Policy Brief

Implementing the Ecosystem-Based Approach in Maritime Spatial Planning

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1 Introduction

This policy brief examines how the Ecosystem Based Approach (EBA) can be applied in Maritime Spatial Planning (MSP). It provides insights into the different tools which can facilitate the implementation of EBA in MSP and provides an overview of EU Member States that successfully applied EBA in MSP processes. The aim is to assist policy-makers and planners with implementing these concepts together, and provides recommendations for planners. This brief has been developed based on briefing papers developed by the MSP Assistance Mechanism for the Member States Expert Group on MSP.

1.1 Background

Historically, the marine environment and its resources have been managed through fragmented and sectoral approaches (Kelly et al., 2018). This fails to incorporate the complexity and interconnection of marine ecosystems and the cumulative pressures that different human activities have on species and habitats. Sectoral approaches that do not consider the connections between ecosystems contribute to the degradation and decline of ecosystems goods and services, as shown by the increasing marine pollution and decline of fish stocks, among other ecological trends (Long et al., 2015; Veidemane et al., 2017). Additionally, this negatively impacts human well-being and food security. Furthermore, the growing competition between different sectors for the use of marine areas highlights the need to better regulate and organise human activities (e.g. shipping, fishery, offshore windfarms, conservation) in order to reduce conflicts and negative impacts (Veidemane et al., 2017).

In response to the need for new management approaches, concepts such as the EBA and MSP were developed. These integrated, area-based management approaches are underpinned by science and intend to support sustainable development. In the European Union, both concepts are integrated in a number of EU policies, such as the Marine Strategy Framework Directive (MSFD, 2008/89/EU) and the Maritime Spatial Planning Directive (MSPD, 2014/89/EU).

1.2 The Ecosystem Based Approach (EBA)

The concept of EBA (or Ecosystem-based management) has been widely advocated during the Earth Summit in Rio de Janeiro in 1992 and various definitions of the term(s) exist (Buhl-Mortensen et al., 2017). EBA can be intended as an interdisciplinary management approach that acknowledges the complex nature of ecological systems and integrates social, ecological, and governance principles to achieve a sustainable use of natural resources in an equitable way (Domínguez-Tejo et al., 2016). Thus, EBA integrates the complexity of ecosystems as well as the interaction between humans and ecological systems with management decisions (Long et al., 2015; Buhl-Mortensen et al., 2017).

EBA considers humans as integral part of the natural ecosystem and when applied, it can show the trade-off and interactions between the goods and services provided by natural ecosystems and the different management goals (Levin et al., 2009). EBA is advocated in various EU directives related to the management of natural resources, such as the Marine Strategy Framework Directive (MSFD) (MSFD, 2008/89/EU; MSPD, 2014/89/EU; de Grunt et al., 2018). The concept was also transposed into 12 Malawi principles of the ecosystem approach to biodiversity management in 1998 and taken up by Decision V/6 of COP5 of the CBD in 2000 (CBD Secretariat, 2004). The principles explicitly take into account social and socio-political aspects and are presented in the table below:

Principle 1: Management objectives are a matter of societal choice.
Principle 2: Management should be decentralised to the lowest appropriate level.
Principle 3: Ecosystem managers should consider the effects of their activities on adjacent and other ecosystems.
Principle 4: Recognizing potential gains from management there is a need to understand the ecosystem in an economic context, considering e.g. mitigating market distortions, aligning incentives to promote sustainable use, and internalising costs and benefits.
Principle 5: A key feature of the ecosystem approach includes conservation of ecosystem structure and functioning.
Principle 6: Ecosystems must be managed within the limits of their functioning.
Principle 7: The ecosystem approach should be undertaken at an appropriate scale.
Principle 8: Recognising the varying temporal scales and lag effects which characterize ecosystem processes, objectives for ecosystem management should be set for the long term.
Principle 9: Management must recognise that change is inevitable.
Principle 10: The ecosystem approach should seek the appropriate balance between conservation and use of biodiversity.
Principle 11: The ecosystem approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices.
Principle 12: The ecosystem approach should involve all relevant sectors of society and scientific disciplines.

Table 1: The 12 Malawi principles of the Ecosystem-based approach (CBD, 2018).

1.3 Maritime Spatial Planning (MSP)

'Maritime spatial planning' (MSP) is defined in the MSPD as "a process by which the relevant Member State's authorities analyse and organise human activities in marine areas to achieve ecological, economic and social objectives" (Directive 2014/89/EU). With the adoption of the MSPD by the European Commission, Member States are mandated to implement MSP in order to fulfil a set of minimum requirements, including management of human activities that achieve ecological, economic, and social objectives (Veidemane et al., 2017). The planning needs to be based on the best available scientific knowledge about the ecosystems and their dynamics (HELCOM & OSPAR, 2003). MSP initiatives are increasingly being implemented globally. In Europe, they are initiated by national governments in accordance with the MSPD or other national legislations (Santos et al., 2014). One benefit of MSP is the introduction of clearer management objectives and potential reduction of conflicts between different users (Collie et al., 2013).

1.4 Ecosystem-based approach in the MSFD and MSPD

Article 1(3) of the MSFD clearly states that marine strategies "shall apply an ecosystem-based approach to the management of human activities, ensuring that the collective pressure of such 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 enabling the sustainable use of marine goods and services by present and future generations" (MSFD, 2008/89/EU). This shows that the implementation of EBA is strongly

advocated in the MSFD since it is considered a necessary approach to achieve the Good Environmental Status (GES) of the European marine environment.

GES is based on a set of 11 qualitative descriptors spanning from the functions of marine ecosystem to human influences (MSFD, 2008/89/EU). GES is defined in the MSFD as "the environmental status of marine waters where these provide ecologically diverse and dynamic oceans and sea which are clean, healthy and productive within their intrinsic conditions…" (MSFD, 2008/89/EU). The monitoring of GES indicators within the MSFD is a key factor when it comes to assessing the effectiveness of Programmes of Measures (PoMs) and achieving the anticipated objectives on a regional and local scale (Cinnirella et al., 2014). Nonetheless, GES definition as provided in MSFD is open to interpretation by member states, which therefore can define and assess GES differently (Authier et al., 2017; Varkitzi et al., 2018) as also shown by the different GES determinants defined by Member States (DEVOTES, 2015). However, experiences gained during the development of monitoring and indicator systems under the MSFD work can be considered by planners to aid understanding of EBA implementation. Also, the continuously elaborated tools to apply EBA are supporting planners in their practical work.

Rouillard and colleagues (2017) reviewed the different studies on EBA principles and conclude that the MSFD includes concepts of "ecological diversity", "biodiversity", "resilience", and "ecosystem services", which are part of the EBA. The MSFD also calls for a multi-disciplinary assessment, provides a framework for considering social-ecological interactions, and explicitly incorporates adaptive management, which are all features advocated in the EBA concept (MSFD, 2008/89/EU).

Similar to the MSFD, the MSP Directive indicates that to promote sustainable development, blue growth, and the sustainable use of the marine and coastal resources; MSP should be based on EBA (Borja et al., 2013; Directive 2014/89/EU). EBA plays a vital role in MSP because it has the potential to "set boundaries for a management approach" (Schernewskli et al., 2018) as it bases the planning on the best available scientific data and other principles. At the same time, implementing MSP can contribute to the achievement of GES (Suárez de Vivero et al., 2012) since MSP approaches implemented by Member States need to be based on EBA (HELCOM, 2016). The MSP Directive does not directly provide a definition of EBA; however, the requirement to implement EBA is stated in the Preambles (3), (14), (22) as well as directly in the Article 5 on the objectives of MSP as shown in the Table below:

MSPD Preamble (3): "…The application of an **ecosystem-based approach** will contribute to promoting the sustainable development and growth of the maritime and coastal economies and the sustainable use of marine and coastal resources."
MSPD Preamble (14): "In order to promote the sustainable growth of maritime economies, the sustainable development of marine areas and the sustainable use of marine resources, maritime spatial planning should apply an **ecosystem-based approach** as referred to in **Article 1(3) of Directive 2008/56/EC** with the aim of 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." and "an **ecosystem-based approach should be applied** in a way that is adapted to the specific ecosystem and other specificities of building on existing knowledge and experience."
MSPD Preamble (22): "…marine spatial planning as a tool to support the **ecosystem-based approach** to the management of human activities in order to achieve good environmental status…"
MSPD Article (5): "When establishing and implementing maritime spatial planning, Member States shall consider economic, social and environmental aspects to support sustainable development and growth in the maritime sector, **applying an ecosystem-based approach**, and to promote the coexistence of relevant activities and uses."

Table 2: EBA mentioned in the MSP Directive.

Preamble 14 of the MSP Directive also notes that EBA within MSP should be adapted to specific ecosystems and should be based on an adaptive management approach, considering the availability of new data as well as the precautionary principle (Directive 2014/89/EU). MSP can also create a framework for transparent evidence-based decision-making processes, which are reflected in the principles of EBA (Long et al., 2015).

Albeit both the MSFD and the MSP Directive support the implementation of EBA and the achievement of sustainable use of marine resources, Jonet et al. (2016) stress that the two policies have different attributes, which may challenge their integration. On one hand, the MSFD recognises that, if justified, development activities might be carried out even in case they would result in a negative environmental impact (although such activities should not preclude the achievement of GES) (Article 14). On the other hand, the MSP Directive acknowledges the need to consider economic, social, and environmental aspects to support blue growth and development by applying EBA but only mention the need to achieve GES in its Preambles.

The application of EBA still faces challenges regarding merging environmental quality management (e.g. MSFD) with MSP and Blue Growth initiatives. The main challenge remains maintenance and protection of ecological structure and functioning (as required by the MSFD) while at the same time, sustaining production of ecosystem goods and services and the derivation of societal benefits (as required by the MSPD) (Qiu et al., 2013). The MSPD highlights that the correct application of EBA within MSP activities will improve sustainable development of maritime sectors and hence growth of marine and coastal economies.

MSP could help implement the MSFD PoMs through a concise planning and prioritising of activities. In return, monitoring under the MSFD could provide MSP with relevant (spatial) information for the planning process, e.g. to review the plan and assess its impact on the environment.

2 How to apply EBA in MSP?

2.1 Challenges in implementing EBA in MSP

Both MSP and EBA are well-conceptualised approaches, which are in the early stages of implementation and application. Institutional complexity and challenges related to modifications of governance models pose barriers to implementing both approaches simultaneously. Specifically, real world application is hindered by the difficulty to alter multi-layer governance regimes, which have historically been formed to manage sectoral activities individually (Kelly et al., 2018).

Because EBA lacks of a standardised application framework, its implementation has resulted in many different forms with a mixed combination of principles (Long et al., 2015; Domínguez-Tejo et al., 2016)

One of the key barriers for the implementation of EBA within maritime management approaches is the lack of inter-disciplinary science (Alexander et al., 2015). Additionally, maritime spatial plans are usually implemented within short time frames, which do not facilitate the introduction of EBA within MSP management (Veidemane et al., 2017). MSP is still considered a new management tool and only a limited number of case studies exists within the literature, which can help to draw lessons from past experiences and inform future initiatives (Domínguez-Tejo et al., 2016). Furthermore, MSP as an approach to the use of the sea cannot be applied equally everywhere and it needs to be adapted to each specific situation, taking into account the different characteristics of the region.

2.2 Possible solutions for a practical application of EBA in MSP

EBA could be implemented with MSP through the application of the "essential features of the planning process" and the use of economic and environmental impact assessments (HELCOM, 2016) (see 2.4). Various European countries already developed frameworks for the implementation of EBA within their national policy legislations (European MSP Platform, 2018a):

The Netherlands included in its National Water Act strategy an article, which foresees that GES act as the baseline towards which the Strategic Environmental Assessment should be measured. On an MSP project level, a compensation scheme with five steps is foreseen to integrate EBA: 1) Defining spatial claim and applying the precautionary principle, 2) Choosing the location and assessing requisite space and time, 3) Demonstrating national interest to impact on nature 4) Mitigating measures and 5) Compensation of effects.

Latvia follows a three-step approach to implement EBA in MSP: 1) Analysing best knowledge and practice and identification of ecosystem services, 2) Finding alternative developments to assess impacts on marine ecosystems, and 3) Applying precaution and mitigation when using an impact matrix. During the assessment of ecological impacts, Latvia performs a spatial assessment of impacts on special ecosystem features and ecosystem services provision as well as a semi-qualitative assessment of impacts against selected criteria and indicators.

Sweden uses a similar method to assess the environmental impacts in MSP based on EBA with the aim to compare the environmental impact of different alternative plans and assess cumulative impacts. The main pressures are then discussed with stakeholders and alternative plans developed.

The **Federal State Mecklenburg-Vorpommern** (**Germany**) combined various approaches to implement EBA; first by identifying provisioning and cultural ecosystem services, which were then taken up in programme designations. Similarly, important areas for nature conservation and protection were designated as reservation or priority areas for marine conservation. Additionally, a comprehensive SEA was carried out to investigate potential impacts of the State Development Programme.

The United Kingdom sees MSP as a tool for the implementation of the MSFD's indicators. The UK's Marine Policy Statement mentions "The use of the marine environment is spatially planned where appropriate and based on an EBA which takes account of climate change and recognizes the protection and management

needs of marine cultural heritage according to its significance".

2.3 Tools for the implementation of EBA in MSP

The following set of practices and projects provide ideas for implementing EBA in MSP, without being exhaustive nor applicable in every case. They need careful consideration before application but can be used as guidance for developing individual approaches. All examples can be found on the MSP Platform.

- Some tools for conflicts evaluation are available, such as the **COEXIST Analysis** of conflicts score; or the **Tools4MSP Geo-platform** which includes spatial data and metadata to assess cumulative impacts for different categories like coastal defence, sand extraction or energy. **The ADRIPLAN Cumulative Impact Tool** is the main methodological tool used in the project to evaluate the potential impact of maritime activities on the environment. The Data Portal also includes the **ADRIPLAN Conflicts Score Tool.**

- **The Strategic Research and Innovation Agenda (SRIA)** developed by the Bluemed Initiative of the Mediterranean Sea includes actions aiming to develop inter alia tools to assess the cumulative impacts of human activities to ensure an ecologically sound exploitation of marine resources and to use decision tools to select sites for offshore installations.

- **Baltic SCOPE** developed an EBA toolbox and provides a checklist to use in the planning process to identify potential synergies and conflicts in relation to the environment.

- **Symphony** provides an analytical tool for assessment of cumulative effects in MSP. The tool will be used in the Strategic Environmental Assessment of the Swedish MSP to assess spatial ecological risks form different planning alternatives while implementing the EBA.

- **CONCEAL** mapped cumulative noise from shipping to inform marine spatial planners and/or conservationists about the limits of good conservation status under the MSFD.

- The Guidelines developed for the project **ECODUMP** explicitly deal with the influence of MSP and ecosystem-based principles on the search and assessment of new disposal sites at the near-shore of Lithuania.

- **The pilot plan for the Western Gulf of Gdansk** developed in the project BaltSeaPlan outlines the preparation of a SEA report for maritime spatial plans in line with EBA and with the special issue that the planned area contains Natura 2000 sites.

- The project **BALANCE** outlines the concept of blue corridors and how to work with it during practical marine spatial planning processes.

- **ECOMAGIS** developed a complex GIS for an ecosystem-based management through integrated monitoring and assessment of the status of flora and fauna in the Romanian part of the Black Sea.

- Two practices have developed tools for all sea basins like the **MareFrame Decision Support Framework** and **the ODEMM approach for EBA**.

- The **ESaTDOR** and **Med-IAMER** projects investigated typologies of land-sea interactions and developed associated spatial indicators.

- Real case study: Integrated Management of the Marine Environment of the Barents Sea and the Sea Areas off the Lofoten Islands shows implementation of a monitoring program following EBA in the context of a sea use plan.

2.4 The Strategic Environmental Assessment (SEA) can facilitate the implementation of EBA in MSP

Strategic Environmental Assessment:
The 'process by which environmental considerations are required to be fully integrated into the preparation of Plans and Programmes and prior to their final adoption. The SEA requires the environmental authorities to be consulted at the screening stage; scoping and it requires an assessment of reasonable alternatives and the Member States must monitor the significant environmental effects of the implementation of plans / programmes in order to identify unforeseen adverse effects and undertake appropriate remedial action'

The SEA is considered an important framework for implementing the EBA in MSP since it can help to identify the impacts on the ecosystem (European MSP Platform, 2018b). It plays an important role to improve the plans, by reducing the possible environmental impact a plan can cause. In these assessments, alternatives are provided on issues which might do harm to the environment. When a plan is approved, projects will start on implementing the plan. For example, new offshore wind farms will be built in designated areas. When doing so, an Environmental Impact Assessment (EIA) needs to be conducted to analyse the potential negative consequences and to find alternatives.

The following table shows examples of SEAs in the North Sea Region (NorthSEE project, 2018):

Country	Plan	SEA
Belgium	Maritime Spatial Plan for the Belgium Part of the North Sea (2014)	SEA on the design of the MSP
Germany (national)	Maritime Spatial Plan for the EEZ of the North Sea (2009)	Maritime Spatial Plan for the EEZ of the North Sea
Germany (Schleswig-Holstein)	Maritime Spatial Plan for the Territorial Sea of the Baltic and North Sea – Schleswig Holstein (2010)	Umweltbericht
Germany (Lower-Saxony)	Maritime Spatial Plan for the Territorial Sea of the North Sea – Lower Saxony (2006)	Umweltbericht zur Änderung der Verordnung über das Landes-Raumordnungsprogramm Niedersachsen
Norway	Management Plan 2013: Integrated Management of the Marine Environment of the North Sea and Skagerrak	https://www.regjeringen.no/contentassets/f9eb7ce889be4f47b5a2df5863b1be3d/en-gb/pdfs/stm201220130037000engpdfs.pdf
Sweden	Swedish Maritime Spatial Plan for the Kattegat (under development)	Miljökonsekvensbeskrivning Havsplan – Västerhavet

2.5 Guiding steps for planners for implementing the Ecosystem-based Approach (EBA) in Maritime Spatial Planning (MSP)

- Develop clear long-term ecosystem objectives, targets and indicators against which progress can be monitored, taking into account synergies with the Marine Strategy Framework Directive and the Strategic Environmental Assessment Directive.
- Use integrative approaches instead of sectoral approaches for the management of marine resources.
- Integrate social and economic factors.
- Establish a robust dynamic baseline.
- Consider all forms of information.
- Engage with all relevant sectors.
- Monitor, review and adapt management.
- Conserve ecosystem structure and function and manage within functional limits.
- Adopt a co-ordinated and integrated approach to management of human activities.
- Use appropriate spatial and temporal scales.
- Plan and manage in a decentralized way to the lowest appropriate level as far as the MSP governance system allows.

3 Conclusion

The increasing use of marine resources and the development of coastal areas will exacerbate the number – as well as the magnitude – of pressures on marine ecosystems, which will also negatively impact social and economic dimensions. Consequently, maritime planners, managers, and governments should properly collaborate to implement EBA in MSP and other environmental management decisions - not only because it is required by a growing number of maritime policies; but also because of the added economic value given by the protection of important ecosystem services, which provide vital goods and services.

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