



Monitoring and evaluation of maritime spatial planning – A review of accumulated practices and guidance for future action

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ABSTRACT

The Maritime Spatial Planning Directive 2014/89/EU requires implementation of spatial planning in the marine waters of EU Member States and the establishment of maritime spatial plans by Member States at the latest by 31 March 2021. In Directive 2014/89/EU it is explicitly mentioned that maritime spatial plans shall be reviewed by Member States as decided by them but at least every 10 years. This article aims to review accumulated practices in monitoring and evaluation of maritime spatial plans based on a review of literature, interviews and an expert workshop. Numerous approaches to monitoring and evaluation are applied and available. Monitoring and evaluation of maritime spatial plans is about more than the identification and use of best available methods, it requires sufficient skills and resources, for the evaluators and for stakeholders that might be involved. While not explicitly mentioned in the MSP Directive, equity in the allocation of marine areas for use is highlighted as an important emerging issue. Maritime developments are influenced by a mix of policies and linear approach to M&E fail to capture this complexity. The value of M&E is that it can improve the quality of MSP by instigating and structuring a participative processes with cross-sectoral and cross-border learning.

1. Introduction

The Maritime Spatial Planning Directive 2014/89/EU was adopted in 2014 and requires implementation of spatial planning in the marine waters of European Union (EU) Member States and the establishment of maritime spatial plans by Member States at the latest by 31 March 2021.¹

Maritime Spatial Planning (MSP) is a policy tool that aims to support the sustainable development of marine areas and coastal regions, and particularly for the restoration of Europe's seas to good environmental health. The high and rapidly increasing demand for maritime space for different purposes, such as installations for the production of energy from renewable sources; oil and gas exploration and exploitation; shipping and fishing activities; ecosystem and biodiversity conservation (i.e. marine protected areas); the extraction of raw materials; tourism; aquaculture installations and underwater cultural heritage; as well as

the multiple and cumulative pressures on coastal resources, require an integrated planning and management approach.

Directive 2014/89/EU describes the objectives of MSP (Art. 5) and formulates minimum requirements for maritime spatial planning. It asks Member States to (a) take into account land-sea interactions; (b) take into account environmental, economic and social aspects, as well as safety aspects; (c) promote coherence between MSP and the resulting plan or plans and other processes, such as integrated coastal management or equivalent formal or informal practices; (d) ensure the involvement of stakeholders; (e) organise the use of the best available data; (f) ensure trans-boundary cooperation between Member States; and (g) promote cooperation with third countries.

Anno 2021, various Member States (MS) have established maritime spatial plans, or revised versions of maritime spatial plans (e.g. Belgium), whereas some MS are in an earlier stage of development (including e.g. Sweden and Italy).² In Directive 2014/89/EU it is

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¹ The Directive applies only areas within national jurisdiction and not to Areas Beyond National Jurisdiction (ABNJ).

² For an up to date overview of the status of maritime spatial planning the European Union, we refer to <https://maritime-spatial-planning.ec.europa.eu/>

explicitly mentioned that maritime spatial plans shall be reviewed by Member States as decided by them, but at least every 10 years. This is needed to deal with uncertainty and to incorporate various types of change and requires a cost-effective and comprehensive Monitoring and Evaluation (M&E) plan [12]. Yet, there is little guidance or accumulated practice on how to evaluate MSP initiatives [8]. The improvement of maritime spatial plans through the continuous process of monitoring, evaluation and revision is needed to deal with major challenges in developing maritime spatial plans, including but not limited to shortcomings in institutional frameworks, stakeholder engagement and adapting to global environmental change [18].

There is a long history of M&E in other policy domains. Various guidance documents on monitoring and evaluation are developed by the European Commission. These are generally developed for specific policy instruments, such as the European Cohesion Fund and the European Regional Development Fund.³ The academic literature on M&E of spatial planning acknowledges that M&E should be developed in context. Discussing the relationships between planning and evaluation, Terryn et al. [46] conclude that these have become increasingly interdependent, and they influence each other reciprocally. Reviewing existing approaches to M&E, Terryn et al. [46] conclude that these evaluation theories and methods do not become superfluous but need to be applied in specific settings and with specific criteria and intentions. In this context, the literature on M&E show an increased call for evaluation approaches that are congruent with the complexities, ambiguities and uncertainties of contemporary policy practice [50]. Van Veen (et al. 2016) emphasize that this calls for approaches that are participative, responsive, and integrative. Evaluations should not only generate knowledge about the performance of the policies, for the accountability function of evaluation, but also contribute to learning processes of the involved stakeholders. Such approaches to evaluation has evolved for years and come under various labels, such as reflexive-, responsive-, participative-, interactive- or learning evaluations [1,2,20,28,50]. All such labels refer to a focus on learning and interactive dialogue as central to the work, but it is also calling for attention to empowerment of the involved, such as Guba and Lincoln argued already in 1989. Such an approach is experimented with in for instance Dutch land use based nature evaluations [28,50].

This article reviews accumulated practices in monitoring and evaluation of maritime spatial plans to provide guidance to administrators in monitoring, evaluating and revising their maritime spatial plans - in particular in the context of the implementation of the Directive 2014/89/EU on Maritime Spatial Planning (from here on MSP Directive). The main research question addressed is formulated as: "How can EU Member States improve monitoring and evaluation of the implementation of the MSP Directive?" The following sub-questions are formulated:

- What are the accumulated experiences with monitoring and evaluation of maritime spatial plans, with a focus on methods used and topics covered?
- What are the gaps in monitoring and evaluation of maritime spatial plans and how can these be bridged?
- What can be recommended to Member States for future monitoring and evaluation of the implementation of the MSP Directive?

This paper focusses on the European MSP Directive in establishing a framework for MSP, recognizing that there are different approaches to MSP across the globe [40,47,53]. These global experiences are not driven by the European MSP Directive but worth looking into. The review of experiences with M&E of maritime spatial plans is, therefore, not limited to Europe and includes experiences from Asia and the United States.

³ https://ec.europa.eu/regional_policy/sources/docoffic/2014/working/wd_2014_en.pdf

Table 1
Linkages between research questions and methods.

Research questions	Literature review	Interviews	Expert workshop
<i>Accumulated experience</i>	X	X	
<i>Gaps and how to bridge these</i>		x	x
<i>Recommendations for future M&E</i>		x	X

The key concepts Monitoring and Evaluation were defined in an iterative process, drawing upon the EU Better Regulation toolbox⁴ and expert feedback. Final definitions were the following:

- Monitoring is a continuous assessment that aims at providing all stakeholders with early detailed information on the progress or delay of the ongoing activities.
- An evaluation is a systematic and objective examination concerning the relevance, effectiveness, efficiency and impact of activities in the light of specified objectives. In the context of this study, we talk about ex-post evaluations, used by the European Commission to assess whether a specific intervention was justified and whether it worked (or is working) as expected in achieving its objectives and why.

2. Methods

To collect data and answer the research questions formulated above, the study made use of three different methods: literature review, interviews and expert workshop. It was assumed that monitoring and evaluation (M&E) of MSP is relatively new and, thus, that information on the available experiences is partly described in literature and partly undocumented. Hence, this combination of methods uses data from different sources. A review meeting was organised to validate findings from the literature review and the interviews with experts in MSP. Table 1 visualizes the methods used to provide data per research question. The methods are described in more detail under their respective headings below.

2.1. Systematic literature review

A structured literature review is conducted to provide context on the state of play for monitoring, evaluation and revision of MSP and/or of maritime spatial plans, and this is based on relevant scientific literature retrieved from Scopus published between January 2014 and December 2019. Scopus (<https://www.scopus.com/>) was selected being one of the two largest index and citation database on the market, with a wide coverage of scientific journals (Baas et al., 2020). It is used in various marine research publications (see e.g. Costello and Ballantine 2015; Martin et al., 2016; Chalkiadakis, Drakou, and Kraak 2022). Complementary to this, specific repositories, data portals and reports related to marine and coastal environments and MSP were also examined. This includes the reports available on the European MSP platform website, reports provided by UNESCO/IOC and reports available on the Commission's websites. Publications older than 2014 were not included because the MSP Directive was adopted in 2014.

The literature review was divided into the following steps.

- 1) In the first step, we made use of specific search terms to retrieve available literature. As a result, a long list of scientific documents

⁴ https://ec.europa.eu/info/law/law-making-process/planning-and-proposing-law/better-regulation-why-and-how/better-regulation-guidelines-and-toolbox/better-regulation-toolbox-0_en

Table 2
Characterisation of interview respondents.

Professional background	Gender		Country of residence
Academic/Research Institute	5	Male	7
Government	6	Female	4
Denmark (2), Greece (2), United Kingdom (1), Croatia (1), Belgium (1), Sweden (1), Finland (2), Ireland (1)			

Table 3
Characterisation of participants in the expert review workshop.

Professional background	Gender		Country of residence
Academic/Research Institute	5	M	9
Government	4	F	2
NGO	1	U	0
Other	1		
France (1), Finland (1), UK (1), Sweden (1), Italy (1), Bulgaria (1), Portugal (1), Ireland (1), Belgium (1), Spain (1)			

from Scopus and non-scientific documents from elsewhere was compiled, containing 244 records.

- All reports and scientific publications identified in step 1 were then assessed by the study team. Publications were scored according to their link with MSP, link to monitoring, evaluation and/or assessment and revision, and reference to methods used. For each criterion, publications received a score on a 1–4 scale (4 = very clear; 3 = clear; 2 = somewhat clear; unclear, 1 = uncertain). Inter-coder reliability tests were carried out on 30 out of 199 publications and showed limited variation in scoring. As a result of the reliability test, a limited number of publications were discussed and, where needed, scores were adjusted. This procedure enabled us to identify the most relevant reports and scientific publications. Hence, we proposed to include 17 reports and 26 scientific publications, with a minimum score of 11 points.
- All relevant documents, collected in the document databases, were scrutinised on the practices and methods used. Identified practices and methods were collected in a database, indicating author(s), source, publication year, geographical scope and links to the original documents.

2.2. Interviews

Explorative, semi-structured interviews with experienced practitioners and evaluators of MSP were conducted. DG MARE provided names of experts in maritime spatial planning. In the selection of interviewees, an equal distribution among experts from North and South European countries was sought; and a balance between academics and public officers. Europe's COVID lockdown (April 2020) proved a hurdle to reach experts. Nine interviews were conducted by Skype, while two experts gave written feedback on the questionnaire. Respondents remain anonymous in this manuscript. For a characterisation of respondents, see Table 2.

In the interviews, we critically discussed methods and practices used, and evaluated whether these are useful in evaluating the progress in implementing Directive 2014/89/EU and achieving policy goals formulated in other, related Directives. For respondents from countries with little experience with implementing the MSP Directive, questions were adjusted to enable a meaningful conversation on policy evaluation. The questionnaire used as a guideline in the expert interviews is presented in Annex 1. All experts received an overview of evaluation methods, product of the literature review. During the interviews, explicit attention was paid to the question how the European Commission can support the Member States with M&E of maritime spatial planning. Interviewees remain anonymous. The outcomes of the interviews were analysed by the study team and the analysis was presented and discussed in the expert meeting.

2.3. GAP analysis

A gap refers to a situation where no applicable method or tool exists to evaluate MSP against one of the formulated objectives. To identify gaps, we created a matrix, mapping the objectives in 2014/89/EU, related Directives and criteria for the content of the document, on the one hand, with the methods and practices identified, on the other hand. With the matrix, we scored the relation of each method against each MSP-related objective. The scoring system in the matrix has five levels: 0 - this method does not provide relevant data; 1 - this method might at best provide some insights; 2 - method is useful but additional methods are surely needed; 3 - method is useful, but might need additional methods to get a full comprehension; and 4 - method can be used and will provide enough info on its own. However, it should be noted that this scoring exercise required nuancing as some methods are only partially explored and presented in the reviewed publications, which may “under-” or “over-” estimate their real potential for addressing MSP objectives. Therefore, each method was scored against 22 objectives by five different researchers of the project team. Scores with large discrepancies were then discussed internally as to reach a consensus on a common score. The average of these scores was calculated and used as a final score to identify the overall compliance of the method with a given MSP-related objective.

2.4. Expert review workshop

Lastly, expert feedback was collected on the draft findings as to validate approaches taken, and to identify gaps and potential ways to address these gaps – including recommendations on monitoring and guidance that can facilitate the process. Feedback was gathered from a group of MSP researchers and practitioners from across the EU in an online workshop. The characteristics of participating experts are presented in Table 3.

In preparation for the workshop, the draft findings were shared among the experts together an assessment sheet to structure the feedback. During the workshop, the approach to the study was presented to the participants before opening discussions on the coherence, effectiveness, efficiency, equity and decision-making quality as well as existing gaps. These topics were discussed in two breakout groups as well as in the summarising plenary.

3. Results

The following paragraphs present the results of the analyses conducted, starting with results from the systematic literature review. These are followed by results from expert consultation, GAP analysis and the expert review.

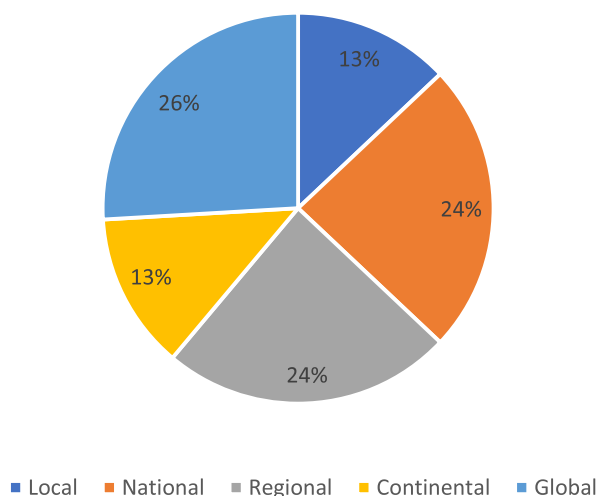


Fig. 1. Scale considered in literature (out of 69 studies).

3.1. Current practices of monitoring and evaluation

In total, 68 relevant studies were found in the scientific literature, that described practices for monitoring MSP. These were assessed in detail. The studies had a large heterogeneity in terms of spatial scale, seas and sectors covered as well as objectives and methods. Fig. 1 shows the spatial scales taken in the selected studies. In general, we found that global and continental level studies tend to address multiple or non-specified seas. On the other hand, regional and national level studies deal mostly with specific cases, which are mainly characterized by spatial-data driven assessments, for example in the Baltic [51] and North Sea [6].

Reviewing the geographical focus of the studies included in the literature review with a sea-basin approach, the following picture emerges (see Fig. 2). In 11 studies, the geographical focus is not specified – these typically are reflection papers that do not study implementation in a particular sea-basin (see for example [25,52,54]). The largest group of papers did discuss multiple sea-basins (see for example [5,42,48]), followed by publications with a sole focus on the Baltic Sea. The low number of publications on the Black Sea basin is explainable, as only two EU Member States border this sea-basin. The limited number of publications with a focus on the Mediterranean does not match with the large number of Member States bordering this sea basin.

The analysis of sectors included in the literature shows a rather even spread of covered sectors. Dealing with marine living resources includes studies on aquaculture [48] and fisheries [35], as well as a number of broader focussed studies [4,16]. Art 5 of Directive 2014/89/EU prescribes that Member States shall aim to contribute to the sustainable development of various sectors. The sectors that are subsequently mentioned re-occur in the overview (see Fig. 3). Desalination is covered in 7 publications (Including [39,54]) even though this sector is not explicitly mentioned in Art. 5 of 2014/89/EU.

Lastly, the literature review aimed to characterise the approach used in M&E of maritime spatial plans. First, we evaluated whether the reviewed practice geared towards monitoring, assessment or revision. We defined *monitoring* as a continuous flow of data and information providing all stakeholders with early detailed information on the progress or delay of ongoing activities.⁵ An *assessment* is the subsequent identification of the level of performance, whereas an *evaluation* determines the degree of compliance to previously set goals. A *revision* refers to a change that is made in maritime spatial planning, or the

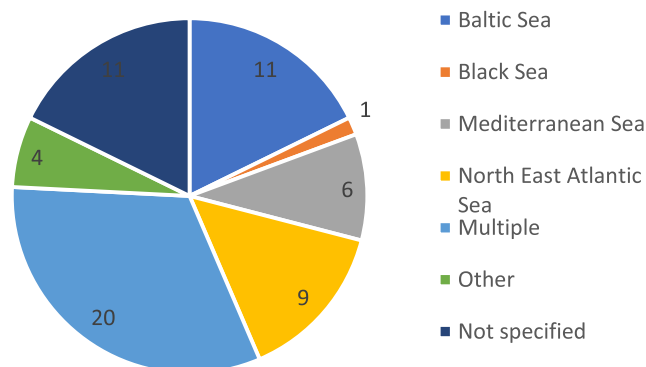


Fig. 2. Sea Basins focussed on in reviewed literature.

process of doing so.⁶ The next question was if the approach taken was qualitative or quantitative. Results are present below (see Fig. 4).

Overlooking the documents reviewed, most assess the implementation of the MSP Directive (30), some have a focus on the revision of maritime spatial plans (6) and only few have a focus on monitoring (3). It is noticeable that 20 manuscripts are characterised as taking an ‘other’ method. This group consist of a variety of manuscripts in which monitoring or assessment of MSP is the backdrop for, for example, the development of new indicators or serious games.

These results illustrate that dominance of qualitative assessment of the implementation of the MSP Directive. Only a few studies take a monitoring approach [13,31,49] and slightly more focus on the process of revising maritime spatial plans. It is noticeable that no purely quantitative practices were identified: in all the cases where quantitative methods were used, they were used in conjunction with qualitative methods (See among others [4,17,51]).

3.2. Methods used in identified practices

After the characterisation of the practices reviewed (as presented above), the study team examined the selected literature further to extract the methods used in these practices. In Table 4 below these are grouped and presented. This overview contains both methods used by academic research and in research for policy-makers, all with a focus on monitoring and evaluation of MSP.

The extent to which these methods are able to cover the various objectives of MSP is further discussed in the section ‘Gap analysis’.

3.3. Expert views on monitoring and evaluation of MSP

Below, a summary of findings based on the eleven expert interviews is provided. The summary presents relevant remarks from respondents, first generally on the approach and, next, on the methods used for M&E of MPS, stakeholder involvement and identifying gaps.

3.3.1. On MSP and approach to monitoring and evaluation

Regarding the approach to M&E, respondents agree that a holistic approach is required to respect the complexity of human-environment interactions, emphasizing the contribution of M&E to participative and cross-border learning. Working with multi- and transdisciplinary teams is recommended to avoid blind spots in the scope and nature of used methods. For a more effective evaluation of the implementation of the Directive, it must provide a clear distinction between M&E functions. Respondents highlight the continuous and systematic character of monitoring with respect to the process of data collection, descriptive analysis, and specific indicators. To them, evaluation refers to the

⁵ <http://web.undp.org/evaluation/documents/handbook/me-handbook.pdf>

⁶ <https://dictionary.cambridge.org/dictionary/english/revision>

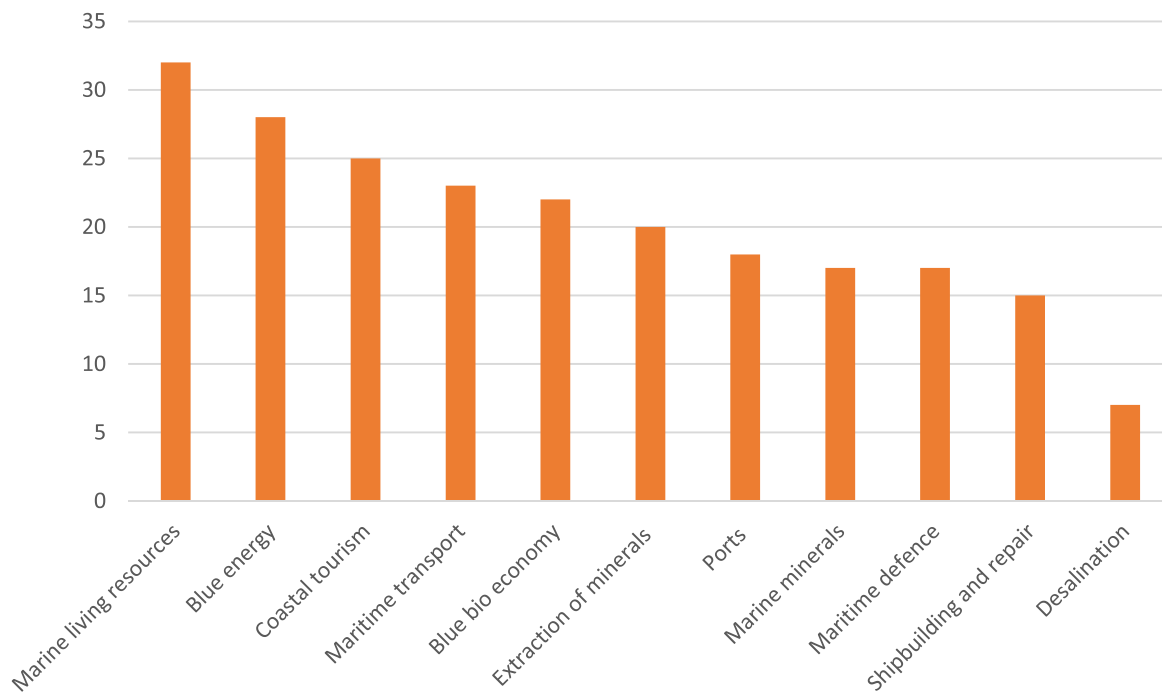


Fig. 3. Sectors covered in practices reviewed.

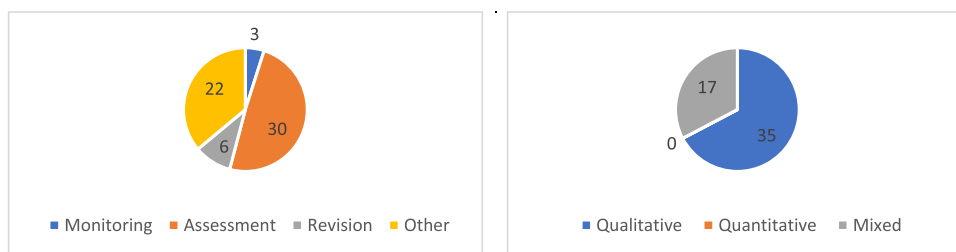


Fig. 4. Characterisation of methods used.

periodic process of reviewing progress in achieving objectives, as well as to the analysis of the degree of effectiveness of the approaches taken, in order to learn lessons for improvement.

M&E of maritime spatial plans cannot be seen apart from the MSP development phase in which a Member State finds itself. Respondents argue that national maritime spatial planning has two phases: the first phase refers to the transposition of EU regulation into national legislation (setting norms and priorities); the second the actual maritime spatial planning to comply with that legislation (implementation). Its implication is that the EU guidelines and objectives in the directives are not the reference for maritime spatial planning in each of the EU countries, but the reference for the development of national legislation to which MSP must comply. Additionally, they distinguished bottom-up and top-down approaches in maritime spatial planning by the different member states; which results in a different legal status of the national maritime spatial plans: in some countries the plans are legally binding, in others they are considered strategic instruments for regional development.

3.3.2. On methods used for monitoring and evaluation of MSP

Respondents identify five main analyses that are necessary in M&E of MSP, considering respectively the physical conditions; transformed spatial structures; demographic structure; social structure; and social and economic conditions.

Respondents observed two trends in the use of methods for monitoring and evaluation of MSP. First, there is a rise in the use of web GIS to

support interactive planning as decision support system with different functions: data collection; aggregation of data; and quality assurance on the data sets used, mainly meta-data that provide indicator pools of sustainability. Mostly the INSPIRE standards are followed. Second, the quantification of sea use effects on ecosystem services is gaining precedence, as indicators are developed to assess the supply of ecosystem services under different spatial configurations. This assessment includes the dependency of human activities on ecosystem services generated by the marine environment, that is, how human activities affect or benefit ecosystem services and vice versa. Indicators are pushed by the EPPS (Entry-Preparation-Plan-Strategy) framework for biodiversity and ecosystem services; or The Economics of Ecosystems and Biodiversity (TEEB) for the economic evaluation of ecosystem services.

The availability of an inventory and integration of methods used in the MS can add value to M&E by providing coherence and consistency between the different methods (or in the words of respondent quoted below: tools) from different disciplines and within a discipline (trans-disciplinary approach). “That way we all work on the better integration of the different tools so they are consistent and make sense when they are used in big projects that provide policy recommendations” (respondent 6). This does not suggest that there is one single method for M&E of MSP; the normative (ideals) and strategic objectives (country priorities) ultimately influence which methods are needed to perform the evaluation.

Table 4
Overview of methods retrieved from literature review.

Method	Description	Illustrative references
Sustainability Indicators for evaluation	Support the process of following-up on achievements made by monitoring and reviewing from a sustainability perspective	[8]
Integrated socio-economic and environmental assessment	Analysis aiming at evaluating and comparing the importance of maritime sectors for economic, social and environmental impacts	[23,38]
Evaluate monetary impact of MSP	Evaluation of how MSP benefits specific blue economy sectors, with the aim to feed the results into relevant EU policies and Competent Authorities in charge of implementing MSP	[14]
Economic input-output analysis	Evaluate the socio-economic importance of marine and coastal activities, by determining the (relative) impact of blue economy sectors or activities	[37]
Evaluation of legal framework	Assessment of the adaptive quality of the legal framework, required in the maritime space given its many interdependencies, changing needs, political landscape and evolving scientific knowledge	[45]
Evaluation of ecosystem services provided	Analysis of the provided ecosystem services, sometimes combined with an economic valuation of these services	[10,22]
Quantification of sea use intensity and conflict value	Evaluation methodology to assess how MSP addresses conflicts among various sea users and the conflicts between sea uses and marine environmental protection	[16]
Stakeholder participation assessment framework	Assessment of the degree of stakeholder involvement promoted by MSP authorities during the planning process as well as the consequences of these decisions	[42]
Cumulative impact assessment	(or cumulative effects assessment) Evaluation of the potential direct and indirect impacts of multiple maritime activities on the environment, quantifying generated pressures on the environmental components (in current and future scenarios)	[19,36]
Strategic environmental assessment	Integration of environmental aspects into the MSP assessment so that sustainable development is promoted	[26]
Generic M&E frameworks	Assessment directed at supporting planners, stakeholders and the public to conclude whether the jointly set MSP objectives have been met or plausibly will be met in the future	[49]
Spatial mapping (GIS based)	Spatial data standards and infrastructure, such as INSPIRE (Directive 2007/2/EC), to improve and strengthen the information management and data for MSP	[3]
Guidance for Ecosystem Based Approach	A balanced approach between development needs of the maritime sectors and the natural environment	[11]

3.3.3. On stakeholder involvement

There is a strong emphasis on the key role of the stakeholder in maritime spatial planning and the extent to which stakeholders have been able to make their voices heard in MSP, which should be evaluated as well. This starts with the identification of relevant stakeholders: "it is important, at least for our work, to first map the relevant stakeholders in different areas. The relevant stakeholders are not just the population living on the coast; the relevant stakeholders are all the stakeholders that are willing to work in marine areas" (respondent 6). This could mean people who are interested in the whole panorama of sea functions, from producing energy from the oceans; in shipping, fishing and aquaculture to maritime regulation; and coastal tourism.

Furthermore, there is an institutional dimension to stakeholder involvement; the extent to which involvement is facilitated varies among Member States according to their planning history, existing institutional infrastructure and traditions. How involvement is organized diverges from nationally organized stakeholder consultation giving feedback to maritime policies; to bottom-up evaluation of maritime spatial plans by regional councils. Such characteristics of the implementation of MSP in a country need to be considered in evaluation as well.

Finally, it is considered important to evaluate if stakeholders have the required skills to participate in the processes set-up. If not, training is considered pivotal in a broad sense of enabling stakeholders to have an informed say in decision-making, rather than making sure that people are merely informed.

3.3.4. On support from the European Commission

Respondents pointed to a need for support in translating the various EU Directives into practice: not only what to do; but how to do it. Once it is clearer what is expected from the Member States, it also becomes easier to evaluate if expectations are met. More specifically, there is a demand for more guidelines and best practices on how to implement the ecosystem-based approach to maximize its potential to provide transparency and democracy as an instrument to easily convey information on environmental resources to both (policy) decision makers and for the use of coastal communities themselves (that is, as an emancipatory instrument).

Further guidance on the approach and tools to use in M&E of MSP is deemed useful. A toolbox with description of methods to use in M&E can ease the process within MS and contribute to a more consistent approach across the different countries.

Another recommendation is to facilitate learning as integral part of MSP. Respondents observed that learning takes place when member states of a sea basin collaborate and interact on best practices. While such learning takes place at EU platforms set-up for that purpose, it is at a regional scale that member states around a sea basin benefit from a reiterative process in which countries acquire basic experiences to participate. The exchange of practices, the learning and the questions asked subsequently become more precise and detailed with each cross-country interaction, to the benefit of applied methods.

Respondents expressed caution to avoid that MSP M&E guidance and instructions are used to compare the different countries in evaluating their progress in maritime spatial planning. Social trust, generated by regular interaction and exchange of experiences may reduce such political sensibility. Experts indicated that people get to know each other quite well after years of close cooperation on a sea basin.

Finally, respondents remarked on the limiting factor of budget; observing that the extent to which MSP can be monitored and evaluated is determined by investment in data collection methods and architecture.

3.4. Gap analysis

To identify gaps in the methods used for M&E, a matrix was created, mapping the objectives in 2014/89/EU, related Directives and criteria for the content of the document with the methods and practices identified. In the matrix, we do not aim to evaluate each method on its merits, instead we scored the relation of each method against each MSP-related objective (see Table 5) to assess if progress on all objectives of the MSP Directive can be monitored and evaluated with currently used methods.

The scoring system in the matrix has five levels: 0 - this method does not provide relevant data; 1 - this method might at best provide some insights; 2 - method is useful but additional methods are surely needed; 3 - method is useful, but might need additional methods to get a full

Table 5
Results of GAP analysis (colour scale with dark green for maximum score 4 and dark red for minimum score 1).

	Sustainability Indicators for evaluation	Integrated socio-economic and environmental assessment	Evaluate monetary impact of MSP	Economic input-output analysis	Evaluation of legal framework	Evaluation of ecosystem services provided	Quantification of sea use intensity and conflict value	Stakeholder participation assessment framework	Cumulative impact assessment	Strategic environmental assessment	Generic monitoring and evaluation frameworks	Spatial mapping (GIS based)	Guidance for Ecosystem Based Approach
Art 5.1 Consider environmental, social and economic aspects	3.8	4	1.5	1.8	2	2.5	1.5	2	2.5	3.5	3.5	3	3.5
Art 5.1 Apply an ecosystem-based approach	2.3	2.3	1.3	1	1.3	3.3	1.5	1.8	3	3	3	1.7	4
Art 5.1 Promote coexistence of relevant activities and uses	3.5	3.5	2	2.3	1.7	2.3	4	2.8	2	2.5	3.5	2.7	3.3
Art 5.2 Contribute to the sustainable development of energy sector at sea	3.5	3.3	2.3	2.3	1.3	1.8	2	1.8	2.3	2.5	2.5	2	2.5
Art 5.2 Contribute to the sustainable development of maritime transport	3.3	3.3	2.3	2.3	1.3	1.8	2	1.8	2.3	2.5	2.5	2	2.8
Art 5.2 Contribute to sustainable development of fisheries	3.3	3	2.3	2.3	1.3	2	2	1.8	2.3	2.5	2.5	2	2.8
Art 5.2 Contribute to sustainable development of aquaculture	3.5	3	2.3	2.3	1.3	2	2	1.8	2.3	2.5	2.5	2	2.8
Art 5.2 Preservation, protection and improvement of the environment, including resilience to climate change impacts	3.3	2.8	1.5	1.3	1.7	3.3	2	1.8	3.3	3	2.5	2	2.5
Art 5.2 Promotion of sustainable tourism	3	2.8	2.3	2	1.3	2	2	1.8	2	2.5	2.5	2	2.3
Art 5.2 Sustainable extraction of raw materials	3	2.8	2.3	2	1.3	1.8	2	1.8	2.3	2.5	2.5	2	2.5
Art 6.2.a Land-sea interactions	2	2.5	2.3	1.8	1.3	2.3	1	1.5	3	2.5	2	1.7	2.3
Art 6.2.b Environmental, economic and social aspects (incl. safety);	3.5	3.8	2.3	2.3	2	2.3	1.5	1.8	2.8	3	3	2.3	3.3
Art 6.2.c Coherence between MSP and other processes, such as integrated coastal management	2	2.8	1.3	1	2.3	1.8	1.5	2.3	2.3	3	2	1.7	3.5
Art 6.2.d Involvement of stakeholders	2.3	2.8	1.3	1	1	1.5	3	4	2	1.5	3	1	2.8
Art 6.2.e Use of the best available data;	3	3.5	1.5	2.5	1	2	1	1.5	2	1.5	2	2	2.5
Art 6.2.f Trans-boundary cooperation between MS	2.3	2.3	1	1.5	2	1.5	2	2.5	2	2	2	2	2.5
Art 6.2.g Cooperation with third party countries	1.8	2.3	0.7	1.5	2.3	1.5	2	2.5	2	2	2.5	1.7	2.5

comprehension; and 4 - method can be used and will provide enough info on its own.

The GAP analysis highlights that the generic M&E methodologies, such as sustainability indicators and integrated sustainability assessments, have the potential to cover the majority of objectives and minimum requirements of the MSP Directive. Methodologies for assessment of the Ecosystem-Based Approach are applicable, covering all objectives and minimum requirements. These methods are data intensive and require substantial resources to make use of their full potential. Other methods are less broadly useable but can cover specific elements of the MSP Directive, e.g. methods to evaluate stakeholder participation or evaluate the promotion of co-existence. Starting from the objectives and

minimum requirements, it is noticeable that methods are less adapted to monitoring and evaluating how maritime spatial planning has dealt with Land-sea interactions, Transboundary cooperation and Cooperation with third party countries.

3.5. Review by experts

The review of the draft deliverables presenting the preliminary findings during the expert workshop uncovered a set of attention points for M&E of MSP. The evaluation step is mentioned by one expert as an afterthought in most planning processes, primarily driven by compliance reasons. This limits the ability to effectively review and learn from

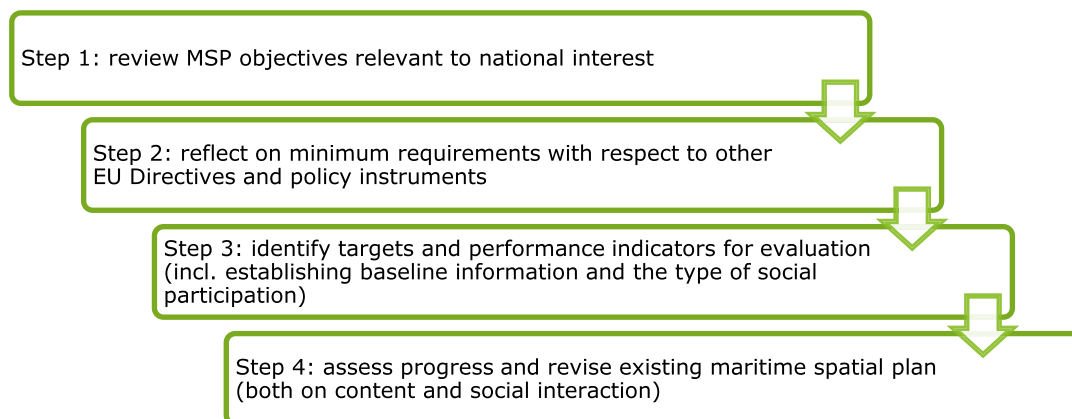


Fig. 5. Visualisation of guidance for assessment of MSP.

previous plans, which makes guidance and support for these processes strongly relevant.

In order to provide the highest possible value for planning practitioners, several features need to be considered in the M&E of MSP. Experts emphasized the importance of clear definitions, in particular of potentially overlapping terms such as monitoring, assessment and evaluation. This is necessary to avoid grey zones and misunderstandings between planners, stakeholders and the public.

Any guidance tool has to consider the fact that there are many different ways of performing MSP across Europe. Thus, it is impossible to capture all aspects in any single tool. A rigid prescription of one approach to evaluation and monitoring needs to be avoided. Rather, guidance needs to start from a higher level of generalisation to provide broader value for practitioners under various approaches to MSP. M&E needs to be inclusive to different cultures, economic sectors, environmental advocates, and academic disciplines. This arises from the mediating role of MSP in a context characterised by the need for cross-border or even multilateral sea basin-based planning of a broad range of interests.

Additionally, the importance of considering equity is highlighted by the experts. Due to the novelty of this concept in the MSP discussion, further guidance on how it can be integrated in the planning process and the development of indicators for M&E is needed. A definition and practical examples for equity considerations in the process and outcome are deemed necessary by the reviewers.

Lastly, the experts expressed that M&E should be communicated in simple ways that enable a broad range of stakeholders, including citizens, to understand the results. This ensures transparency and accountability of planners, which in turn is necessary to form the basis for revisions that improve the effectiveness, efficiency and equity of the MSP.

4. Discussion

4.1. Reviewed practices represent a myriad of different approaches

Reviewing the accumulated experience with M&E of MSP, based on literature review and expert input, one cannot but conclude that there is a myriad of different approaches and not one dominant approach. The reviewed practices are generally characterised as assessments and take a qualitative or mixed approach. Various different methods are used. While some methods have the potential to cover all objectives and minimum requirements of the MSP Directive, their application is resource and data-demanding. Lack of resources and data will compromise the applicability of methods such as “Integrated assessment” and “Cumulative impact Assessments”.

The variety of methods used is in itself not surprising, given that many European Member States have only recently implemented their first maritime spatial plan. Furthermore, the approach to MSP differs per country, even it originates from the same EU Directive (See e.g. the study by [47]). The requirement to evaluate maritime spatial plans at least once every 10 years does, however, justify a closer look into the recommended approach to M&E.

4.2. Rethinking the role of monitoring and evaluation of MSP

The development of activities at sea is influenced by a mix of different policies. Consequently, the achievement of a particular objective (e.g. the development of offshore energy) often cannot be attributed to MSP alone. Laurian et al. [30] acknowledges that the attribution issue is common in evaluation of plans given the absence of control groups, quasi-experiments, and statistical analysis that identify the independent effects of plans, as practiced in program evaluation. Cause-effect relationship between plans and materialized outcomes are difficult to identify and assess [7,21]. In the case of the MSPs, there has been no assessments of the situation at the start of the MSP, which then could be

compared to the situation after a certain period of time. A linear measure of cause-effect relationships is then hard to achieve.

One suggested approach to deal with the attribution issue is to take an empirical turn. Koch et al. [27] observe that, in the context of emission reductions, policymakers combine many different policy tools to achieve emission reductions. They introduce an approach to identify effective policy interventions in the EU road transport sector by detecting treatment effects as structural breaks in CO₂ emissions. This search for ‘causes of effects’ within a statistical framework allows them to conclude on the effectiveness of policy mixes. The question if it is this could work in the context of MSP, as this would require significant data-sets while still facing the challenge to deal with external drivers of ecosystem changes, such as climate change [43].

More fundamentally, the question is whether an exact conclusion on the contribution of MSP to achieving societal objectives is what is needed most. Martin [34] argues that policy-mix learning requires a shift from fragmented evaluation of the effectiveness of individual instruments [34] to more holistic evaluations, accounting for interactions among instruments in a complex policy context (multi-rationales, multi-level, multiactor) [32].

Following the feedback from respondents and the expert review, we argue that the purpose of M&E of MSP is not to provide a definitive one-dimensional answer to the question if MSP contributed to achieving a particular policy objective. M&E is of greater value if it can initiate and stimulate processes of social learning and empowerment of the involved. Reflexive or interactive evaluations could then be at the heart of the M&E. Organising M&E of MSP for the purpose of contributing to the creation of a dialogue space [33] could then allow a joint process of learning, where various stakeholders reflect on and jointly seek to improve MSP.

4.3. Considerations before starting M&E

In conducting M&E, the knowledge and skills of the evaluators, including their level of understanding of EU Regulations and Directives such as the MSFD (2008/56/EC), is of primary importance. The close interrelations between EU requirements often necessitate compliance across multiple directives, depending on the overarching objective of interest. The MSP Directive is only concerned with the planning and distribution of space between various sectors or users of the marine space. It does not specify exactly how the particular targets for the objective or objectives are reached, nor the EU requirements associated with developing the various sectors. If a Member State wishes to assign a marine area for aquaculture development, the MSP Directive specifies minimum requirements on considerations on land-sea interactions; economic, social and environmental as well as safety aspects; an ecosystem services approach; stakeholder involvement; promote coherence; use of best available data and cooperation with other countries. The MSP Directive does not, however, detail regulations on the alterations to natural habitats or indigenous species covered in the MSFD and the Biodiversity Strategy (COM(2015) 478), nor does it explore the requirements to water quality and pollution from excess nutrient and organic matter enrichment specified in the Water Framework Directive (2000/60/EC) and the Strategic Environmental Assessment (2001/42/EC). Therefore, evaluators need to be familiar with the requirements of other related EU Directives and Regulations.

Similarly, there are country specific and national legislations related to the overarching objectives and specific targets for individual sectors and users of the marine space. Due to the diversity and complexity of country specific legislations and policies, the guide cannot incorporate all processes particular to each Member State. In this case stakeholders from various ministries overseeing the sectors of interest, as well as stakeholders from the sectors and industries themselves, need to be involved in tailoring the guide to the aspirations and objectives of the Member State. The quality of the joint efforts to identify causes-effects and modes of improvements, is then pivotal to enhance the quality of

the MSPs. This search could then include both the physical effects (evidence based input) as well as the effects on the roles and interactions of the various stakeholders in the process and how these have changed due to the MSP-process.

4.4. Equity as emerging topic in MSP

While not explicitly mentioned in the MSP Directive, equity in the allocation of marine areas for use is highlighted as an important emerging issue for marine governance [29], stressed by expert interviews and in the expert workshop. Equity (and social justice) concerns are intrinsic to MSP. Some groups benefit more, or are perceived to benefit more, than others in terms of continued or new access to information and data, the decision making process, space and resources. The MSP Directive is critically evaluated as, it is argued, the implementation of the Directive privileges “stationary” users over mobile users [9,24,41].

M&E of MSP can and should address the issue of equity, questioning for example if there was a balanced and equitable representation of stakeholders during all phases of the development maritime spatial plans should involve. By that an equitable distribution of economic and social benefits and burdens can be stimulated. The engagement and selection of representatives should then be transparent in order to monitor and evaluate the participation. Recent advances in developing the concept of social sustainability have elaborated on three dimensions relevant in the context of MSP: recognition, representation and distribution [44]. These dimensions can be the basis for an approach to M&E of equity in MSP.

4.5. Guidance for future evaluators

Using the results from the systematic literature review, interviews and expert workshop, the following recommendations for M&E of MSP are formulated. For a successful approach to M&E of MSP, Member States are recommended to address the following questions:

1. Which maritime sectors have become important to the national MSP objective since the last review or the establishment of the MSP?
2. What considerations need to be made in order to comply with the minimum requirements set-out in article 6 of Directive 2014/89/EU, as well as other relevant EU Directives and policy instruments?
3. Which targets are appropriate based on the objectives selected and the indicators that are most relevant in assessing progress made to achieve those targets?
4. Which methods can assist in carrying-out points 1–3?

Taken together, answering these four questions can support the Member States in developing a systematic approach to M&E of MSP (see Fig. 5).

Under step 2, it is necessary to incorporate Member State obligations under prevailing EU Directives and policies – for example, the Common Fisheries Policy (1380/2013/EU); Marine Strategy Framework Directive (2008/56/EC); Strategic Environmental Assessment (2001/42/EC); Environmental Impact Assessment (2014/52/EU); Integrated Coastal Zone Management (COM(2013) 133); Biodiversity Strategy (COM (2015) 478); Water Framework Directive (2000/60/EC), Habitats and Birds Directives (92/43/EEC and 2009/147/EC); and so forth. An assessment of the state of the marine environment and habitats is needed to ensure conformity with the objective of the MSP Directive to take an ecosystem-based approach. To guide the development of targets and indicators, core principles are outlined to assist Member States in selecting the most appropriate targets and indicators. For example, targets should follow a SMART framework, and indicators should embody characteristics of good indicators [13].

5. Conclusion

Now that all Member States of the European Union are expected to have maritime spatial plans in place, it is time to look forward. Member States will have to evaluate and revise their plans in the coming years. This study evaluated and discussed the accumulated practice in M&E of MSP in order to formulate recommendations for improved M&E. The study concludes the following.

The review of practices, through literature review and expert consultation, identifies numerous approaches to M&E. Generic methods are often used, tailored to MSP by development of specific indicators and objectives. Next to this, a number of rather specific methods can be identified, with a focus on, amongst others, sea-use conflicts and economic benefits of MSP. The topic of equity is considered important in relation to MSP, yet no methods to evaluate the impact on equity exist. A dedicated toolbox with methods to use in M&E of MSP can support maritime spatial planners and contribute to the consistent use of methodologies in the EU.

M&E of maritime spatial plans is about more than the identification and use of best available methods. Respondents emphasize that the process of M&E requires sufficient skills and resources, for the evaluators and for the stakeholders that might be involved. It also requires an understanding of the numerous relationships between the MSP Directive and other European Directives, as well as with national legislation, policies and priorities. This is in line with the reasoning of Faludi [15] who argued that strategic spatial plans must be evaluated not primarily in the light of their material outcomes, but for how they improve the understanding of decision makers of present and future problems they face.

The EU can support Member States in monitoring and evaluating the implementation of the MSP Directive by offering guidance, including methodological guidelines, while acknowledging that the differences between Member States call for different approaches. The EU has supported Member States in the implementation of the MSP Directive before, amongst others through the MSP Assistance Mechanism. Taking into account that the MSP Directive itself “is without prejudice to the competence of Member States to determine how the different objectives are reflected and weighted in their maritime spatial plan or plans” (Art 5.3) providing guidance, is a thin line to walk on as Member States are wary of detailed reporting guidelines, leading them to become accountable vis-à-vis the European Union.

MSP takes place in a context of policy mixes in which linear cause-effect relationships are hard, if possible at all, to identify. The value of M&E is that it can improve the quality of MSP by instigating and structuring a participative processes with cross-sectoral and cross-border learning.

CRedit authorship contribution statement

S.W.K. van den Burg: conceptualization, methodology, writing original draft, writing review; M. Skirtun: conceptualization, formal analysis, writing original draft; O. van der Valk: investigation, formal analysis; W. Rossi Cervi: investigation, formal analysis; T. Selnes: formal analysis, writing, T. Neumann: methodology, investigation, formal analysis; J. Steinmann: investigation, formal analysis; G. Arora: investigation, formal analysis; P. Roebeling: conceptualization, methodology, writing review.

Data Availability

The data that has been used is confidential.

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