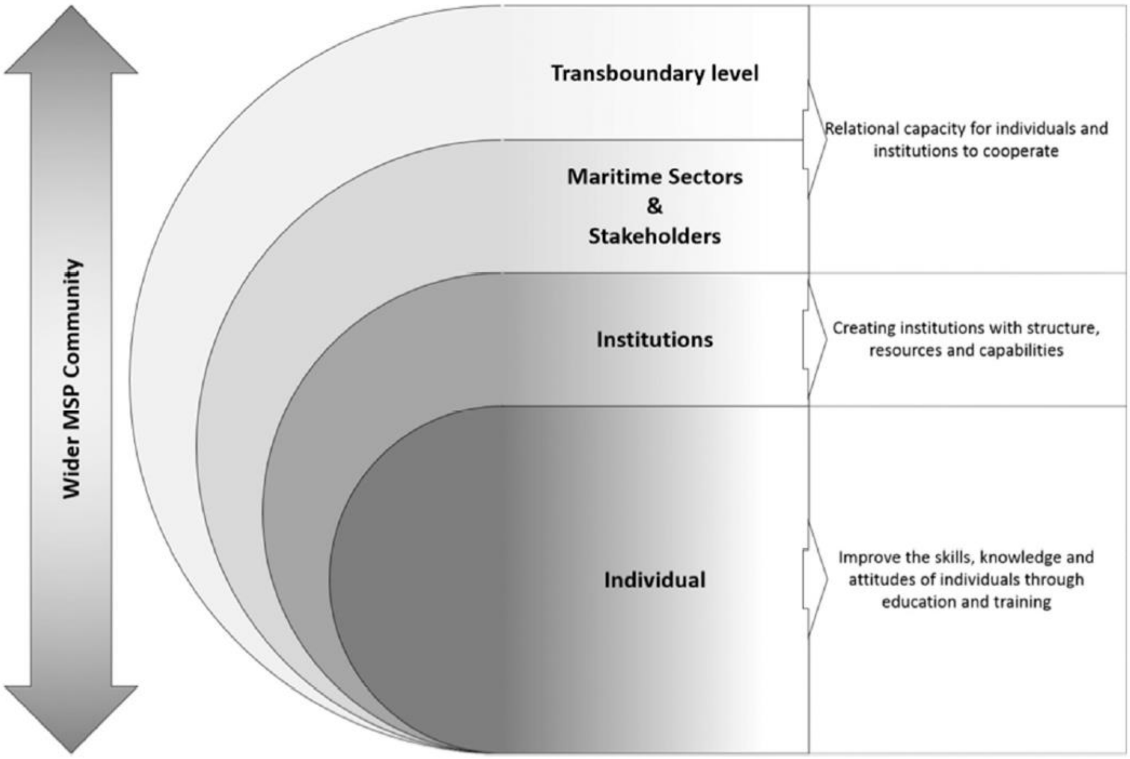

Figure 5: Multifaceted Approach to Capacity Building for MSP (source: Ansong et al., 2019)

In addition, the relational/network dimension of capacity building for MSP has mainly been undertaken through cross-border consortia and projects where capacity for partnership, effective communication and cooperation between these institutions have considered disciplinary boundaries to share information and tailor common approaches that can be applied in MSP.

For example, Plan Bothnia was one of the first cross-border projects to test transboundary MSP, generating experience in international cooperation and knowledge of different planning methods and cultures. The MASPNOSE project included a process focused on the Dogger Bank Natura 2000 site designated by Germany, UK and the Netherlands which enhanced interaction between stakeholders and authorities to develop fisheries management proposals. The ADRIPLAN project which was the first of its kind in the Mediterranean region, building on existing scientific and research cooperation in the Adriatic sea to explore and advance a methodology for MSP implementation in the region (Ansong et al., 2019, p.5).

Table 4: Competencies of maritime planners based on MSP activities (source: Ansong et al., 2019)

MSP Process/Activities	Competences: Skills and Knowledge
• **Defining/Selecting the planning area**	Existing jurisdictional boundaries, bio regions, dialogue skills,
• **Planning process and programme of activities**	Programme/project management, systems thinking and management processes
• **Visions, Aims and Objectives**	Policy Analysis, Logical Framework Analysis
• **Gathering Evidence/Stock Taking**	Data Collection methods, spatial database management, existing governance system
• **Stakeholder Engagement**	Stakeholder Engagement Tools, Facilitation, Negotiation skills, communication skills
• **Analysis of current and future conditions – issues, spatial conflicts, options/alternatives, scenarios**	GIS skills, Scenario analysis, Sector Assessment, Synthesising information, Spatial Analysis; Socio-Economic analysis, Environmental analysis, intuitive reasoning
• **Development of plan policies/measures**	Existing sectoral policies, activity planning, analysis of existing governance system, writing clearly, consensus building
• **Plan approval and adoption**	Knowledge on policies and legislation
• **Plan Implementation**	Project/Organisational management
• **Monitoring and Evaluation**	Understanding a 'logic model' and indicators; knowledge of existing monitoring programmes

Lastly, capacity building can and should be tailored to specific competencies and activities for MSP, as it is critical that a marine spatial planner or team have the competencies to be able to function within the complex environment of MSP. Table 4 below lists some examples of competencies considered necessary based on the MSP activities and experience briefly discussed above. For a more detailed explanation, see: Ansong et al. (2019: p.4-6).

Needs (What resources are required for applying the method?):

Time: Capacity building requires a significant investment in time from maritime planning practitioners and their institutions.

Data: No specific data requirements have been identified for this method.

Costs: Most educational material for MSP is publicly available. However, there are costs associated with organising training and education, workshops, etc..

Skills: Skills to consider in capacity building include, but are not limited to: thinking strategically, communicating effectively, analysis and judgement, objective decision-making, project management, stakeholder engagement, research & problem-solving skills, facilitation, and negotiation and mediating.

Pros and cons (What are the strengths and challenges of the method/tool?):

Strengths:

- Capacity building and knowledge exchange contributes to an adaptive MSP process.
- In addition, capacity building can contribute to a more holistic approach for coordinating sectoral policies, facilitating transboundary cooperation and optimising planning advantages.

Challenges:

- An overarching challenge is that capacity needs to be developed across a range of institutions, from a dedicated planning body to other contributing partners, across interested parties and stakeholders (e.g. developers and their consultants, NGOs) and in the wider MSP community. Inevitably, this takes time and resources and may require priority setting.
- A specific challenge is the transdisciplinary nature of MSP, the complexity and size of the task, and inevitable limitations in resources to respond to these. MSP is generally well-established within the environmental management community but there remain gaps (e.g. the involvement of social scientists and provision of socio-economic expertise).

Considerations (What issues should be considered when using the method/tool)?

- "MSP education/training should address the transdisciplinary nature of MSP by ensuring that course modules and content cuts across the core attributes of MSP including environmental and socio-economic aspects" (Ansong et al., 2019: p.6).
- "Modules such as hands-on workshops, field trips and case studies which emphasise the practical aspect of MSP should be integral to MSP training" (Ansong et al., 2019: p.6).
- "The diversification of MSP training and education to include more short courses, webinars, in-house training, workshops and MSP literacy campaigns should be encouraged" (Ansong et al., 2019: p.6).

Further information (Any particular website or case study that is useful?):

- UNESCO's Intergovernmental Oceanographic Commission (IOC-UNESCO) and the European Commission adopted in March 2017 a Joint Roadmap to accelerate Maritime/Marine Spatial Planning processes worldwide. As a result of this fruitful partnership, the International MSP Forum and the MSPglobal Initiative were established one year later.
- The European Maritime Day (EMD) Conference is the annual two-day event during which Europe's maritime community meet to network, discuss and forge joint action on maritime affairs and sustainable blue economy.
- A study by Gissi and Vivero (2016), in the context of the Erasmus Mundus Master Course on Maritime Spatial Planning (EMMCMSP), analysed the existing educational provisions for MSP, identifying a multiplicity of combinations on contents and methods.
- Case study: This publication by Borberg et al. (2013) reveals the results of the assessment of knowledge, capacity, and needs related to MSP in the context of the US' National Oceanic and Amotspheric Administration (NOAA).

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6. (SPATIAL) DECISION SUPPORT SYSTEMS

Name (Common name/names of method/tool):

(Spatial) decision support systems.

Purpose (What does the method/tool aim to achieve?):

Interactive (spatial) decision support systems (SDSS) serve to support decision-making regarding MSP and to improve the spatial management of marine resources.

As there are many complex trade-offs between the various ecological, economic, and social objectives within MSP, SDSS can be used to compare alternative scenarios in order to identify potential 'cost-effective' solutions, trade-offs and areas of synergy.

Outcome (What information does the method/tool provide?):

This method can help to solve problems related to marine and coastal management. SDSS can model exploited marine ecosystems to foster understanding of system dynamics; identify major processes, drivers, and responses; highlight major gaps in knowledge; and provide a mechanism to evaluate management strategies before implementing them (Fulton et al., 2011; Stelzenmüller et al., 2013).

Applicability (When and where can the method/tool be applied?):

SDSS require compiling, organizing and analysing spatial data, including administrative, ecological, environmental, socio-economic and human use data. This means that a robust spatial data infrastructure (SDI) is required to develop a useful SDSS. Existing datasets need to be integrated and utilized (see Step 1 and 2 in Figure 6 below).

Operationalization (How does the method/tool work?):

This method is part of the following three key steps for MSP data management (Ehler & Douvere, 2009; Stamoulis & Delevaux, 2015), see Figure 6 below. The application of SDSS is the third and final step in the following process:

1. Define existing conditions through data collection (and pay attention to data management), including administrative, ecological, environmental and human use data.
2. Analyse existing conditions using spatial ecological modelling, human dimension research methods and cumulative impact assessments. Various tools have been developed for this purpose, all of which fall under the realm of Geographic Information Science (GISc), which is the foundation of Geographic Information Systems (GIS).
   Of the four primary data types mentioned earlier, ecological and human use data require additional analysis to maximize their usefulness in a MSP framework. These analyses include mapping important biological and ecological areas and human uses.
   Second order analysis consists of cumulative impact assessment which draws on ecological, human use and environmental data to analyze possible conflicts and compatibilities among human activities and the natural environment.
3. Project future conditions using underpinning models. A multitude of models exist to assess the ecological (e.g. MARXAN and EwE), social (see e.g. IUCN, 2016) and economic (e.g. InVEST) impacts of MSP scenarios.

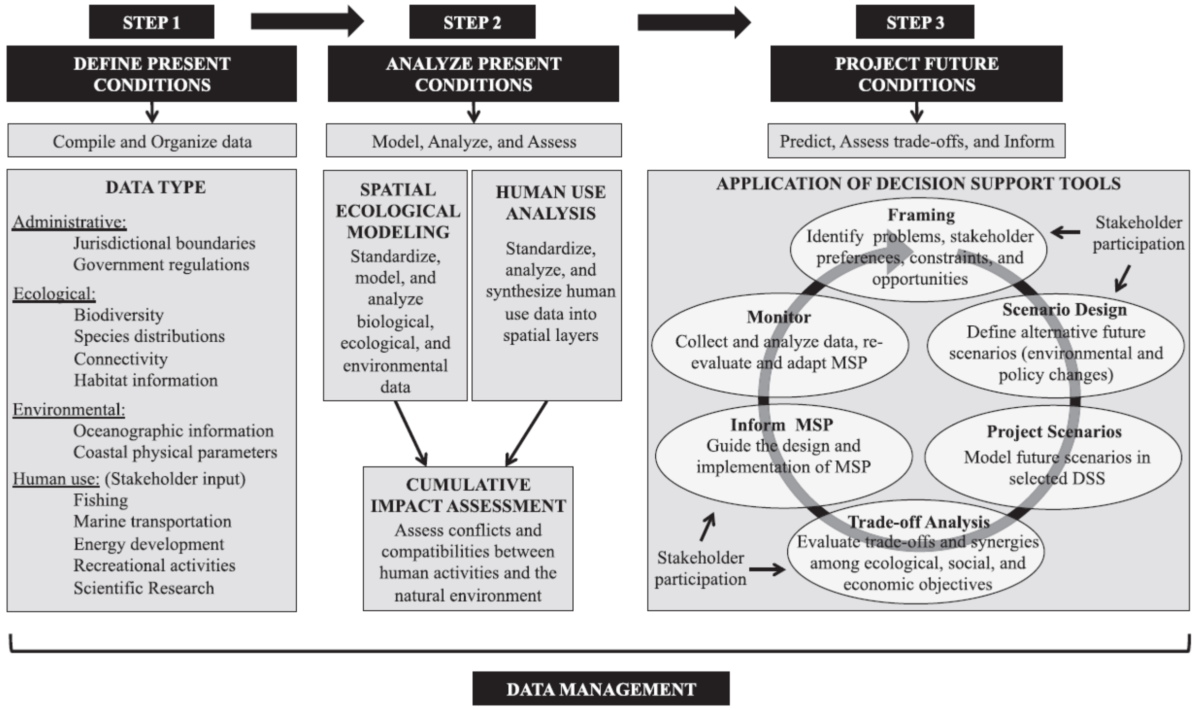

Figure 6: Key steps within the MSP process related to data and information (source: Stamoulis & Delevaux, 2015)

Needs (What resources are required for applying the method?):

Time: In case complex ecological, social and economic models (with large data requirements) are used, the use of S/DSS can be very time consuming.

Data: Data requirements increase with the complexity of the used ecological, social and economic models.

Costs: Costs increase with the complexity of the used ecological, social and economic models.

Skills: Data management, modelling and result interpretation skills are needed, as well as appropriate IT infrastructure.

Pros and cons (What are the strengths and challenges of the method/tool?):

Strengths:

- The primary benefits of using S/DSS in the MSP decision process are their ability to centralize, integrate and manage a wide range of spatial data, the speed of processing those data, and the clarity of outputs that are easily understood by end-users (Stamoulis & Delevaux, 2015).
- Governing bodies must still make decisions among alternative solutions, but these alternatives can be defined and understood more quickly and easily, and evaluated in terms of trade-offs and synergies (Yee et al., 2015).
- Case study example: "The advantages of this S/DSS for MSP, which was developed over the course of this project, are that it facilitates the minimization of area-based conflicts, allows the government and other marine culture stakeholders to access additional information regarding the most favourable seaweed cultivation areas, and improves the welfare of local fishermen" (Sutrisno et al., 2018: 865).

Weaknesses:

- The application of SDSS is a very time consuming process. The main challenge of this tool is that it requires compiling, organizing, managing, modelling, and analysing large amounts of different types of data, as well as the identification of different indicators and scenarios.
- SDSS do not systematically include uncertainty and risk arising from data gaps, scale mismatches, or lack of knowledge. This needs to be recognized and accounted for by MSP. The technical challenges and costs of tool implementation will increase depending on these factors (Fulton, 2011).

Considerations (What issues should be considered when using the method/tool)?

- Decision support systems have the potential to improve MSP if high accuracy data is used. for large scale MSPs high quality, consistent data is difficult to gather.
- The need for SDSS increases with the number of planning objectives and potential trade-offs.
- SDSS are more useful and more likely to be adopted in a structured decision-making context when they are GIS-based, MPA related, publicly available, and participatory (Stamoulis & Delevaux, 2015: 218).
- Key challenges for implementing effective environmental SDSS are socio-economic (data collection and data analyses) rather than technical. This also requires a more local- and site-based oriented attitude of researchers and government (idem.: 220; Papathanasiou & Kenward, 2014).

Further information (Any particular website or case study that is useful?):

- The Tools4MSP Geoplatform (former ADRIPLAN Portal) is a community-based, open source portal based on GeoNode, a web-based Content Managemetn System (CSM) for developing geospatial information systems and for deploying spatial data infrastructure (SDI).
- Useful case study: Stamoulis, K.A. and J.M. Delevaux (2015). Data requirements and tools to operationalize marine spatial planning in the United States. Ocean & Coastal Management, 116: 214-223.
- Upcoming reports from the BONUS BASMIATI project on user requirements for Spatial Decision Support Systems in MSP and guidelines for the establishment of the SDSS platform for MSP.
- MARXAN provides decision support to a range of conservation planning problems, see website and software; see also the website of Ecopath with Ecosim (EWE) Approach.
- For Social Impact Assessment (SIA), see the ESMS Guidance Note (2016).
- InVEST (Integrated Valuation of Ecosystem Services and Tradeoffs) is a suite of models used to map and value the goods and services from nature that sustain and fulfill human life. It helps explore how changes in ecosystems can lead to changes in the flows of many different benefits to people.

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7. MSP MONITORING AND EVALUATION

Name (Common name/names of method/tool):

MSP monitoring and evaluation.

Purpose (What does the method/tool aim to achieve?):

The main purpose of the monitoring and evaluation approach is to foster learning and to improve the MSP process. Monitoring and evaluation of plans and policies is generally required by national and European legislation. Monitoring and evaluations that shed light on outcomes as well as on the process of making and implementing MSP, increase our understanding of various aspects of policies and plans.

The monitoring and evaluation approach to MSP will help planners, stakeholders and the public to conclude whether the jointly set objectives have been met or whether it is plausible that the objectives will be met in the future. This will contribute to a better understanding of the relationship between objectives, planning decisions and outcomes, as well as to identify possible problems or discrepancies, and to illustrate possible consequences for society and the environment (Varjopuro et al., 2019: p. 3-4).

Outcome (What information does the method/tool provide?):

One of the key challenges with monitoring and evaluating MSP is how to determine what direct and indirect effects are actually generated by MSP. An evaluation approach that looks at MSP from different perspectives and in a broader context can produce useful information that helps to deal with this so-called 'attributability challenge' (Varjopuro et al., 2019: p. 2).

Like impact assessment, the monitoring and evaluation approach is based on a selection of different indicators. However, the monitoring and evaluation approach is more comprehensive than impact assessments, as it includes questions concerning the objectives and planning decisions of MSP, rather than just the outcomes (see Figure 7).

Depending on the selection of indicators, the monitoring and evaluation approach provides information and insights into various dimensions of MSP. This information can be directly used to adapt the actual planning and monitoring process, thereby contributing to a flexible and dynamic MSP process.

Applicability (When and where can the method/tool be applied?):

In principle, the monitoring and evaluation approach can be applied to any MSP process. This is evidenced by several case studies, such as for Belgium, Germany, Latvia and Poland (see Varjopuro et al., 2019).

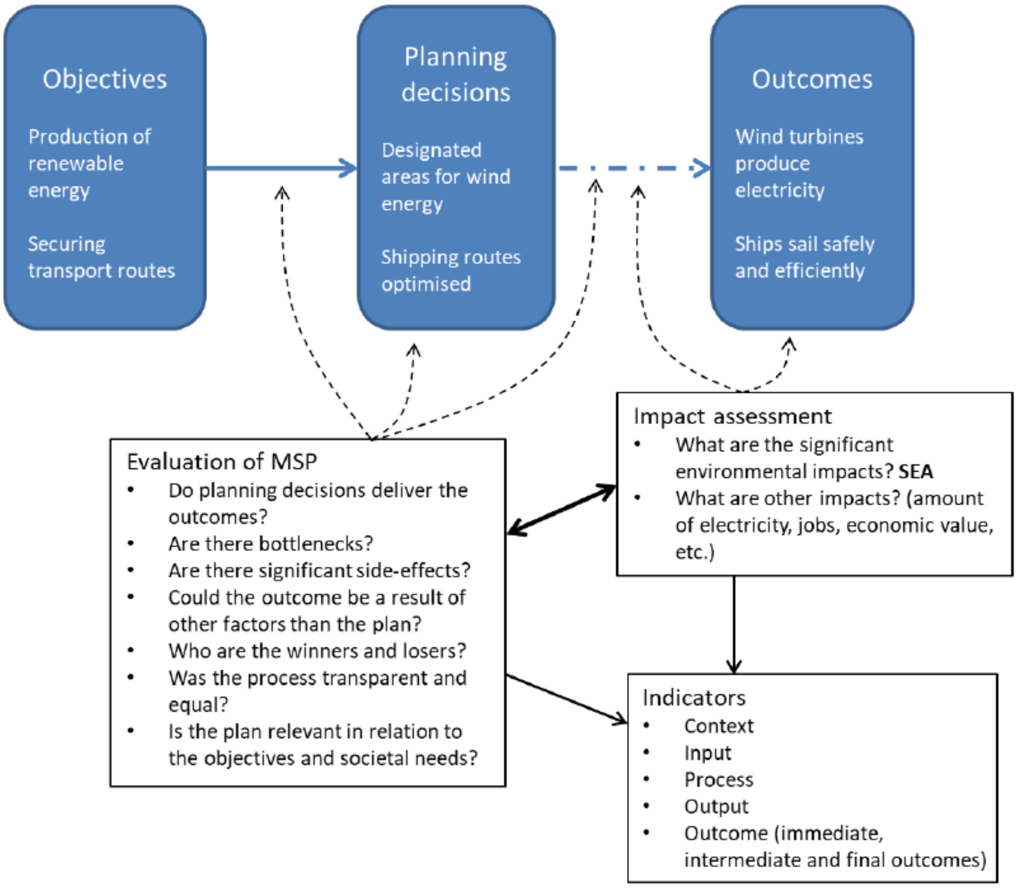

Figure 7: Schematic presentation of MSP monitoring and evaluation framework (source: Varjopuro et al. 2019)

Operationalization (How does the method/tool work?):

There are several different approaches and focuses for the monitoring and evaluation of MSP (see Figure 8). The evaluation of spatial planning has often been based on a linear (or at least cyclical) understanding of planning processes (Terryn et al., 2016). However, the non-linear and often unpredictable character of spatial development calls for a monitoring and evaluation approach that is suitable for the level of complexity of a particular planning context. This means monitoring and evaluation should co-evolve with the evaluated MSP process.

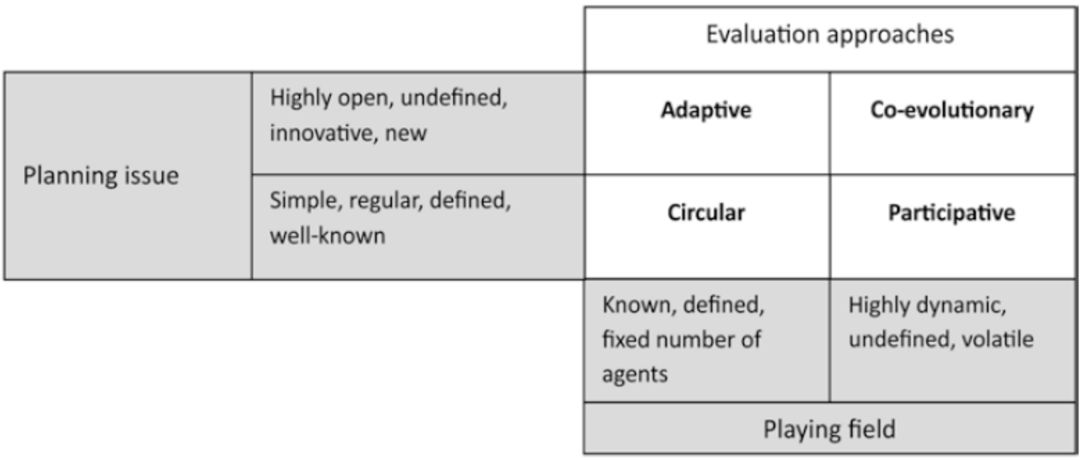

Figure 8: Evaluation approaches in relation to the degree and reasons of complexity of the planning contexts (source: Terryn et al. 2016, p. 1087; Varjopuro 2019, p. 422)

Structured expert- and stakeholder-based evaluation can be built on the so-called 'theory-based evaluation methodology' (Laurian et al. 2010; Varjopuro et al. 2019; Wong et al. 2006). The term theory-based implies that all decisions include an idea – a theory – of how that decision will be implemented and how it will produce the intended results. This approach is developed for evaluating policies and plans that operate in complex environmental and societal contexts and is recommended by the European Commission for evaluations of regional development policies (European Commission 2013). For a more detailed description of the application and conceptual basis of this approach, see Varjopuro (2019).

A theory-based evaluation of MSP starts with describing plausible mechanisms through which the planning process can produce its impacts. The actual evaluation then collects evidence to test whether the implementation of the plan unfolded as anticipated (and why); whether the anticipated results were achieved; and whether the implementation of the plan produced any unintended impacts (Varjopuro 2019, p. 428). An important part of the evaluation is to describe how various components of the evaluated intervention relate to each other and to describe the factors that influence these relations (Coryn et al. 2011; Varjopuro et al. 2019: p. 10).

A central practical phase in this evaluation approach is the construction of plausible steps, from planning decisions to preferred outcomes. The plausible steps can be described in multiple ways:

- a short storyline presenting the overall assumptions ("theories of change") in a comprehensible way, including a deconstruction of the assumptions into components and their relationships;
- the "theories of change" can be described in tables or visually presented as cognitive maps.

To address the challenge of knowing the impacts of MSP, it is important to shed light on different factors that (might) support or hinder the development towards the preferred objective. It is also advisable to identify unintended consequences and to systematically map who the affected parties are and how they are affected in different steps of the scheme.

Finally, indicators are useful for monitoring the achievement of MSP objectives. The information they provide can also help discussions with experts and stakeholders. However, it is important to emphasize the role of indicators as supporting tools, rather than the monitoring and evaluation framework (Varjopuro et al. 2019: p. 14). Quantitative indicators give a clear measure of progress and are easily comparable. However, qualitative indicators can often provide more usable information for monitoring and evaluation purposes than quantitative indicators. Either way, the indicators must be justified and designed carefully. The different types of indicators can be categorized as follows (Varjopuro et al. 2019: p. 17):

- Context indicators: Collect information on general developments in maritime sectors and marine environment. This information will help in analysing the relevance of the MSP (e.g.: Is the MSP focussing on the most important issues?).
- Input indicators: Collect information on actions and resources to develop the plans and responsibilities. This information will help in analysing preconditions for successful planning.
- Process indicators: Collect information on the planning process, including those from all stakeholders. This information will help in analysing the quality of the planning process, including equity and representativeness. They also set the standard for a good quality process.
- Output indicators: Collect information on the planning decisions and study the plan. This information will help in analysing the quality and relevance of the plan (e.g.: Is the plan responding clearly to the most important developments and needs of stakeholders?).

Needs (What resources are required for applying the method?):

Time: The evaluation approach is an ongoing and therefore time-consuming process.

Data: The data requirements depend on the policy objectives and the selection of qualitative and/or quantitative indicators.

Costs: The evaluation approach itself can be performed at low costs. For the monitoring of indicators and collection of data, costs can arise, but this will likely have benefits for other needs as well.

Skills: This approach requires skills in data collection, data analysis, planning and facilitating multi-stakeholder meetings.

Pros and cons (What are the strengths and challenges of the method/tool?):

Strengths:

- The MSP monitoring and evaluation approach provides the opportunity to create a broader societal discussion on the process and impacts of MSP.
- Oliveira and Pinho (2011: p. 295) summarise the benefits of evaluating spatial planning by stating that evaluation can:
  - Legitimise planning by improving citizens' understanding of the impacts of proposals;
  - Help decision-making to tackle complex problems;
  - Track and (eventually) adjust the course of planning proposals by reviewing the implementation of operational actions or the allocation of resources; and
  - Contribute to a continuous learning process.

Challenges:

- Challenging epistemological question of ability to know the effects of MSP and what MSP delivers in practical terms.
- MSP is not (and should not be) a very detailed plan. MSP can designate areas for specific uses and may set conditions for the use, but the actual development of the areas is stipulated in private and public decision-making and also permitting processes that come after MSP (Ehler, et al. 2019). Hence, it is not always clear to what extent the concrete consequences of these detailed level decisions are attributable to planning provisions given in MSP plans.

Considerations (What issues should be considered when using the method/tool)?

Based on the experience of different case studies, Varjopuro et al. (2019) conclude:

- Monitoring and evaluation should be kept as simple and pragmatic as possible, instead of aiming to build very complicated frameworks.
- Broad objectives are needed to provide overall direction and purpose for MSP. But to ensure successful monitoring, detailed sub-objectives need to be developed too. The sub-objectives need to be realistic, clearly defined and verifiable. Qualitative and quantitative indicators for monitoring MSP should be linked to the sub-objectives, as well as to broader developments in maritime sectors, the marine environment and society.
- It is important to organise systematic expert and stakeholder evaluation processes that can help reduce uncertainties about the outcomes of MSP and how it influences maritime sectors, the marine environment and society. A practical solution for this would be to form national MSP monitoring and evaluation networks, based on the existing national working groups that support the preparation of MSP plans.

- Quantitative measuring of impacts is possible only for very few aspects of MSP. A combination of qualitative and quantitative indicators can produce good results. For instance, process indicators can follow the number of stakeholder events and number of stakeholders consulted, but if such information is added with qualitative feedback from the stakeholders, the planning authorities will have a good information basis for improving the planning process.
- Participatory collection of input from experts and stakeholders can significantly support utilisation of information collected with the help of indicators. Broad expertise is needed to explain how MSP has affected or failed to do so in relation to information collected with, for instance, context indicators. Also, feedback on the MSP process can help better identify needs for developing the process if survey-based information indicates problems in the process.
- Finally, the non-linear and partly unpredictable character of spatial developments is an important point to be taken into account in the evaluation of spatial planning.

Further information (Any particular website or case study that is useful?):

- Pan Baltic Scope project

References:

Coryn, C.L., L.A. Noakes, C.D. Westine and D.C. Schröter (2011). A Systematic Review of Theory-Driven Evaluation Practice From 1990 to 2009. American Journal of Evaluation 32(2): 199-226.

European Commission (2013). EVALSED Sourcebook: Method and Techniques. European Commission/DG REGIO.

Laurian, L., J. Crawford, M. Day, P. Kouwenhoven, G. Mason, N. Ericksen and L. Beattie (2010). Evaluating the Outcomes of Plans: Theory, Practice, and Methodology. Environment and Planning B: Planning and Design, 37(4): 740-757.

Oliveira, V. and P. Pinho (2011). Bridging the gap between planning evaluation and programme evaluation: The contribution of the PPR methodology. Evaluation, 17(3): 293-307.

Terryn, E., L. Boelens and A. Pisman (2016). Beyond the Divide: Evaluation in Co-evolutionary Spatial Planning. European Planning Studies, 24(6): 1079-1097.

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8. INTEGRATED SOCIO-ECONOMIC AND ENVIRONMENTAL ANALYSIS

Name (Common name/names of method/tool):

Integrated socio-economic and environmental analysis.

Purpose (What does the method/tool aim to achieve?):

Integrated socio-economic and environmental analysis aims at evaluating and comparing the importance of maritime sectors in the dimensions of economic, social and environmental impacts.

The comparison can be used to mediate conflicts between uses by revealing their importance and potential need for compensation for negative (environmental) impacts.

In combination with multi-criteria analysis (MCA), it offers support to decide between different planning options/scenarios. MCA is mostly used to determine the optimal site for a planned project out of different alternatives, but this also allows to address the multi-scale and transboundary dimensions of MSP.

Outcome (What information does the method/tool provide?):

The tool provides shares of contribution to the overall impacts (economic, social and environmental) of each sector in relation to the maritime sphere.

Another outcome can be the support of selecting the most appropriate option/scenario as a result of the decision support approach.

Applicability (When and where can the method/tool be applied?):

The tool is suitable for regions with interactions of multiple sectors/uses that may experience conflict within or between sectors/uses. Therefore, it is suitable for larger areas as opposed to small geographical scopes.

This tool is suitable for existing sectors/developments in an area. Projections for new sectors/developments are possible if reliable assumptions on associated impacts are available.

Operationalization (How does the method/tool work?):

Integrated socio-economic and environmental analysis allows to evaluate and compare impacts of different activities according to the following steps:

Step 1 – Determine the scope: decide on the geographical and sectoral scope. For the geographical scope, boundaries will need to determine which sea- and land-based activities are considered. The sectoral scope describes the uses (synonymous to sectors) that will be evaluated and compared in that area (such as fisheries, energy generation, tourism and shipping).

Step 2 – Define criteria and indicators: for social, economic and environmental impact, a definition of what these categories comprise is necessary. For each of these indicators need to be defined. At least one indicator per impact is required; more indicators will improve accuracy. Examples of indicators are: gross value added per use (economic), number of jobs created by each use (social) and environmental pressures from uses (environmental).

Step 3 – Collection of data: For each use, data on the indicators developed in Step 2 needs to be collected, if it is not already available. The data needs to be linked to a use to allow calculating the share in overall impact.

Step 4 – Analysis of the data: To enable the comparison, the impact for every use needs to be given as a percentage of the impact of all uses combined. This happens for economic, social and environmental impacts. The result are relative impacts for each sector per impact category. Depending on the relative weight of the impacts, the total percentage can then be calculated. The table below gives an example:

Use / Sector	% of economic impact	% of social impact	% environmental impact	Total %
Fisheries & aquaculture				
Coastal tourism				
Renewable energy				
Maritime transport				
Coastal agriculture				
Etc.				
Total	100%	100%	100%	100%

Breaking down economic, social and environmental elements into more than one indicator is possible and will increase the accuracy of the analysis. For social impacts, safety or quality of life criteria can complement the creation of jobs. For environmental impacts, a broad range of ecosystem pressures can be included.

Needs (What resources are required for applying the method?):

Time: Performing the analysis and comparison itself does not require substantial time. Collecting data on the indicators can be time-consuming (see below).

Data: Economic data is required to evaluate the contribution of each sector, and can be obtained from Input-Output tables. Data on social and environmental indicators is also required, and can be obtained through existing monitoring activities, dedicated collection or computer-based modelling. The more elaborate the analysis (i.e. the more criteria and indicators are used), the higher the need for consistent and high-quality data.

Costs: The analysis itself can be performed at low costs. For the monitoring of indicators and collection of data, costs can arise, but this will likely have benefits for other needs as well.

Skills: Statistical skills are required to process and analyse primary (monitoring; collection) and secondary (Input-Output tables) data. A basic application of this tool does not involve high levels of quantitative abilities, but elaborate multi-criteria decision analysis can have a high complexity with a need for in-depth modelling skills.

Pros and cons (What are the strengths and challenges of the method/tool?):

Strengths:

- Integrated socio-economic and environmental analysis can improve the transparency and accountability of decisions, and build a quantitative basis for conflict mediation.
- If data is available from existing monitoring practices, the additional resources for this tool are low.
- Integration with stakeholder participation or GIS is possible to make the process more inclusive or and spatially explicit.

Weaknesses:

- Although transparency is improved, the outcome relies on the choice of indicator(s) and potentially on the grouping of environmental impacts into categories. Using a single indicator for each impact category results in high dependence on this one factor.
- The accuracy of measured indicators is also dependant on the type and frequency of data collected and the level of scientifically validated knowledge.
- High-quality decision support is possible but requires extensive data input and high level of skills in quantitative analysis.
- In the basic assessment, uses are assumed to have positive impacts on economic and social criteria and negative impacts on environmental criteria. In situation where the picture is more ambiguous (e.g. a use has negative and positive environmental impacts), calculations need to reflect differences in this criterion.

Considerations (What issues should be considered when using the method/tool)?

Not reported.

Further information (Any particular website or case study that is useful?):

- For more information on developing indicators for MSP, see this Handbook on MSP Indicators Development (short version) or the Roof Report on Common Indicators.
- For a useful overview of a number of MSP case studies with integrated assessments, see this World Ocean Council report (2016).
- For more information on multi-criteria analysis (MCA), see the guidelines on this Capacity4dev page.

References:

Niavis, S., T. Papatheochari, T. Kyratsoulis and H. Coccossis (2017). Revealing the potential of maritime transport for ‘Blue Economy’ in the Adriatic-Ionian Region. Case Studies on Transport Policy, 5: 380-388.

Jajac, N., J. Kilic and K. Rogulj (2019). An integral approach to sustainable decision-making within maritime spatial planning – a DSC for the planning of anchorages on the Island of Šolta, Croatia. Sustainability, 11: 104.

9. PARTICIPATORY PROCESSES

Name (Common name/names of method/tool):

Participatory processes.

Purpose (What does the method/tool aim to achieve?):

The purpose developing participatory processes as part of the Ecosystem Approach (EA) is to increase acceptance and understanding by all stakeholders in the MSP implementation process. As such, workshops are a tool for stakeholder participation, knowledge exchange and institutional learning (Ehler & Douvere, 2007; Slater & MacDonald, 2018). In particular, workshops can be used to:

- Identify good practices that illustrate how maritime spatial planning can help implement an ecosystem-based approach to sea-use management;
- Develop an international community of scientists and planners that want to put ecosystem-based management into practice; and
- Identify priorities for future action.

Outcome (What information does the method/tool provide?):

The outcome of participatory workshops is a greater and shared understanding of the ecological and policy linkages and interactions. This is evidenced by a number of case studies, including the Cooperative Participatory Evaluation of Renewable Technologies on Ecosystem Services (CORPORATES) project. Specifically (Slater & MacDonald, 2018: p.271):

> *"The workshops were designed to draw out individual participants' information and knowledge, which then collectively enabled a group to work together to enhance awareness and to reach consensus".*

In other words: workshops are a 'hands on' way of generating a shared understanding of the interlinkages among different aspects of the marine ecosystem and the benefits derived from it. Workshop activities and shared learning objectives can be used to develop tools that enable trade-offs to be agreed through the process, which would facilitate the development of integrated policy for the marine environment (*idem.*: p.270-271).

Applicability (When and where can the method/tool be applied?):

The success of participatory processes depends on the active participation of different stakeholders. The first challenge is to identify and secure an appropriate range of stakeholders who can commit to at least two dates to attend the project workshops. Ideally, this includes participation by policy makers, scientists, representatives from different industries, regulators, advisers, fishing organisations, NGOs, tourism operations, recreationists and (local) governments.

Operationalization (How does the method/tool work?):

The appropriate form and frequency of participatory workshops depends on the context and objectives of a particular project or policy. The following description serves as an example and is based on experiences from the CORPORATES project (see Slater and MacDonald, 2018).

The CORPORATES project included two different participatory workshops. The first workshop aimed to identify existing knowledge and to develop shared understandings about the goals of a project or process. In the second workshop, different sectors worked together to link different categories (sectors/uses) to different Ecosystem Services. In addition, the shared knowledge gained through the activities within the workshops was augmented by seminars which provided learning about relevant aspects of the project (Slater & MacDonald, 2018: p.271).

The task for the first participatory workshop is to devise appropriate activities to identify existing knowledge and quickly develop shared understandings within and across the participating stakeholders. In the case of the CORPORATES project:

- Sectoral representatives (fisheries, conservation and recreation) physically drew on hard copy maps of the project area to identify specific areas and activities of importance to their sector. These were then displayed and discussed by all participants.
- The sector groups then created lists of benefits derived from the mapped activities, which were compared in order to identify commonalities and differences.

In the period between the two workshops, the CORPORATES research team grouped the benefits identified by the stakeholders into broader categories and linked them to three key Environmental Services: fish and shellfish; climate regulation; and seascape.

During the second participatory workshops, participants from different sectors worked together in small groups to link the different categories and benefits back to the three key Environmental Services. Each mixed sector group then created their own conceptual system model (CSM) in order to explore interactions and feedbacks between ecological processed and associated features, benefits, and activities. Each group was facilitated by members of the project team in their development of the CSM. Consensus was required by the stakeholder groups and it was the ability to balance trade-offs that encouraged agreement. Once the CSM was finalised, the groups discussed the potential impacts of the relevant law and policy developments concerning key areas. Finally, individual participants were invited to write out their personal opinions on possible future priorities and activities that would enhance the ability of a mixed group to reach consensus (Slater & MacDonald, 2018: p.270-271).

Needs (What resources are required for applying the method?):

Time: Preparing and organising a participatory process with a wide range of stakeholders requires substantial time and effort.

Data: Other than relevant legal and policy documents, no additional data is needed.

Costs: There are costs associated with the organisation and facilitation of participatory workshops by professionals, as well as the use of a venue (or digital software).

Skills: Organising and facilitating participatory workshops requires skills in moderating, communication, time management, and digital or visual support.

Pros and cons (What are the strengths and challenges of the method/tool?):

Strengths:

- This method helps to achieve positive and early engagement between different stakeholders and sectors by identifying shared benefits.
- The main benefit of a knowledge exchange project is the opportunity to share expertise with those from a related area, but with different skills and baseline information.
- Finally, the process was effective because it succeeded in providing two way active engagement; activities enabled stakeholders to engage and contribute local knowledge, as well as to identify evidence gaps in areas for policy development.

Challenges:

- It takes considerable time and effort to practically organise participatory workshops with many different stakeholders.
- The comprehension of the relationship between national law, EU law, and international law remains a challenge for many stakeholders.

Considerations (What issues should be considered when using the method/tool)?

- In case it is not possible to get all stakeholders to participate at one physical location (due to travel restrictions for example), digital alternatives such as webinars should be explored.
- Research shows that, in order to be effective, the law and policy have to be fully embedded within the participatory process to enable an ecosystem approach in MSP to be implemented. "There was a real challenge in ensuring that the complexity of the legislative and regulatory framework was appropriately understood, but this was essential in order to move on to the institutional learning element of the project. Developing this understanding involved a two way process of knowledge exchange which, inter alia, clarified for the lawyers, as well as the other participants, issues around use of terminology; the complexity of the relationship between law and policy and the much wider legal framework within which the MSP and ecosystem approach regime operated" (Slater & MacDonald, 2018: p. 275-276).

Further information (Any particular website or case study that is useful?):

For more information about the CORPORATES project and the co-creation of a conceptual system model (CSM), see:

- Slater, A.M. and A. MacDonald (2018). Embedding Law in Participatory Processes Enables an Ecosystem Approach to Marine Decision Making: Analysis of a North Sea Example. In The Ecosystem Approach in Ocean Planning and Governance (pp. 256-283). Brill Nijhoff.

For more information about multi-stakeholder work in the context of MSP, see:

- Coulby, H. (2009). A Guide to Multistakeholder Work: Lessons from The Water Dialogues. The Water Dialogues: multistakeholder dialogues on water and the private sector, May 2009. URL: http://www.mspguide.org/sites/default/files/resource/guide-to-multistakeholder.pdf

For more information about the first international workshop on MSP, see:

- Ehler, C. and F. Douvere (2007). Visions for a Sea Change. Report of the First International Workshop on Marine Spatial Planning. Intergovernmental oceanographic commission and man and the biosphere programme. IOC Manual and Guides No. 48, IOCAM Dossier No. 4. UNESCO, Paris.

A wide range of stakeholder engagement tools can be found, such as for the U4IoT project (https://u4iot.eu/), the MindTools webpage (https://www.mindtools.com/), the Service Design Tools webpage (https://servicedesigntools.org/) and the UNaLab co-creation Toolkit (https://unalab.enoll.org/).

References:

Ehler, C. and F. Douvere (2007). Visions for a Sea Change. Report of the First International Workshop on Marine Spatial Planning. Intergovernmental oceanographic commission and man and the biosphere programme. IOC Manual and Guides No. 48, IOCAM Dossier No. 4. UNESCO, Paris.

Slater, A.M. and A. MacDonald (2018). Embedding Law in Participatory Processes Enables an Ecosystem Approach to Marine Decision Making: Analysis of a North Sea Example. In The Ecosystem Approach in Ocean Planning and Governance (pp. 256-283). Brill Nijhoff.

10. SERIOUS GAME FOR STAKEHOLDER ENGAGEMENT IN MSP

Name (Common name/names of method/tool):

Serious game for stakeholder engagement in MSP.

Purpose (What does the method/tool aim to achieve?):

The main purpose of the serious game approach is to raise awareness among stakeholders about the concept, challenges and purpose of maritime spatial planning. It can also be used to increase understanding of stakeholders, in particular as a way to foster mutual understanding between conflicts of use and to create a mediating atmosphere.

Outcome (What information does the method/tool provide?):

The serious game collaborative tool increases awareness and familiarity of stakeholders with the concept of MSP and thereby builds capacity for a wide range of parties and interests. This enables participation along the process of MSP establishment and revision from, for example, under-represented stakeholders. Outcomes can also be used to create an environment for dialogue between maritime users, policymaker and planners about the complexities and possible solutions.

Applicability (When and where can the method/tool be applied?):

The serious game tool can be used at different scales, from the local to sea basin level. In a common set-up, the game simulates relations between multiple countries and is, therefore, well-suited for cross-border contexts.

With the objective to raise awareness or improve dialogue between stakeholders, the serious game is best played at an early stage of an MSP (revision) process. One particular opportunity is at the very start of the MSP (revision) process, where it can be used to bring together planners and stakeholders to understand needs and constraints, while also creating an informal platform for discussion.

Operationalization (How does the method/tool work?):

The serious game approach lets participants experience the dynamic and complex interactions of MSP. The set-ups vary, but they have certain characteristics in common:

- Participants are assigned different roles of stakeholders in the maritime planning process. In international game settings, these will be related to one of the (often fictional) countries, either in teams per country or individually. Examples for roles are maritime spatial planners, conservationists, industry representatives or military.
- One or multiple game leader facilitate the process as game masters. The game leader(s) guides players through the game and supports in the case of questions. If the serious game is used to collect input for real-life planning processes, questions to participants about their experience and reasons for certain actions can be appropriate. Game leaders are usually experts in MSP policy and planning.
- The objective of the game is to develop a coordinated maritime spatial plan with the inclusion of the present fictional stakeholders. It is not about winning or losing the game but to focus on the overall process and build understanding and capacity for real-life MSP.
- Games are often designed to reflect decision-making with incomplete and missing information as well as without clear rules on who talks to whom when. Therefore, it can be up to the game leader(s) to set rules or intervene as to serve the objective of the session.

Detailed game descriptions of the serious games on MSP can usually be obtained from the game developers (see links and references below for more information).

Needs (What resources are required for applying the method?):

Time: Playing time for sessions of existing serious games are between 1.5 and 3 hours for a single game, up to more than 4 hours for more complex games. Furthermore, preparation and evaluation requires additional time. Overall, time needs are moderate.

Data: Data needs for the serious game are low for a fictional, ready-made game. For a targeted game that covers a specific MSP area, however, more data is needed. Nevertheless, even in a targeted setting the game will be a simplification of reality that does not cover all details of the actual area.

Costs: Financial needs for a serious game are low. Materials can usually be obtained at low costs from the developers. On-line materials are free to download (see below).

Skills: Organising a session of a serious game requires an important combination of skills. Technical knowledge of the planning process as well as skills in moderating large groups are necessary for the successful implementation.

Pros and cons (What are the strengths and challenges of the method/tool?):

Strengths:

- Serious games are inclusive collaborative tools that provide a low-barrier entry point to MSP processes. It has proven to be successful in creating awareness as well as increasing understanding of concepts used and trade-offs faced by planners.
- The serious game approach is a flexible and adaptive means to create stakeholder engagement and promote a basis for common discussion among real-life stakeholders.
- The tool is well suited for a number of contexts, from local to transboundary areas.

Challenges:

- Players with large experience in MSP see (slightly) less value in playing fictional scenarios. An integration in the real-life planning process needs to be more carefully planned than an awareness raising session with interested but inexperienced players.
- Even though called a serious game, the simulation remains detached from real life. Players can interpret their role different to real-life actors in the same position. This can cause false impressions.

Considerations (What issues should be considered when using the method/tool)?

Not reported.

Further information (Any particular website or case study that is useful?):

- An interesting example is the EU-funded project SIM4NEXUS, a Serious Game that investigates bio-physical and policy interlinkages across five nexus domains: water, land, food, energy, and climate, facilitating learning and design of policies within the nexus. The Serious Game is a computer game that aids learning about the Nexus by helping users to understand and explore the interactions between water, energy, land and food resources management under a climate change context, divides the problem into manageable interventions, and allows participants to learn by doing. The ultimate goal of game development is to create a fun and interactive capacity-building tool to be used in research, educational settings and management.
- MSP Challenge integrates best available geo, maritime and marine data with simulation models for ecology, shipping and energy production. Using advanced game technology and game thinking, MSP Challenge is designed to engage and immerse users, making it a perfect environment for stakeholder engagement, planning through co-design, learning and education.
- A wide range of stakeholder engagement tools can be found, such as for the U4IoT project (https://u4iot.eu/), the MindTools webpage (https://www.mindtools.com/), the Service Design Tools webpage (https://servicedesigntools.org/) and the UNaLab co-creation Toolkit (https://unalab.enoll.org/).

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Keijser, X., M. Ripken, I. Mayer, H. Warmelink, L. Abspoel, R. Fairgrieve and C. Paris (2018). Stakeholder Engagement in Maritime Spatial Planning: The Efficacy of a Serious Game Approach. Water, 10(6): 724.

Jean, S., L. Gilbert, W. Medema, X. Keijser, I. Mayer, A. Inam, and J. Adamowski (2018). Serious Games as Planning Support Systems: Learning from Playing Maritime Spatial Planning Challenge 2050. Water, 10(12): 1786.

Mayer, I., Q. Zhou, X. Keijser and L. Abspoel (2014). Gaming the Future of the Ocean: The Marine Spatial Planning Challenge 2050. Pages 150-162 in M. Ma, M.F. Oliveira and J. Baalrud Hauge (Eds) Serious Games Development and Applications. Springer, Cham, Switzerland.

SDGA 2014. Lecture Notes in Computer Science, Vol 8778: 15-162. Springer, Cham. URL: https://doi.org/10.1007/978-3-319-11623-5_13.

11. SOCIAL IMPACT ASSESSMENT

Name (Common name/names of method/tool):

Social impact assessment (SIA).

Purpose (What does the method/tool aim to achieve?):

Social impact assessment (SIA) is typically defined as the processes of analysing, monitoring and managing the intended and unintended social consequences, both positive and negative, of planned interventions, as well as of any social change processes invoked by those interventions. The primary purpose of an SIA is to bring about a more sustainable and equitable biophysical and human environment (Vanclay, 2012: p.150).

If MSP decisions are imposed (i.e. when they have no legitimacy with those who are affected), there is likely to be resistance, resentment and potentially non-compliance. Gaining social legitimacy – or a "social license to operate" – is therefore important for the success of the goals of MSP. This can be achieved through the use of effective community engagement methods as part of SIA.

Outcome (What information does the method/tool provide?):

SIA is primarily the process of managing social issues. It is a multi-faceted activity that deals with all stakeholders. It assists communities in visioning the future, in thinking about appropriate development, and in coping with change. It assists regulatory agencies in providing information to be used in the assessment of proposals, the determination of conditionalities and the appropriateness of compensatory arrangements. It also works with proponents (both private sector and government) in engaging with stakeholders, in considering the social issues in planning; in conceiving and designing mitigation measures to reduce harm, and in developing enhancement actions. It potentially can be used to coordinate the collection and utilisation of local knowledge of nearby communities in project development approach (idem.).

Applicability (When and where can the method/tool be applied?):

Although typically undertaken in a prospective (ex-ante) setting so that it can contribute to decision making and planning, SIA is also retrospective (ex-post) studying past events to build a knowledge base from which to make predictions about current or future issues. This tool is suitable for existing sectors/developments in an MSP area. Projections for new sectors/developments are possible if reliable assumptions on associated impacts are available.

SIA plays an important role in the project approval process, but is of greater use when it is applied in the planning and design stages considering issues such as how to mitigate, monitor and manage the impacts likely to be experienced.

Operationalization (How does the method/tool work?):

The tasks of SIA essentially involve (Vanclay, 2012: 150-151):

- Creating participatory processes and a deliberative space to facilitate community discussions about desired futures, the acceptability of likely negative impacts and proposed benefits, and community input into the SIA process, so that they can come to a negotiated agreement with the proponent – preferably on the basis of the emerging legal principle of 'free, prior and informed consent' (FPIC);

- Gaining a good understanding of the communities and stakeholders likely to be affected by the MSP process (i.e. profiling), including a thorough stakeholder analysis to understand the differing needs and interests of the various sections of those communities;
- Identifying the needs and aspirations of the various communities;
- Scoping the key social issues (the significant negative impacts as well as the opportunities for creating benefits);
- Identifying key indicators and collecting baseline data;
- Forecasting the social changes that may result from the MSP process and the impacts these are likely to have on different groups of people;
- Establishing the significance of the predicted changes, and determining how the various affected groups and communities will likely respond to them;
- Identifying ways of mitigating potential negative impacts and maximising positive opportunities;
- Developing a monitoring plan to track implementation, variations from mitigation actions, and unanticipated social changes, especially negative impacts;
- Facilitating an agreement making process between the communities and the proponent ensuring that FPIC principles are observed and that human rights are respected, possibly leading to the drafting of an Impact and Benefit Agreement;
- Assisting the proponent in the drafting of a Social Impact Management Plan (SIMP) that operationalizes all benefits, mitigation measures, monitoring arrangements and governance arrangements that were agreed to in the Impact and Benefit Agreement (IBA), as well as plans for dealing with any ongoing unanticipated issues as they arise; and
- Putting processes in place to enable proponents, regulatory authorities and civil society stakeholders to implement arrangements implied in the SIMP and IBA and to develop their own corresponding management action plans, establish respective role and responsibilities throughout the implementation of action plans, and maintain an ongoing role in monitoring.

Needs (What resources are required for applying the method?):

Time: As there is no 'quick fix' to stakeholder participation and gaining social legitimacy, this method requires considerable time and attention throughout the MSP process.

Data: Information regarding social or cultural issues can best be acquired through qualitative methods such as interviews, participatory mapping or workshops.

Costs: In principle, SIA can be performed at low costs. For the assessment and monitoring of social indicators and data collection, costs can arise, but this will likely have benefits for other needs as well.

Skills: Effective community engagement processes require professional skills and experience in communication, facilitation, conflict resolution and qualitative research methods.

Pros and cons (What are the strengths and challenges of the method/tool?):

Strengths:

- SIA improves the quality of decision making and the legitimacy of decisions, it reduces harm experienced by communities, and potentially increases the likely benefits associated with the MSP process;
- Thus, doing SIA properly is not a cost, but an investment in risk management that will reduce likely future expenditures by the early identification and remedy of potential issues that would otherwise lead to litigation, delays to approval, costs in the form of managing protest actions, and business lost through reputational harm; and
- SIA has the potential to identify local knowledge that could be used to guide siting decisions and reduce costs that come from poor siting.

Challenges:

- The main challenge to SIA is the need to accept the time, attention, resources and professional skills that it takes to develop and implement effective community engagement processes;
- In addition, it is important to realise that conflict is inevitable and needs to be managed appropriately, depending on the context; and
- Lastly, it can be a challenge to develop socially legitimate methods to determine the intrinsic value of (marine) landscapes, nature, biodiversity, habitats and heritage, etc., in a way that has broad agreement and can be used in effective decision making.

Considerations (What issues should be considered when using the method?)

Given the focus on economic impacts that is prevalent in many MSP impact assessments, Member States should clarify whether SIA should indeed form part of an integrated impact assessment, and how this fits and can be reconciled with the need to conduct a cost-benefit analysis. If social impact is seen as a key part of the impact assessment process, this should be expressed clearly in the written guidance as well as in IA training sessions (TEP & CEPS, 2010: 3). Lessons from the SIA field show (Vanclay, 2012: p. 152):

- The needs of the worst-off members of society must always be considered;
- Even the act of doing a social impact assessment can create positive social impacts;
- Often the biggest (negative) social impact is fear and anxiety caused by the policy; and
- A key concept is trust – if past experiences of a community with MSP are bad, new developments may be regarded sceptically, even if they are beneficial and best practice.

Further information (Any particular website or case study that is useful?):

- SIAhub is a website for Social Impact Assessment practitioner. For useful guides and tools, see: http://www.socialimpactassessment.com/resources.asp.
- For an example of SIA application to coastal zone management in the Wadden sea region, see: Vanclay, F. (2012). The potential application of social impact assessment in integrated coastal zone management. Ocean & Coastal Management, 68: 149-156.
- Useful toolkits for stakeholder participation:
- "Stakeholder Engagement and Public Participation Framework and Toolkit", Department of Health and Human Services, State Government of Victoria, Australia. See: https://www.dhhs.vic.gov.au/publications/stakeholder-engagement-and-public-participation-framework-and-toolkit.

- “Guidance Note UNDP Social and Environmental Standards (SES): Stakeholder Engagement”, United Nations Development Programme (UNDP). See: https://info.undp.org/sites/bpps/SES_Toolkit/SES%20Document%20Library/Uploaded%20October%202016/Final%20UNDP%20SES%20Stakeholder%20Engagement%20GN_Oct2017.pdf.
- A wide range of stakeholder engagement tools can be found, such as for the U4IoT project (https://u4iot.eu/), the MindTools webpage (https://www.mindtools.com/), the Service Design Tools webpage (https://servicedesigntools.org/) and the UNaLab co-creation Toolkit (https://unalab.enoll.org/).

References:

TEP & CEPS (2010). Study on Social Impact Assessment as a tool for mainstreaming social inclusion and social protection concerns in public policy in EU Member States. Executive Summary, June 2010. Commissioned by the European Commission (DG EMPL).

Vanclay, F. (2012). The potential application of social impact assessment in integrated coastal zone management. Ocean & Coastal Management, 68: 149-156.

12. STAKEHOLDER PARTICIPATION ASSESSMENT

Name (Common name/names of method/tool):

Stakeholder participation assessment

Also known as: Stakeholder participation assessment framework (SPAF).

Purpose (What does the method/tool aim to achieve?):

SPAF is intended to be used by a neutral evaluator who aims to understand the decisions related to the degree of stakeholder involvement promoted by MSP authorities during the planning process as well as the consequences of these decisions. SPAF includes both process and ethical criteria, contributes to strengthen MSP processes and to promote more horizontal and integrated ocean governance approaches.

Outcome (What information does the method/tool provide?):

SPAF provides the following information (Quesada-Silva et al., 2019):

- Objectives and purposes for stakeholder involvement;
- Overview of which stakeholders were involved;
- Overview of when stakeholders were involved;
- Evaluation of how stakeholders were engaged;
- Estimate of the cost of stakeholder engagement;
- Stakeholders' perceptions on the stakeholder engagement process.

Applicability (When and where can the method/tool be applied?):

SPAF can be used at the end of the MSP cycle, as well as at the end of each of the three MSP planning phases (i.e. the normative, strategic or operational planning phase).

Operationalization (How does the method/tool work?):

SPAF has two phases. Phase I involves gathering of information on why, who, when and how stakeholders were involved, as well as the associated costs, using the proposed categorisations (see Outputs). In particular (Quesada-Silva et al., 2019):

1. Reasons for adopting stakeholder participation: Overall, 15 potential reasons for adopting stakeholder participation during MSP are provided.
2. Overview of which stakeholders were involved: This involves i) checking the Stakeholder Analysis used by the MSP authorities if there was one; ii) identifying if any sectors and categories of stakeholders were excluded (a list of sectors and categories that could have been engaged during MSP is provided); iii) investigating whether the sampling strategy adopted was random or followed some method or criteria and if the person representing the organization was a leader with decision-making power and if he/she was representing the interests of the majority; and iv) evaluating which stakeholders were prioritised and why. Overall, 12 reasons for prioritisation are provided.
3. Overview of when stakeholders were involved. This refers to the mapping of stakeholders (from 2.) that were involved in what steps of the MSP process (the normative, strategic or operational planning phase).
4. Evaluation of how stakeholders were engaged. This refers to the evaluation of the degree of participation and implemented engagement activities, and involves determining who was responsible for facilitating the stakeholder participation activities and if he/she was neutral. Overall, 7 types of stakeholder engagement strategies and 13 stakeholder engagement methods are provided.

5. Estimate of the cost of stakeholder engagement. This refers to the time and expenses associated with the MSP process, which involves developing a list of the resources and identifying the total cost specific to the stakeholder participation as well as who has covered that cost.
6. Stakeholders' perceptions on the stakeholder engagement process. This refers to stakeholders' perceptions about i) their relationship with other stakeholders after joining engagement activities; ii) the stakeholders' representativeness; iii) the power influence of stakeholders involved; iv) the methods of engagement; v) the final MSP plan; vi) stakeholders' willingness to keep engaging in MSP; vii) the drivers shaping the MSP process; viii) the existence of bottom-up mechanisms; ix) the availability, access, language and format used to share information, collaboration among stakeholders, negotiation procedure and results; x) the facilitator(s); and xi) the influence of economically and politically powerful stakeholders.

In Phase II, the positive and negative consequences of a MSP participatory process are analysed using a list of 12 questions to be answered, based on the information gathered using the specific criteria of Phase I, as well as on stakeholders' perceptions after their experience from taking part in the process.

Needs (What resources are required for applying the method?):

Time: Implementing the SPAF is a time-consuming task.

Data: The SPAF requires data to be collated during the MSP process (the normative, strategic or operational planning phase).

Costs: Implementing the SPAF requires financial resources.

Skills: Implementing the SPAF is a complex task that needs trained human resources.

Pros and cons (What are the strengths and challenges of the method/tool?):

Strengths:

- The SPAF is a recently developed framework, which abridges previous relevant work.
- The SPAF includes both feedback (received directly from involved stakeholders) and a codification (which could help perform objective analysis).

Weaknesses:

- While the SPAF can be used during the process of stakeholder engagement and participation, it is best suited for an assessment following the participation.
- The SPAF includes many different categories of methods, strategies, reasons for engagement, etc.. It might, therefore, be useful to use tools for visual representation of data to ensure that the information is easily digestible.
- It has been identified as a challenge to effectively involve stakeholders in the MSP process.

Considerations (What issues should be considered when using the method/tool)?

- It is important to test the SPAF before implementing as well as to consider specific cultural and political contexts.
- If the available financial resources for the implementation of the SPAF are limited, a shorter version of the SPAF could be used.

Further information (Any particular website or case study that is useful?):

- European MSP Platform page on SPAF
- For a useful case study in a different geographical context, see: Mannan et al. (2020). Enabling stakeholder participation in marine spatial planning: the Bangladesh experience. Journal of the Indian Ocean Region.
- For a discussion of elite interests, advocacy for disenfranchised groups and achieving progressive MSP, see: Flannery, W. and McAteer, B. (2020). Assessing marine spatial planning governmentality. Maritime Studies, 19: 269-284.
- A wide range of stakeholder engagement tools can be found, such as for the U4IoT project (https://u4iot.eu/), the MindTools webpage (https://www.mindtools.com/), the Service Design Tools webpage (https://servicedesigntools.org/) and the UNaLab co-creation Toolkit (https://unalab.enoll.org/).

References:

Quesada-Silva, M., Iglesias-Campos, A., Turra, A., & Suárez-de Vivero, J. L. (2019). Stakeholder Participation Assessment Framework (SPAF): A theory-based strategy to plan and evaluate marine spatial planning participatory processes. Marine Policy, 108: 103619.

13. STAKEHOLDER PERCEPTIONS AND INTERESTS ANALYSIS

Name (Common name/names of method/tool):

Stakeholder perceptions and interests analysis – an actor-oriented approach.

Purpose (What does the method/tool aim to achieve?):

The aim of the method is to evaluate the effectiveness of a MSP in addressing local problems and tensions, distributional effects and resulting changes in power relations by combining the analysis of stakeholder representation in the planning process with an analysis of points of conflict, and an evaluation of their negotiation. The ultimate goal is ensuring that the MSP process is open and accounts for the perceptions and interests of all relevant stakeholders.

Outcome (What information does the method/tool provide?):

This method provides information about the perceptions and interests of the relevant stakeholders with a focus on how they perceive their interests are/were negotiated, how points of conflict were resolved and who gained from the MSP process.

Applicability (When and where can the method/tool be applied?):

The actor-oriented approach for assessing and evaluating stakeholder perceptions and interests can be used during the development of an MSP as well as after it has been implemented. In the former case, the approach would help identify the diversity of values, views and interests, and avoid the undermining of conflicting interests and resulting injustices – allowing for adjustments to be made in order to ensure that the plan is fair. In the latter case, the approach allows for evaluating the planning process, determining perceptions and interests that may have skewed the process, or identifying best practices and lessons learned that could be used to make changes.

Operationalization (How does the method/tool work?):

The method includes the following six steps:

Step 1 – Mapping the actors associated with the MSP. The types of stakeholder may vary depending on the case, but some categories include: national authorities, regional authorities, local authorities (municipalities), NGOs, representatives of academia and private sector actors. The final result could comprise a diagram, such as the example presented in Figure 9.

Step 2 – Identifying, based on qualitative expert interviews, actor groups and institutions (as mapped in Step 1) to take part in the in-depth analysis.

Step 3 – Selecting interviewees from the identified actor groups and institutions (from Step 2). Selection criteria include specialist knowledge, professional seniority, relevancy to the MSP and participation in the MSP.

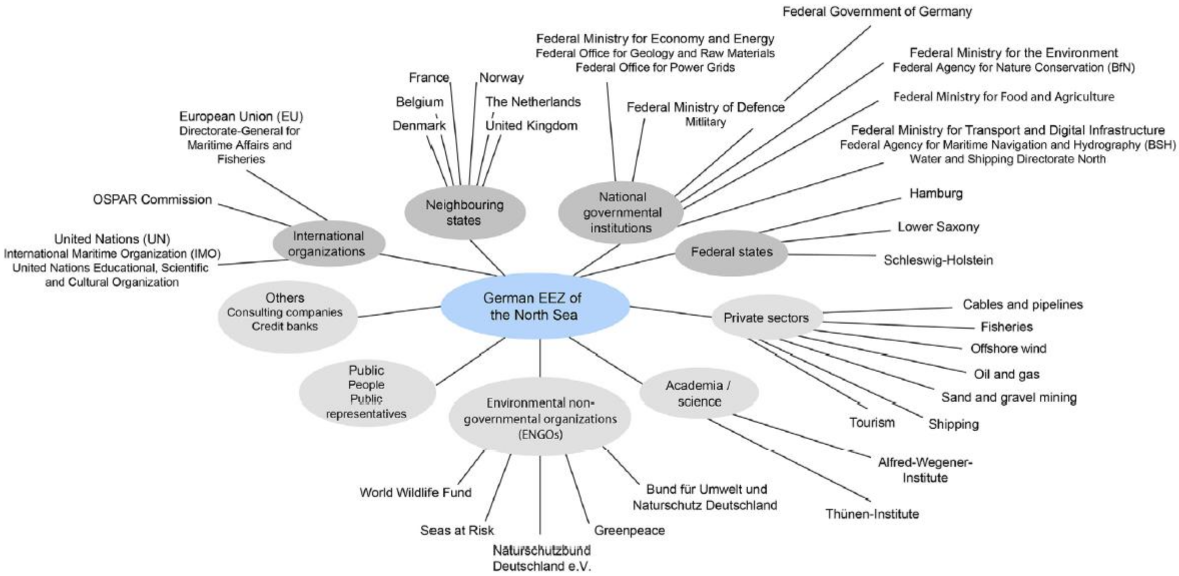

Figure 9: Actor map for the German EEZ of North Sea (source: Aschenbrenner & Winder, 2019)

Step 4 – Conducting interviews and/or questionnaires with selected interviewees (from Step 3), consulting about actors' general perceptions and needs as well as their experience with the planning process. Topics to be explored include: participation, power relations, interests, knowledge, perception and conflict. By evaluating the perspectives of the actors, inference can be made to the MSP, its framing, efforts to deal with tensions, conflicts and stakeholders.

Step 5 – Evaluating the perspectives of the actors and analysing the results of the interviews and/or questionnaires allows for the identification of common themes and core categories as well as content-related commonalities and differences. Developing a table which plots the types of actors and their respective perceptions and interest is recommended. These results are used to evaluate the MSP in terms of effectiveness, participation, distributional effects and changes in power relations. A framework for the critical evaluation of MSP is provided in Figure 10. Some suggested questions to be addressed in the evaluation include: How effective was MSP in addressing conflicts?; How were the various actors involved in the planning process?; What distributional effect did MSP have?; and How did power relations change as a result of MSP?

Step 6 – Drawing conclusions from the MSP process and the efforts taken to deal with tensions and conflicts.

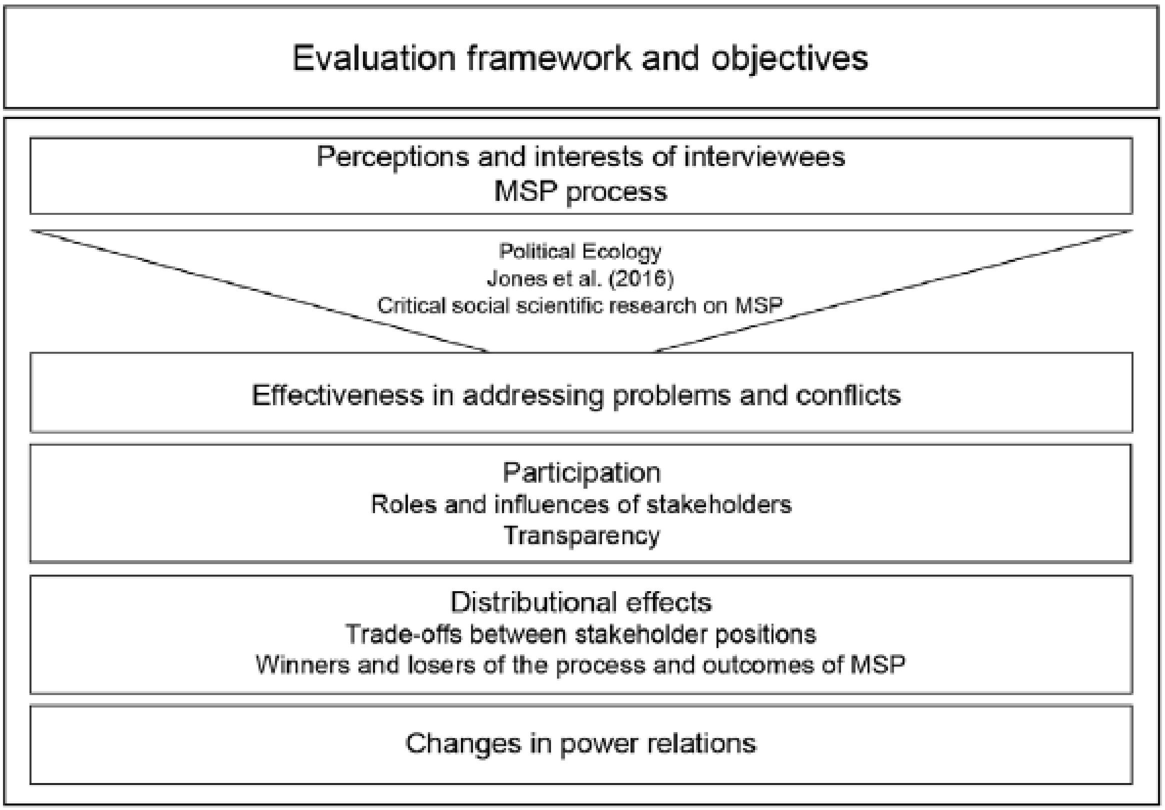

Figure 10: Framework for the critical evaluation of the marine spatial planning (source: Aschenbrenner & Winder, 2019)

Needs (What resources are required for applying the method?):

Time: The time needed depends on the scope of the assessment (e.g. number of interviewees selected for consultation, decision to use interviews and/or questionnaires, number of interview questions, etc.).

Data: The method foresees the collection of qualitative data via interviews and/or questionnaires.

Costs: Costs are, mostly, proportional to Time needs.

Skills: Stakeholder mapping, data collection (interview/questionnaire design and implementation) and qualitative data analysis skills are necessary to use this method.

Pros and cons (What are the strengths and challenges of the method/tool?):

Strengths:

- The method reveals perceptions and interests of all relevant actors in the MSP process.
- The method reveals trade-offs between diverging perceptions and values.
- The method reveals power positions of actors.

Weaknesses:

- Not reported.

Considerations (What issues should be considered when using the method/tool)?

- The evaluator should be aware that stakeholder views may differ greatly and accounting for that and remaining neutral in the data collection and analysis is important.
- All best practices for conducting qualitative research (such as ensuring that all stakeholder groups are well-represented, that interview questions are non-leading, that the interviewer is impartial, etc.) apply.

Further information (Any particular website or case study that is useful?):

- Lukic et al. (2017) 'Stakeholder Profiles', MUSES Project. This report was the result of stakeholder analysis conducted to gain a better understanding of the various actors relevant in the context of multi-use combinations examined in the MUSES project. The analysis took into consideration different geographical and governance scales, and focused on identifying actors behind the drivers and barriers for the multi-use development. Stakeholder profiles were developed for each of the multi-use combinations, and visualized through Venn diagrams, providing a clear overview of relevant actors on different geographical scales, for each of the examined combinations.
- Useful case study for stakeholder analysis: Experiences from the Ionian island pilot project.
- A wide range of stakeholder engagement tools can be found, such as for the U4IoT project (https://u4iot.eu/), the MindTools webpage (https://www.mindtools.com/), the Service Design Tools webpage (https://servicedesigntools.org/) and the UNaLab co-creation Toolkit (https://unalab.enoll.org/).

References:

Aschenbrenner, M. and G.M. Winder (2019). Planning for a sustainable marine future? Marine spatial planning in the German exclusive economic zone of the North Sea. Applied Geography, 110: 102050.

14. STRATEGIC ENVIRONMENTAL ASSESSMENT

Name (Common name/names of method/tool):

Strategic Environmental Assessment (SEA).

Purpose (What does the method/tool aim to achieve?):

The purpose of an SEA is to identify and describe a plan or activity's effects and consequences on human health and the environment, as well as on the management of the physical environment and natural resources (SwAM, 2018: p. 31). The objective of the environmental assessment is to integrate environmental aspects into the MSP so that sustainable development is promoted.

SEA has three key objectives (Partidário, 2012: p.12):

1. Encourage environmental and sustainability integration, setting enabling conditions to nest future development proposals;
2. Add value to the decision-making process, discussing opportunities and risks, and turning problems into opportunities;
3. Change minds and create a strategic culture in MSP decision-making, promoting institutional cooperation and dialogues, avoiding conflicts.

Outcome (What information does the method/tool provide?):

SEA is an environmental assessment instrument, generally understood as a strategic and flexible framework with a number of key elements. SEA acts strategically by integrating relevant social, institutional, economic and environmental issues; assessing environmental and sustainability opportunities and risks of strategic options to help drive sustainable development; and ensuring active stakeholder engagement through dialogues and collaborative processes.

As a strategic framework, SEA helps to create a sustainable development context, by integrating environmental and sustainability issues in decision-making, assessing strategic development options and issuing guidelines to assist implementation (Partidário, 2012).

SEA helps to understand the development context of the strategy being assessed, to appropriately identify problems and potentials, address key trends, and to assess environmental and sustainable options that will achieve strategic objectives for MSP (idem., 2012).

Applicability (When and where can the method/tool be applied?):

SEA can be applied to any MSP process and should take place whenever required by law. As for the spatial focus: the line between the marine areas and coastal zones is important from an environmental perspective. In addition, the cross-border environmental impact in relation to neighbouring countries can be investigated. For practical purposes, SEA can be carried out for a limited MSP area or marine sub-regions, even if the influence are for certain environmental aspects is broader (SwAM, 2018: p. 31).

SEA's entry point should be as early as possible in the MSP decision making and planning process, ideally before strategic objectives have been established.

Operationalization (How does the method/tool work?):

The **strategic thinking model** in SEA is structured in three fundamental stages of a cyclical process (Partidário, 2012: p.29-40):

Stage 1 – Setting the context and strategic focus is a priority of an SEA cycle. The purpose is to ensure that the SEA concentrates only on what is important and that it understands and is adapted to the natural, social, cultural, political and economic context of the object of assessment. The decision problem must be understood.

Stage 2 – Establishing 'pathways for sustainability', i.e. the strategic options for development. This needs to be conducted in a strong inter-linkage with the MSP policy-making and planning teams. Assessment of opportunities and risks may need to be conducted several times. The strategic assessment should look into strategic options as possible pathways to help choose a strategic direction. Guidelines may include recommendations for institutional adaptation or new regulations, for subsequent levels of planning, for project's environmental impact assessment (EIA), or for any other type of measures or policy choices that eventually may be relevant. A final report to register the assessment results should then be prepared and collectively discussed, through appropriate communication approaches.

Stage 3 – The third stage is a continuous stage, connecting SEA to strategic decision-making during implementation, but also connecting back to the first stage in a subsequent policy review or planning cycle. Follow-up, with monitoring, evaluating and communication should be an on-going routine in strategic environmental and sustainability assessment, systematically linked to the planning process and engaging with relevant stakeholders.

The **environmental assessment** can be conducted according to the following three steps (SwAM, 2018: p. 35-38):

Step 1 – Identification of the connection between sectors and pressures. The environmental assessment is based on the sectors defined in the MSPs within the themes. The sectors' impact is linked to the type of potential impact (pressures) as defined in the Marine Strategy Framework Directive (Directive 2008/56/EC). The purpose of this is to achieve a suitable structure in the environmental assessment.

The environmental assessment is largely based on data analysis providing a quantitative assessment of the cumulative environmental effect from a spatial perspective. For this, Symphony, Cumulative Impact Assessment (CIA; http://data.adriplan.eu/tools4msp/ciinfo) and Cumulative Effect Analysis (CEA; Knights et al., 2015) can be useful tools. These are assessment methods that have been developed as an aid for MSP and are based on the ecosystem approach. Their objective is to show on a general level how environmental effects differ between different areas and how MSP affects this distribution. Importantly, these tools do not provide a complete basis to fully cover all of the pressures of the MSFD. Accessibility to input is, however, considered comprehensive enough to provide a good general illustration of the MSP's effects and environmental impact.

Step 2 – Description of the values, environmental impacts, and environmental effects. In this step, the different sector's environmental impacts and effects are identified and basic conditions in the MSP area are described. Symphony, CIA and CEA can be used to describe the present situation, as well as alternative future scenarios. Each sector's contribution to the environmental impact and to the total cumulative environmental effect can be stated as a percentage, allowing for comparison.

In addition, the areas in the marine sub-regions with significant change in the cumulative environmental effect can be identified and compared with the 'zero alternative'. These areas can be described in more detail with regard to changes in activities from the sectors and the associated impacts. As some of these impacts are not calculated by Symphony, CIA or CEA, qualitative assessments should be included as part of SEA.

Step 3 – Assessment of environmental consequences. In this final step, the nature and scope is assessed of the environmental effects that arise as a result of different marine sector's impact.

Needs (What resources are required for applying the method?):

Time: SEA is a continuous process to desigining, implementing and assessing MSP. As such, it requires considerable time and effort from policy-makers, planners and stakeholders.

Data: An up-to-date monitoring database should be set up to provide data for environmental evaluation and to inform any future changes of strategic direction. Input data includes information on: living environments (e.g. infrastructure and coastal development); energy (e.g. bird impact); defence (artillery ranges pollution); storage/extraction of materials (e.g. sand extraction habitat loss); transportation and communications (e.g. shipping oil spills, dredging habitat loss or greenhouse gases); aquaculture (e.g. fish farming habitat loss); and commercial fisheries (net-fishing catch).

Costs: SEA itself can be performed at low costs. For the monitoring of indicators and collection of data, costs can arise, but this will likely have benefits for other needs as well.

Skills: Statistical skills are required to process and analyse primary (monitoring; collection) and secondary (quantitative assessment of cumulative effect) data.

Pros and cons (What are the strengths and challenges of the method/tool?):

Strengths:

- SEA promotes sustainable development and helps to understand sustainability challenges, incorporating an integrated perspective early in the policy-making and planning process;
- SEA informs planners, decision makers and the public on the sustainability of strategic decisions, ensuring a democratic decision making process and enhancing the credibility of decisions.

Weaknesses:

- Not reported.

Considerations (What issues should be considered when using the method/tool)?

- Not reported.

Further information (Any particular website or case study that is useful?):

For more information on the SEA methodology and practical applications, see:

- Partidário, M. (2012). Strategic Environmental Assessment: Better Practice Guide – methodological guidance for strategic thinking in SEA. Portuguese Environment Agency (APA) and Redes Energéticas Nacionais (REN), SA. Lisbon.
- Swedish Agency for Marine and Water Management – SwAM (2018). Strategic Environmental Assessment of the Marine Spatial Plan proposal for the Baltic Sea. 10 April 2018, Gothenburg, Sweden.

- The Tools4MSP Geoplatform (former ADRIPLAN Portal; http://data.adriplan.eu/) is a community-based and open source portal, including the Cumulative Effects Assessment (CEA) tool that aims to support the MSP process under an Ecosystem-Based Approach (EBA) by assessing the potential cumulative impacts of maritime activities on the marine environment.

References:

Partidário, M. (2012). Strategic Environmental Assessment: Better Practice Guide – methodological guidance for strategic thinking in SEA. Portuguese Environment Agency (APA) and Redes Energéticas Nacionais (REN), SA. Lisbon.

Knights, A.M., G.J. Piet, R.H. Jongbloed, et al., 2015. An exposure-effect approach for evaluating ecosystem-wide risks from human activities. ICES Journal of Marine Science, 72(3): 1105-1115.

SwAM (2018). Strategic Environmental Assessment of the Marine Spatial Plan proposal for the Baltic Sea. Swedish Agency for Marine and Water Management (SwAM), 10 April 2018, Gothenburg, Sweden.

15. ECOSYSTEM SERVICES ASSESSMENT

Name (Common name/names of method/tool):

Ecosystem Services Assessment (ESA) or, alternatively, Nature's Contribution to People (NCP).

Purpose (What does the method/tool aim to achieve?):

An analysis of the provided ecosystem services, sometimes combined with an economic valuation of these services, can support administrators in decision-making. The Millennium Ecosystem Assessment introduced the ecosystem services concept to analyse how ecosystems contribute to human well-being.

A common classification of ecosystem services is the CICES (see www.cices.eu) produced by the European Environment Agency. Various indicators are developed to quantify ecosystem services provided by the marine ecosystem (Hattam et al., 2015).

Outcome (What information does the method/tool provide?):

This method can be used to evaluate how (variants of) a maritime spatial plan, implemented or projected, vary in terms of provided ecosystem services. The method typically illustrates the quantity of ecosystem services provided, distinguishing between the provisioning, regulation and cultural ecosystem services.

Applicability (When and where can the method/tool be applied?):

Ecosystem Services Assessment can be conducted in situations where administrators aim to evaluate maritime spatial plans from an anthropocentric perspective. The focus is on the services provided by the ecosystem, including biotic and abiotic provisioning, regulating and cultural services.

A full ecosystem services assessment requires compiling, organizing and analysing spatial data, including ecological, environmental, socio-economic and human use data. A robust spatial data infrastructure is required to conduct a full ecosystem services assessment. Various existing datasets can be integrated and utilized.

Operationalization (How does the method/tool work?):

The approach to conduct an Ecosystem Services Assessment in the context of MSP consists of the following steps (based on Farella et al., 2020):

- Stocktaking includes generating an understanding the ecosystem considered. This includes information on how the ecosystem is used by humans, what environmental components it consists of and what ecosystem services are provided. The capacity of marine ecosystems to provide marine ecosystem services (MES) can be assessed using a MES matrix approach (see Depellegrin et al., 2017).
- Selection of relevant Ecosystem Services and indicators for assessment, monitoring and evaluation. The CICES classification can be used to select relevant ecosystem services, taking into account data availability and level of knowledge in the area studied.
- Assessment of Marine Ecosystem Services. In the approach taken by Veidemane et al. (2017), a qualitative assessment was used for the assessment of regulating and maintenance services. A matrix was created to evaluate capacities of marine benthic ecosystems to provide ecosystem services (ES). A small expert group composed of key marine biologists was established to assess the potential supply of ES by habitat type. Assessment results were compiled on ES maps generated in GIS software.

- Assessment of impact of spatial use scenarios. Distinct scenario’s must be developed describing which uses are foreseen in which areas. Scenario’s can depart from different perspectives, for example economic growth or social well-fare formulated (see Figure 11).

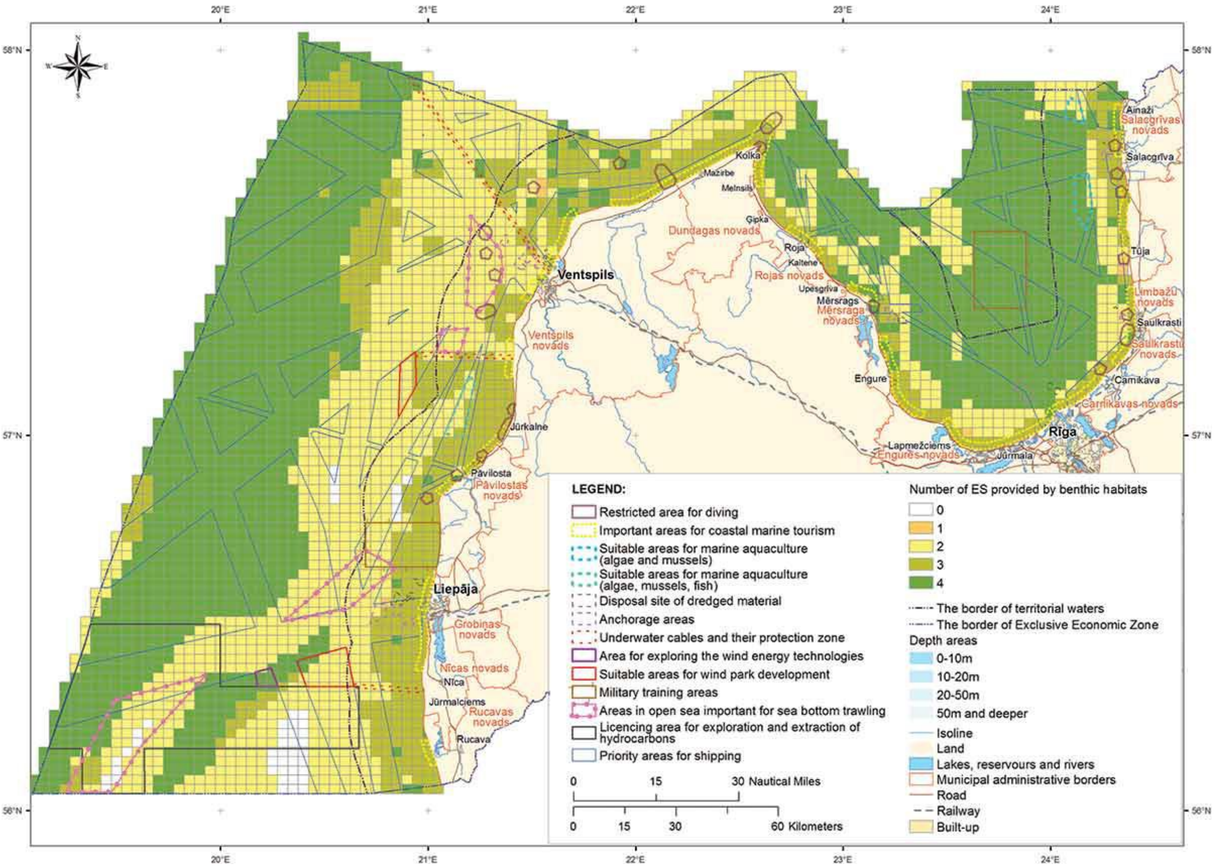

Figure 11: Example of results of Marine Ecosystem Services Assessment (source: Veidemane et al., 2017)

Needs (What resources are required for applying the method?):

Time: Simple rapid assessment can be carried out, while more detailed analyses with frequent stakeholder engagement become time-demanding.

Data: Geospatial data, characterising the ecosystem components and ecosystem services provided. Data on current and projected human use of the sea.

Costs: Dependent on the level of detail in data collection and processing, as well as on the level of interaction with stakeholders deemed necessary.

Skills: Understanding of the concepts of Ecosystem Services and ecological knowledge to understand relation between ecosystem components and services provided, modelling and result interpretation skills are needed, as well as appropriate IT infrastructure.

Pros and cons (What are the strengths and challenges of the method/tool?):

Strengths:

- The Ecosystem Services concept can be used to make the benefits from ecosystems spatially explicit as well as illustrate the positive and negative impacts of (scenarios of) maritime spatial plans (Hattam et al., 2015).
- The primary benefits of Marine Ecosystem Services in the MSP decision process are their ability to centralize, integrate and manage a wide range of spatial data, the speed of processing those data, and the clarity of outputs that are easily understood by end-users (Stamoulis & Delevaux, 2015).
- The assessment provides insight into the trade-offs and synergies between different ecosystem services. Nevertheless, governing bodies must still make decisions among alternative solutions.

Weaknesses:

- The main challenges that hinder this process are related to a high level of uncertainty in marine ES mapping and assessment, thus making questionable the applicability of the results in policy- and decision-making (Veidemane et al., 2017).
- Uncertainty can be reduced by in-depth investigation to improve understanding of marine ecosystems and the dynamics in time and space. While information on the state of the marine ecosystem is available, e.g. as required by the Marine Strategy Framework Directive (Directive 2008/56/EC), a full understanding may require substantial additional research.
- Ecosystem Services Assessments do not systematically include uncertainty and risk arising from data gaps, scale mis-matches, or lack of knowledge. This needs to be recognized and accounted for by MSP.

Considerations (What issues should be considered when using the method/tool)?

- While the Ecosystem Services Assessments provide a structured approach to understand the benefits of ecosystems, the approach does not offer a solution to negative trade-offs.
- The level of uncertainty can be high if there is limited data to draw on.

Further information (Any particular website or case study that is useful?):

- The CICES website provides a common classification of ecosystem services.
- The Tools4MSP Geoplatform (former ADRIPLAN Portal) is a community-based, open source portal providing maps of ecosystem services provided by marine ecosystems.
- The Marine Ecosystem Services Partnerships brings together information from across the globe, show casing case-studies and data available for use in future analyses. The ecosystem services assessment Toolkit (http://toolkit.grida.no/) provides an overview of economic valuation methods, associated studies and links to related sites.
- The ValuES Methods Database (http://aboutvalues.net/method_database/) contains profiles of a diverse range of methods, tools and sources for assessing ecosystem services and values around the world.

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16. INPUT-OUTPUT ANALYSIS

Name (Common name/names of method/tool):

Input-output analysis.

Purpose (What does the method/tool aim to achieve?):

Input-output analysis can be used to evaluate the socio-economic importance of marine and coastal activities, by determining the (relative) impact of blue economy sectors or activities. In the context of the Plan4Blue project (http://www.syke.fi/projects/plan4blue):

> *"The Input-output (I-O) methodology explores the linkage and production effects of the Estonian and Finnish maritime sectors on national economies and cross-border cooperation."*

Outcome (What information does the method/tool provide?):

Input-output analysis is used to quantify and compare the social, economic and environmental impacts of different blue economy sectors or maritime activities.

Through input-output (I-O) tables, the (relative) contribution of a sector/activity can be assessed. With the use of appropriate data transformations or statistical techniques, the multiplier effects of each sector/activity can be estimated as a response to changes in demand.

Additionally, by estimating the demand of each sector/activity for production inputs, the Gross Value Added (GVA) of each sector/activity can be derived.

Applicability (When and where can the method/tool be applied?):

The evaluation of the socio-economic contribution of a sector/activity can be conducted on an individual basis or in a comparative context against the contribution of other marine and coastal sectors/activities.

Depending on the selected indicators, this method can be applied as long as the appropriate data is available. For example, indicators used to measure the significance of maritime transport typically refer to the value generated by the sector, the number of jobs, the relevant sectoral contribution to taxes and investments, and the amount of trade volumes carried by sea. Maps of shipping traffic density, necessary for MSP purposes, can be mapped with GIS tools.

Operationalization (How does the method/tool work?):

Generally speaking, input-output analysis can be divided into three phases:

Phase 1 – Indicator selection to quantify the intensity of the sector/activity. The economic intensity indicator is, generally, quantified through the Gross Value Added (GVA), while their social contribution is, generally, quantified through the amount of job positions that they generate. Additionally, the identification of environmental pressures and risks can be included (see for example the list of pressures and impacts included in the Marine Strategy Framework Directive, MSFD; Directive 2008/56/EC).

Phase 2 – Data collection and indicator calculation. Socio-economic input-output data from regional/national/international statistics with sectoral, and preferably spatial, disaggregation can be used to obtain data for the calculation of indicators per sector/activity. Environmental input-output (dose-response) data is derived from existing knowledge and literature as well as expert opinion and perceptions (see: Med-IAMER, 2015). Indicator values can be used directly (absolute values) or in the form of an index (relative values). When index values are used, the total sector/activity intensity score can be derived using weighted aggregation.

Phase 3 – Comparison and evolution of sector/activity intensity. Based on data for various years, indicator values can be calculated and sector/activity intensity can be analyzed across sectors/activities over time.

Needs (What resources are required for applying the method?):

Time: When input-output tables are available, socio-economic input-output analysis is not too time consuming. The environmental dimension may, however, be more time consuming.

Data: The data used to calculate the indicators may be acquired from regional, national and international statistics and from relevant sectoral and environmental surveys.

Costs: When input-output data are available and updated over time, than the costs associated with a socio-economic input-output analysis are relatively low. The environmental dimension may be more resource consuming.

Skills: Setting-up input-output tables can be challenging. If, however, input-output tables are available (often supplied by national statistics office), input-output analysis does not require high skills.

Pros and cons (What are the strengths and challenges of the method/tool?):

Strengths:

- It is relatively easy to produce an input-output table if the appropriate data is available.
- This method allows for the comparison across different sectors/activities over time as well as between different indicators.

Weaknesses:

- The input-output analysis should be complimented by qualitative analysis of the most relevant legal and policy frameworks as well as governance arrangements (Niavis et al., 2017).
- Lack of basic or specific statistical data on blue sectors may be an obstacle for practical application of this method/tool.

Considerations (What issues should be considered when using the method/tool)?

Indicators need to be elaborated for this analysis to be more comprehensive.

Further information (Any particular website or case study that is useful?):

- The study "Economic potential of maritime regions" (as part of the Plan4Blue project) analyzed how maritime economies contribute to national economies of Finland and Estonia and how productive and efficient blue economy sectors are in maritime regions.
- Other relevant cases studies that use input-output analysis:
- Morrissey, K., O'Donoghue, C., (2013). The role of the marine sector in the Irish national economy: an input-output analysis. Marine Policy, 37: 230–238.
- Niavis, S., Papatheochari, T., Kyratsoulis, T. and Coccossis, H., (2017). Revealing the potential of maritime transport for 'Blue Economy' in the Adriatic-Ionian Region. Case studies on transport policy, 5(2): 380-388.

The following sources provide information on environmental values and valuation methods:

- The Marine Ecosystem Services Partnerships' ecosystem services assessment Toolkit (http://toolkit.grida.no/) provides an overview of economic valuation methods, associated studies and links to related sites.
- The ValuES Methods Database (http://aboutvalues.net/method_database/) contains profiles of a diverse range of methods, tools and sources for assessing ecosystem services and values around the world.

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17. SPATIAL DATA INFRASTRUCTURE

Name (Common name/names of method/tool):

Spatial data infrastructure.

Purpose (What does the method/tool aim to achieve?):

Spatial data standards and infrastructure, such as INSPIRE (Directive 2007/2/EC), aims to improve and strengthen the information management and data infrastructures needed for setting up Maritime Spatial Planning (MSP) processes.

The INSPIRE Directive allows the sharing of spatial data between sources, users and applications. The common, interoperable data infrastructure makes high-quality data widely available and facilitates cross-border exchange of data as well as collaboration on planning with a focus on environmental aspects.

Compliance with the INSPIRE Directive will be required for data sets in all themes (e.g. oceanographic geographical features or habitats and biotopes) as of October 2020.

Outcome (What information does the method/tool provide?):

The use of INSPIRE standards for spatial planning provides consistent spatial data across borders, for a broad range of spatial features and uses both land and sea based features. Thus, the use of INSPIRE-compliant data supports the integration of multiple spatial plans by making a larger number of reliable, high-quality data sources available.

Applicability (When and where can the method/tool be applied?):

As the key purpose of the INSPIRE standards is standardisation across borders, the main applicability concerns collaboration for regional MSP or planning in areas close to borders. However, national data from different public sources also becomes available through the INSPIRE Directive.

The INSPIRE Directive does not establish a requirement to collect specific data but only provides standards to share existing datasets. Therefore, the applicability of INSPIRE depends on the number of datasets available for a particular area. Analysis of the availability of data for the spatial features needed is therefore necessary before the start.

With regards to the timing, INSPIRE-based data can be applied throughout the entire process of maritime spatial planning. Identifying and defining existing and future desired conditions is supported by the data, extracting plans for public presentations and consultations is facilitated, and it also allows making the MSP available in an interoperable way.

Operationalization (How does the method/tool work?):

INSPIRE groups data (available through the INSPIRE-Geoportal) in 34 data themes of which the ones addressing marine areas are: Sea regions, Oceanographic geographical features, Protected Sites, Habitats and biotopes, Species distribution Transport networks, Agriculture and aquaculture facilities, Energy resources, and Land use (including marine use). E.g., existing maritime activities and uses can be mapped based on the data and considered in line with Art. 8 MSP Directive.

The INSPIRE data can be used for several of the minimum requirements established in Art. 6 MSP Directive. Most importantly, INSPIRE standards support:

- Consideration of land-sea interactions by providing transferable data for both domains;
- Engagement of stakeholders by offering accessible and downloadable data, maps and plans;
- Use of best available data as explicitly referred to in Art. 10 MSP Directive; and
- Trans-boundary cooperation through interoperable data infrastructure in EU Member States.

For the planning of future uses of maritime space, the "planned land use" data model can be used to create Maritime Spatial Plans. It supports the spatial dimensions of all elements of a spatial plan. For this, the ZoningElement feature can be applied together with potential additional limitations using the SupplementaryRegulation feature.

Classification of uses is enabled through HILUCS (Hierarchical INSPIRE Land Use Classification System), which can also be applied to maritime uses.

Needs (What resources are required for applying the method?):

Time: The use of existing datasets and shared information can reduce the time necessary for the planning process. However, if available data is missing or needs to be created for the first time, applying INSPIRE standards are likely to add to the general time needed for the process.

Data: As data is provided by the platform, access to data is standardised and facilitated. In case of only partly available data, additional collection efforts could become necessary. Useful data sources are: EMODnet, Copernicus, SeaDataNet and HELCOM.

Costs: Data and infrastructure are freely available. The processing requires specific software, some of which can be costly.

Skills: Because of the standardised sharing procedure on the INSPIRE-Geoportal, the required skills for this particular tool are low. However, skills in general spatial data analysis tools and presentation are necessary.

Pros and cons (What are the strengths and challenges of the method/tool?):

Strengths:

- The integration of maritime and terrestrial spatial plans facilitates the harmonisation in coastal areas. Coastal zone management, as referred to in Art. 6 MSP Directive is thus supported.
- Collaboration with other Member States is simple because of the shared standards.
- The transparency of the underlying data sources increases the quality of consultations and can therefore improve the planning outcome.
- Because the INSPIRE standards apply to land and sea-based data and dataset, the integration of MSP with terrestrial spatial plans is possible without transformation barriers.

Weaknesses:

- The described process and strengths are limited to INSPIRE-compliant datasets. The availability of such data varies from region to region and country to country.
- Fragmentation of knowledge and differences in national data availability and lack of cross-border harmonized data might be an obstacle for transboundary integration.

Further information (Any particular website or case study that is useful?):

- EU-INSPIRE website.
- EULF Marine Pilot, with the aim to help improve the understanding of INSPIRE in the management of Marine Strategy Framework Directive (MSFD) and related spatial information as well as to provide guidance and tools that facilitate the mentioned obligations.
- MarSP (Macaronesian Maritime Spatial Planning) case study and its 2019 report on Data specification for the maritime spatial planning INSPIRE data model.
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18. REMOTE SENSING FOR MSP

Name (Common name/names of method/tool):

Remote sensing for Marine Spatial Planning and Integrated Coastal Areas Management.

Purpose (What does the method/tool aim to achieve?):

Remote sensing (RS) is a very effective method of obtaining frequent data on a high-level scale about the current state of the oceans and coastal areas. Currently, Integrated Coastal Area Management (ICAM) and Marine Spatial Planning (MSP) are facing a lack of knowledge about the main risks when carrying-out specific types of activities such as economic (shipping) and environmental (conservation). To address this lack of data, it is widely perceived that knowledge gaps cannot be solved by data and observation networks alone, rather a cumulative impact mapping approach provides more useful information. The datasets which are used in this approach however do not fully consider the potential contribution of remote sensing tools. Thus, RS has a vital role to play in ICAM and MSP.

Outcome (What information does the method/tool provide?):

While previous satellite sensors were designed for the sake of research before their application had been defined, RS research has shown across environmental and socio-economic fields to be able to provide targeted data for specific applications. One such result is its ability to produce aggregated and mesoscale data, making it an essential tool in measuring and monitoring the changing states of eco-systems and, more widely, help to provide decision makers with more accurate data on the recovery and sustainability of degraded goods and services. With respect to its implications for MSP and ICAM, RS methods can provide important support to provide up-to-date information on a specified area.

Applicability (When and where can the method/tool be applied?):

There are four main tools that are most pertinent for application: Multi/hyperspectral and VHR camera, Single Band Microwave/infrared, Radar and Light Detection and Ranging (LIDAR). These RS tools can be used to gather data on:

- Pollution and ecosystem health: data can be gathered on a number of different scenarios such as oil spills, coral reefs, sea surface salinity and acidification to mention just a few. This data can be monitored, evaluated and used to prevent and mitigate against future depletions in ecosystem health.
- Natural hazards: data can be gathered on a number of natural processes and occurrences such as flooding, coastal erosion and extreme weather events. This data can then be monitored, evaluated and used to prevent and mitigate against future natural disasters.
- Marine space and use: data can be gathered on MSP exercises such as defining eco-regions, marine traffic, coastal and offshore energy and illegal, unreported and unregulated fishing. This data can then be monitored, evaluated and used to prevent and mitigate against the degradation of marine space.
- Coastal land cover and use: data can be gathered on land-use/ land cover change, levels of urbanisation, land use conflicts and off-shore energy. This data can then be monitored, evaluated and used to prevent and mitigate against further conflicts or increased rates of urbanisation.

Operationalisation (How does the method/tool work?):

Similar to the applicability of RS presented above, the operationalisation of these technologies can be best understood across the four main ICAM/MSP components.

- Pollution and ecosystem health: To monitor eco-system health, in-particular habitat mapping in coastal areas, RS tools such as spaceborne optical (multispectral and hyperspectral) sensors and LiDAR can be used to provide detailed pictures of habitat health. Synthetic-aperture radar14F1 (SAR) can also be used for surface and terrestrial habitats, particularly in flooded areas due to its ability to penetrate canopies and thus fully characterise the structures of coastal habitats. For deep-water habitats, ship borne sonars can be used. In terms of monitoring pollution outbreaks such as oil spills, spaceborne SAR can be used to detect molecular tension differences between the oil surface and the surrounding water surface.
- Natural hazards: Monitoring and evaluating natural hazards are perfectly observable through RS. The most effective tool being SAR satellite altimetry, which can provide data on sea surface hights. RS can also be used for post-disaster evaluations through the combination of SAR and multispectral sensors (e.g. MODIS). In addition, Airborne LiDARs and hyperspectral sensors can be particularly useful for conducting damage evaluations as they provide very high-resolution data.
- Marine space and use: RS technologies are used in the context of MSP through measuring data variables and deriving biodiversity indicators, to help define coastal areas. Shore-based High Frequency (HF) radars and Automatic Identification Systems (AIS) can also be used in the identification of vessels to help monitor maritime traffic (particularly for fisheries and aquacultures).
- Coastal land cover and use: RS technologies can be used in mapping of LULC (land use and land cover) and population dynamics. This works through the use of multispectral, hyperspectral, SAR and LiDAR sensors that can combine data to map LULC mapping and change detection.

Needs (What resources are required for applying the method?):

Time: While the exact time needed to operate these technologies can often be case specific, indications from research are that RS technologies can provide regular and timely data on coastal areas that would not necessarily be available through other methods.

Data: RS is a very effective way of obtaining frequent data on a synoptic scale about the state of the oceans and coasts. Some RS data can be available for free and open source, thus allowing further opportunities to fill gaps in knowledge and increase usability. Data can be available through a number of portals including ESA mirror, CNES mirror, Sea surface and temperature products and COPERNICUS MEMS products.

Costs: Depending on the necessary individual efforts, costs for RS can range from low to high. Available satellite RS data can provide low cost information at regular time intervals, supplying data to in-situ data networks. Recent studies have highlighted that the RS approach has been a cost-effective way of gathering data across a large habitat area. This was due to the use of the Landsat satellite, where data can be accessed for free. For smaller scale and very-high resolution data, however, the data is rarely free, in which case high initial costs may apply. This is making RS less suitable for local management and planning efforts.

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[1] Synthetic-aperture radar (SAR) is a form of radar that can be used to create two-dimensional images or three-dimensional reconstructions of objects including marine and coastal habitats.

Skills: With RS products becoming increasingly user-friendly, it has allowed a greater number of stakeholders to collect and analyse more data.

Pros and cons (What are the strengths and challenges of the method/tool?):

Strengths:

- RS is operationally and routinely used to prevent disasters and mitigate risks, evaluate damage and contribute to vessel detection and monitoring in the context of e.g. oil spills.
- RS can be an important tool in monitoring the coastal environments geo-chemistry and the derivation of biophysical variables.
- RS can be a cost-effective, spatially explicit, continuous and frequent form of collecting observations of coastal areas and marine space. The data it can produce provides information on an aggregate scale that the human eye would not be able to detect.

Weaknesses:

- One main weakness when studying oceans with RS is the quantity, quality and availability of data. From this, RS data is affected by the following challenges:
  - Continuity: Interruptions in observations may occur which can be a problem for a number of monitoring applications.
  - Reliability: For several of the sensors data reliability can be hampered by a number of phenomena, such as cloud masking and errors in atmospheric correction algorithms.
  - Resolution and coverage: With requirements for data on coastal regions being so high, it is often the coast RS data that does not match current modelling needs.

Considerations (What issues should be considered when using the method/tool)?

It is important to note that at the national levels, data support remains poor and the average capacity is not sufficient to support the processing of large quantities of RS data that become available. These geographical differences in data collection can hinder the applicability of RS data, particularly in the monitoring of ocean data at an international level.

Further information (Any particular website or case study that is useful?):

There are a number of future missions in the field of RS which are particularly relevant in the context of ICAM and MSP. For example, the space-borne hyperspectral missions (HyspIRI, ENMap and PACE), scheduled for upload in 2022/2023, poses a great opportunity to expand research into biogeochemistry in oceans and marine ecosystems. In addition, the Landsat-9 satellite is scheduled to be launched in 2023 and will further expand NASAs and USGSs Earth Observing Program. This development will further improve the continuity and reliability of data.

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19. LAWS’ RESILIENCE AND ADAPTIVE CAPACITY ANALYSIS

Name (Common name/names of method/tool):

Laws’ resilience and adaptive capacity analysis.

Purpose (What does the method/tool aim to achieve?):

The purpose of this analysis is to assess the adaptive quality of the legal framework. This legal assessment is necessary in the maritime space, given its many interdependencies, changing needs, political landscape and evolving scientific knowledge.

Outcome (What information does the method/tool provide?):

The outcome of the analysis is an understanding of the resilience of the legal framework in relation to maritime spatial planning. The identified strengths and weaknesses of national legislation in adapting to changing conditions enables a targeted revision to ensure both resilience and the rule of law.

Applicability (When and where can the method/tool be applied?):

The analysis can be applied from the local to the regional level. The scope can be adapted from a single plan or administrative ordonnance to a setting in which an interplay between several laws and plans at different levels are present.

The analysis is best used before a revision of the legal framework is set. However, it can also be applied independently from such a revision. In the latter case, the method can point to a potential need for a future revision.

Operationalization (How does the method/tool work?):

Considering the substantive and procedural requirements for adaptive law, and requirements stemming from the rule of law, there is a need to establish how exactly one goes about measuring the resilience and adaptive capacity of environmental regulatory instruments.

A first important step is to differentiate between substantive and procedural aspects of the legal framework, which serve different functions in respect of adaptive law:

- The substantive perspective calls for diverse goals that offer a framework for pursuing objectives in multiple directions. For instance, objectives of ecological protection, economic activity and social uses need a possibility to be balanced, mediated and possibly combined in the legal framework.
- The procedural perspective focuses on providing a framework for environmental management that includes continuous learning and integration of new knowledge into the decision-making process and development of legislation.

The basis for the analysis of the adaptive capacity of the legal framework is to identify the problems and challenges in economic, social and ecological terms that are faced by the subject of the legal framework (e.g. geographic scope of an MSP). Stating the needs and developing objectives based on these, is essential for transparency and monitoring of the legal revision.

An adaptive and resilient legal framework is based on four key criteria (following Soininen & Platjouw, 2018; see Figure 12 below), which need to be operationalised and evaluated in detail in the specific context the review is to take place:

1. Substance: The law or legal framework should have diverse but clear goals to determine the legality of environmental management. For the revision of the legislative framework of maritime planning, the goals should include the areas of ecology, economy and society.
2. Procedure: The law or legal framework should include an iterative management system with the focus on reducing scientific uncertainty, secure participation and access to justice. A balance between long-term planning components and elements facilitating learning for stakeholders and the pieces of legislation is necessary. Effective monitoring of the effects on environment, economy and society should be in place to identify positive or negative developments quickly and reliably. This is necessary to ensure accountability of policymakers, environmental managers and stakeholders.
3. Instrument choice: A resilient legal framework uses not only prescriptive legal instruments but also economic incentives and voluntary mechanisms to support the policy mix from different angles.
4. Enforcement: Objectives and procedural provisions should be legally binding or accompanied by implementing rules (e.g. time limits, penalties) to ensure compliance and enforceability.

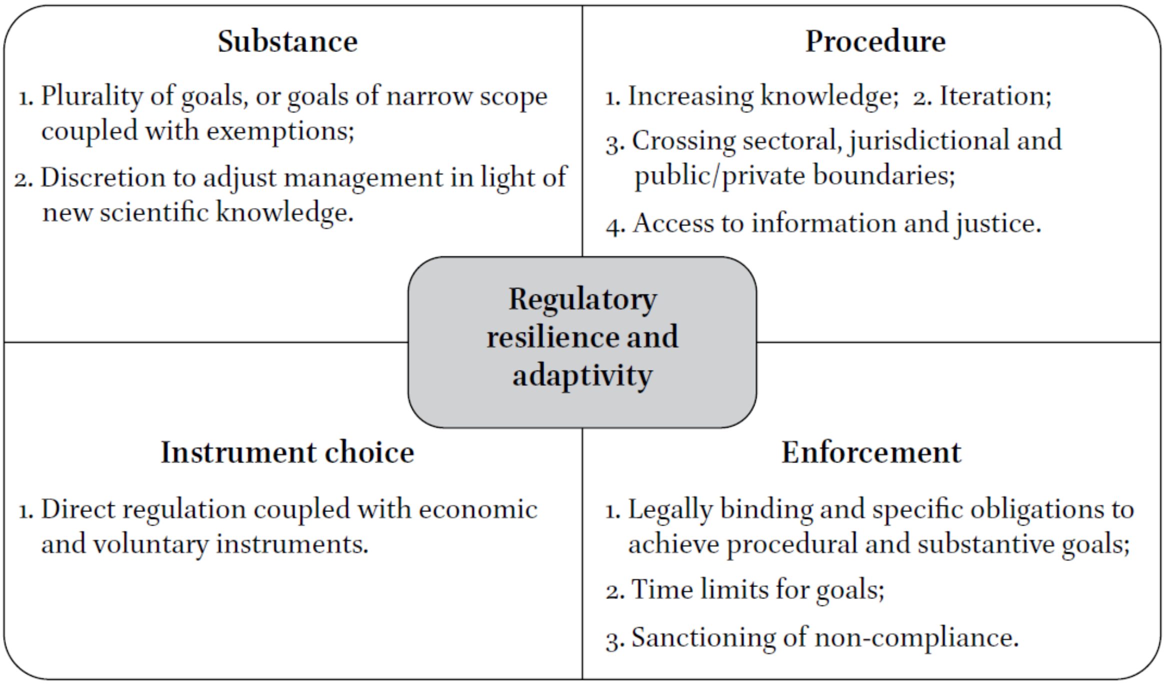

Figure 12: Regulatory resilience and adaptivity (Source: Soininen & Platjouw 2018)

Lastly, the analysis needs to ensure the coherence of the legal framework. This is applicable to all four criteria. Assessing coherence makes sure that laws and other instruments create mutual support instead of inconsistencies. This is highly relevant for substantive goals but also for procedurally and enforcement in areas where multiple regulatory frameworks overlap.

Scientific, legal and policy document analysis is used to evaluate the resilience and adaptive capacity of environmental regulation against these criteria.

Needs (What resources are required for applying the method?):

Time: Depending on the number and level of detail of the laws and plans, the review may require time resources to apply a consistent analytical framework to all applicable pieces of legislation. For fewer pieces, time requirements are substantially lower.

Data: This method does not require additional data. It compares the available data and scientific developments with the legal provisions.

Costs: The systematic review creates only little costs if done internally. Some cases can justify an independent external review which creates substantial cost.

Skills: The combination of the need for legal and technical knowledge of the legal documents in question and of the development of scientific knowledge and data availability, require skills in these areas to perform a meaningful review.

Pros and cons (What are the strengths and challenges of the method/tool?):

Strengths:

- The applicable law is the foundation of the planning process and its output. It needs to adequately reflect the current situation and state of knowledge. This analysis can support the revision of the legal framework.
- Maritime systems, pressures and scientific findings are constantly changing. Static law is not appropriate in this environment of uncertainty. This analysis helps create a legal framework that can adapt to changing needs, technologies, ecosystems and knowledge.
- This analysis contributes to the development of a legal framework that is capable of dealing with changing developments, while keeping to clear objectives that support legitimacy and acceptability of the planning process and its outcome.

Challenges:

- The analysis needs to be complemented by evaluations that focus on whether the potential triumphs and failures of the considered laws and plans are actually realized.

Considerations (What issues should be considered when using the method/tool)?

Adaptive laws need to be balanced with legal predictability in order to prevent misuse and provide a reliable basis for stakeholders' decision-making. Without a degree of legal certainty, resilience and adaptation to new knowledge will hardly be translated into effective changes in practice. Thus, a revision of the resilience of a legal framework needs to find the right amount of legal certainty for stakeholders to ensure predictability (e.g. for investments) but also create adaptive instruments. Clearly describing the needs of a system or area (the initial step above) and, based on this, formulating objectives as well as procedural provisions ensure the balance of needs, pressures and uses of the maritime space. Preventing misuse of administrative powers while also creating effective drivers in evolving systems has to be the guiding principle.

Further information (Any particular website or case study that is useful?):

- BlueAdapt project on blue economy and aquaculture in Finland.

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