Technical Study ‘Maritime Spatial Planning (MSP) for Blue Growth’

Annex III.2: ‘Handbook on MSP Indicators Development’

(long version)

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1 INTRODUCTION

This Handbook was developed under the Technical Study 'Maritime Spatial Planning (MSP) for Blue Growth'. It aims to assist MSP authorities in their planning processes by providing suggestions on the use of MSP indicators. **It is additional to a short and operational version of the Handbook. This version is aimed at MSP stakeholders with interest in the overall theoretical framework of indicators, whereas the short version provides ready to use checklists and guiding questions.**

The purpose and limitations of the Handbook are presented in Section 1. Section 2 presents the role of indicators in the MSP cycle and an overview of the indicator development process. This process is followed step-by-step in Section 3 and in Section 4 the Handbook offers some examples of possible indicators. Section 5 provides references to further sources that may support the development of MSP indicators. Annex 1 presents examples of possible frameworks of indicators for key maritime sectors. As repeatedly highlighted throughout the text, the majority of these indicators extend beyond the control of maritime spatial planners, but are provided as an illustration of the 'Blue Growth' context to which MSP can contribute.

1.1 Purpose of the Handbook

The main objective of this Handbook is to provide suggestions on how to link MSP processes and Blue Growth through an indicator framework. In particular, the Handbook aims to provide the maritime spatial planning community with suggestions on the use of spatial indicators that could support the consideration of Blue Growth in MSP processes. The Handbook reveals both the opportunities and challenges of MSP in this regard. Specifically, MSP should not be considered as the only way of supporting Blue Growth and indicators should be seen as just one of the vehicles facilitating MSP process. **Linking MSP and Blue Growth via indicators is not straightforward** and may only be done with consideration for a number of limitations (presented in section 1.2) and in line with national, regional and even local context in each country.

The key maritime sectors, which are covered by this Handbook are listed below:

- Offshore wind energy;
- Tidal and wave energy;
- Coastal and maritime tourism;
- Marine aggregates;
- Ports and shipping;
- Oil and gas production;
- Pipelines and cables;
- Fishing;
- Marine aquaculture.

1.2 Limitations in the use of indicators

The indicators provided by the Handbook are designed to have an exemplary character. The indicators used will vary by Member State since they have to be adjusted to any national Blue Growth and MSP targets. Further limitations on the use of indicators in a MSP context include:

- Indicators are just one small part of complex MSP decision-making systems. They are only meant to support aspects of decision-making and should not become an end in themselves, or a policy "accessory" with limited added value. Furthermore, there are little one-on-one matches between the MSP and the achievement of an objective. This makes it difficult to select indicators that really indicate whether the MSP has been

successful or not. Most objectives depend on much more than on the decision to assign space for a certain activity, which creates an 'attribution' problem;

- Indicators should be customised to the specific Member State needs. In each country, the situation is different when it comes to MSP needs and processes, therefore indicators offer support to MSP authorities only if interpreted against agreed country-specific objectives and targets (e.g. level of ambitions of involving stakeholders or neighbouring countries in the planning process);

- MSP indicators are not tools for external evaluation. Instead, the main objective of the indicators presented in the Handbook is to provide MSP authorities with a tool for 'self-reflection' on the extent to which their objectives are achieved. The indicators can also help start the debate on achieving targets and subsequently adjust the targets, if considered unrealistic or out-dated due to changes external to the MSP process.

Indicators are useful as a decision-making support tool, but considering that they should be country specific, they are not meant to provide comparisons between countries on their progress in implementing MSP. The use of indicators for cross-country comparisons and external evaluations could lead to false conclusions and would negatively influence the MSP process in its function of encouraging debate between sectors and stakeholders.

2 ROLE OF INDICATORS IN THE MSP CYCLE AND OVERVIEW OF THE INDICATOR DEVELOPMENT PROCESS

2.1 MSP cycle and the potential role of indicators

Before presenting the indicator development steps, it is important to position indicators in the MSP cycle. This is a complex cycle, which is different in the various country/sea-basin contexts, but generally it starts with an analysis of the context, continues with definition of vision, further analysis, developing of solutions and drafting of a MSP, which is then implemented, evaluated, and adapted.[174] The table below provides a description of the role indicators can play in these typical MSP steps:

MSP step		Role of indicators
Step 1	**Assessing the context** and establishing the general framework – review of the existing policies affecting the coast and the sea	During the review of existing policies, look for objectives and targets that have already been set out for the specific coast and sea-basin. If specific enough, in the next MSP steps these can then be easily transformed into indicators, which could show long-term results of the MSP processes. Such existing objectives could be linked for example to nature conservation, or renewable energy production. An example of an overarching document at EU level is the Blue Growth communication, which sets the overall objective of harnessing the potential of Europe's oceans, seas and coasts for jobs and growth.[175]
Step 2	Drawing up **a guiding vision and objectives** – description of what is desired in the specific	The vision guides the overall MSP development process. At this stage, it is usually still early to define indicators. However, if the MSP process has

[174] Schultz-Zehden A. et al. (2008).

[175] European Commission (2012).

	area, i.e. the vision provides the preferred spatial use scenario	already resulted in defining broad (global) objectives, maritime spatial planners should consider if these can be linked to (impact) indicators. An example of such a global objective could be 'increasing wind power generation at sea'. In addition, since the vision should be agreed with stakeholders, indicators assessing the level of interaction with stakeholders and neighbouring countries at this stage can also play a role in the MSP process. It is important to note that both for Step 1 and for Step 2, the MSP objectives should be aligned to objectives that are already defined in other relevant policy documents, e.g. broader sea-basin strategies, terrestrial spatial plans, strategies for MPAs, relevant sectoral policy documents (for example in the sectors of transport and energy). **Indicators helping to reflect on the quality of interaction with stakeholders and neighbouring countries are also relevant for all further steps (2-8) of the MSP cycle.**
Step 3	**Refining the stocktake** – analysis of specific marine and coastal data	The objective of this step is to ensure use of all available and relevant data in the planning process. Thus, indicators may be used to gauge the quality and availability of MSP data.
Step 4	**Identifying issues and problems** – creating a map of spatial uses and conflicts	Indicators can be used at this step to self-assess the extent to which maritime uses and key (for the MSP process) characteristics of the sea are mapped. More importantly, indicators can be used to identify the severity of maritime conflicts and issues, e.g. by reflecting on the conflicted area and the intensity of conflicts or time required to take decisions on maritime construction permits. This analysis can provide baselines for the indicators, which are selected in Steps 5 and 6.
Step 5	**Developing solutions** – specification of objectives and application of analytical tools	At this stage, the global objectives that have been defined at Step 2 need to become more specific and operational. Once these objectives are defined, their corresponding indicators should also be defined, including specific targets, e.g. on limiting current or preventing future conflicts and reduction of time required to take decisions on permits. To a large extent, the definition of specific objectives is the first step in identifying indicators. If at this MSP step the objectives are still too broad, this would probably not allow identification of appropriate indicators.
Step 6	**Drawing up a plan** – setting out general criteria / policies for maritime uses, allocation of space and drafting of a specific planning document and map	Depending on the identified issues problems/solutions and their corresponding indicators, at this stage planners can determine indicators that should measure the assigning of space for specific purposes and the extent to which development criteria are set out. Indicators that correspond to all levels of objectives, included in the MSP, should also become a part of the plan itself.
Step 7	**Implementation and monitoring**	Indicators are the key tool for monitoring the progress of achieving objectives. Furthermore, stakeholder engagement is crucial, which is why,

		as mentioned above, indicators measuring dissemination of information and stakeholder engagement could also be useful.
Step 8	**Evaluation** – assessment of appropriateness of the MSP and the extent of achievement of its objectives	The monitoring of indicators in Step 7 provides key input for the evaluation of the achievement of MSP objectives. These are indicators, which are usually not within the control of MSP authorities, but are nevertheless useful in determining the expected and actual outcomes and impacts of MSP, i.e. the socio-economic and environmental benefits of planning.

Table 9 Link between MSP cycle steps and indicators

In the figure below, these steps are linked in a logical, but linear way, which does not always reflect the actual MSP development. Nevertheless, they offer a good framework that can be used to illustrate the link between MSP cycle and the indicators, which can be considered by MSP authorities.

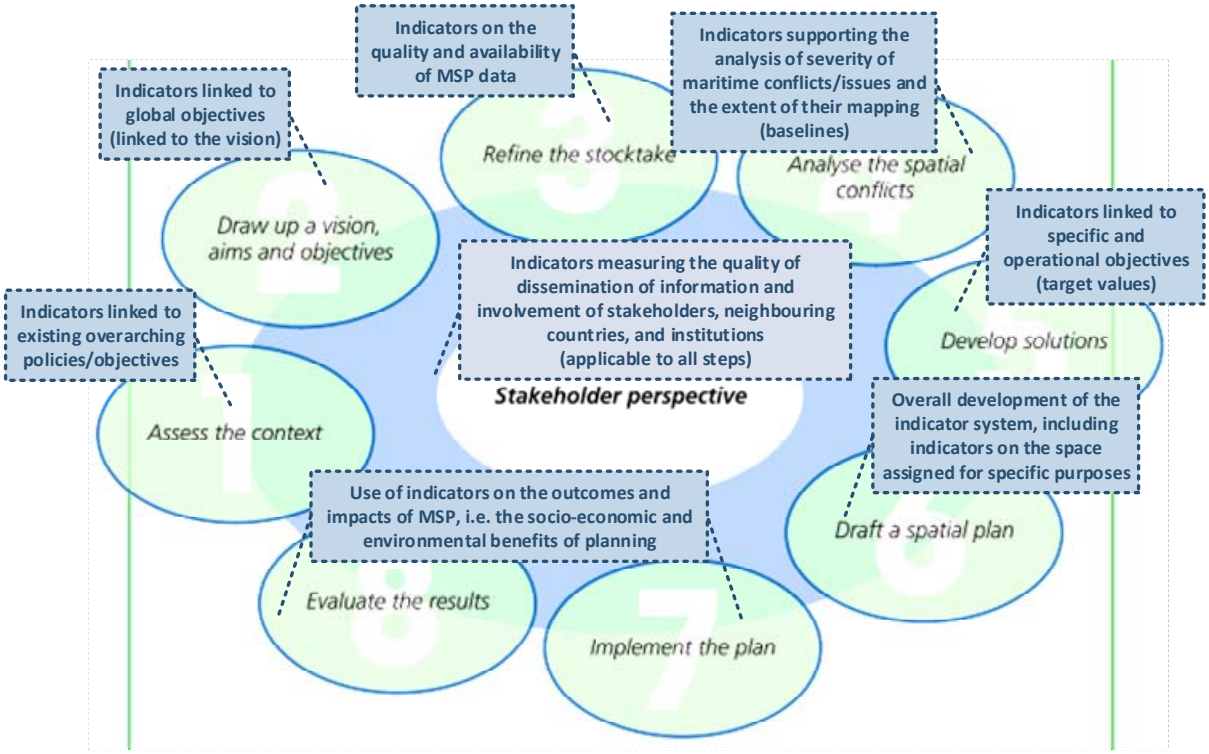


Figure 9 Link between indicator role and MSP cycle (adapted from Schultz-Zehden, Gee, Ścibior 2008[176])

2.2 Overview of indicator development steps and quality criteria

Indicators are usually defined as the measurement of an objective to be met, a resource mobilised, an effect obtained, or a context variable (EVALSED 2013[177]). They provide qualitative and quantitative information with a view to helping actors concerned with public interventions to communicate, negotiate, or make decisions. They should be relevant to

[176] Schultz-Zehden A. et al. (2008).

[177] EVALSED (2013).

policy objectives, based on reliable data, and SMART (see below). Indicators are not meant to measure all planning processes and outcomes, but rather the most important ones, which can (ideally) be quantified. Their number and diversity should neither exceed what can be managed, nor be less than what is necessary for a comprehensive system[178].

MSP indicators must fit the planning context, i.e. the needs addressed by MSP in a given country and national targets. This is the reason why indicators may vary across different countries and why one-size-fits-all solutions should be avoided.

The standard process of indicator development starts with the definition of objectives both for the planning process and for the outcomes of this process. The selected indicators should measure the progress in reaching these objectives. The indicator development process includes the definition of baselines and related target values, as well as the given sources of information, including the analysis of data coverage and gaps. Both during the preparation of maritime spatial plans, and once the maritime spatial plans are in place, progress in reaching the objectives is monitored with the help of the defined indicators. Depending on the progress of achievement of the targets and objectives, the objectives are likely to be redefined, which would trigger also a revision of the indicators. These steps are presented in the graph below and explained in Section 3:

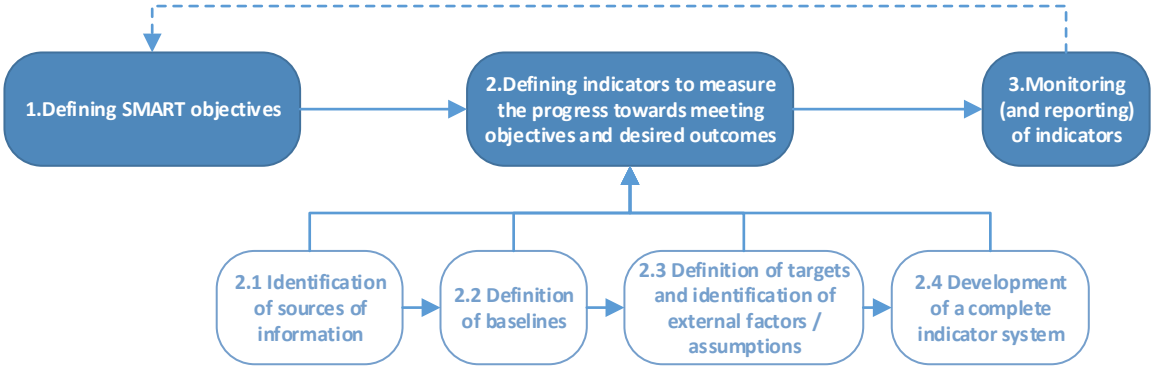


Figure 10 Indicator development process (adapted from Ehler 2009[179] and EC 2004[180])

There are diverse quality criteria, which may be applied when selecting indicators. These include:

- **SMART criteria** – indicators should be **S**pecific, i.e. concrete rather than abstract; **M**easurable through monitoring systems and ideally by existing tools; **A**chievable within the set time limits; **R**elevant to objectives; and **T**ime-bound, i.e. there should be a clear expectation on when the defined targets are expected to be achieved. These criteria are often used also for objectives (see Section 3.1)
- **Cost-effectiveness** – the cost of retrieving data should be justified and commensurate to the available resources for monitoring;
- **Normativity** – there should be a clear direction in which the indicators are expected to move should the planning be successful. In other words, what direction (increase, or decrease) would be considered as a success.
- **Agreement by stakeholders** – the criterion has three dimensions: quality, ownership, and provision of information. Stakeholders should be involved in the

[178] Carneiro, G. (2013).

[179] Ehler, Ch. and F. Douvere. (2009).

[180] European Commission. (2004).

design of indicator systems from the outset of the MSP process in order to ensure an additional quality check from their side. Furthermore, involving stakeholders ensures their recognition of the selected indicators and guarantees the involvement of stakeholders in their monitoring. A third argument for involving stakeholders in the definition of indicators is to address the likely need that some of them would need to provide information to feed in the definition of baselines, targets, and their monitoring throughout the MSP processes.

- **Simplicity** – indicators should be as simple and easy to understand as possible. Having indicators, which are too complex is usually counterproductive, because if stakeholders do not understand the meaning of indicators, they cannot contribute to their development and communicating them during MSP implementation has limited value.

3 INDICATOR DEVELOPMENT PROCESS

3.1 Step 1: Defining SMART objectives

Defining objectives is one of the steps in the MSP cycle and plays a critical role in improving MSP[181]. It is also inherently linked to the selection of indicators. Defining clear objectives allows easier identification of appropriate indicators, which should measure the level of achievement of the objectives. Thus, defining adequate objectives is the first step in identifying good indicators. Measurable objectives should ideally be linked to specific indicators at each step of the MSP cycle.[182]

In general, objectives should meet the SMART[183] criteria:

- **S**pecific – objectives should not be too broad, but rather concrete. For example 'protecting the marine environment' would be a very broad objective;
- **M**easurable – objectives should be defined in a way that allows their quantification: this criterion is directly linked to indicators;
- **A**chievable – the objectives should be attainable within the relevant time and contexts. The 'attainability of stated objectives must be considered in the light of the functions and role of planning in the broader context of marine management'[184];
- **R**elevant – maritime spatial planning should have influence on the defined objectives and they should be relevant to the identified needs;
- **T**ime-bound – the achievement of objectives should be set in a specific timeframe.

Notwithstanding the general requirement that objectives should be specific, it should be noted that they may have different levels, e.g. *operational*, *immediate*, and *global*. A representation of the different levels of objectives is presented in Fig. 3. It also includes *process* objectives, which are directly linked to the MSP processes. The overarching Blue Growth objectives, which are stemming from the Blue Growth communication[185] may also be included in this hierarchy, or alternatively, they can be considered at the level of global objectives. This is not to suggest that plans should have all the represented levels, but

[181] Ehler, Ch. (2014).

[182] Jay, St. (2017).

[183] Cormier, R., et al. (2015).

[184] Carneiro, G. (2013).

[185] European Commission (2012).

rather point out that MSP might refer and contribute to a wider framework. The choice of a structure that links the objectives depends on the hierarchy of the identified problems.

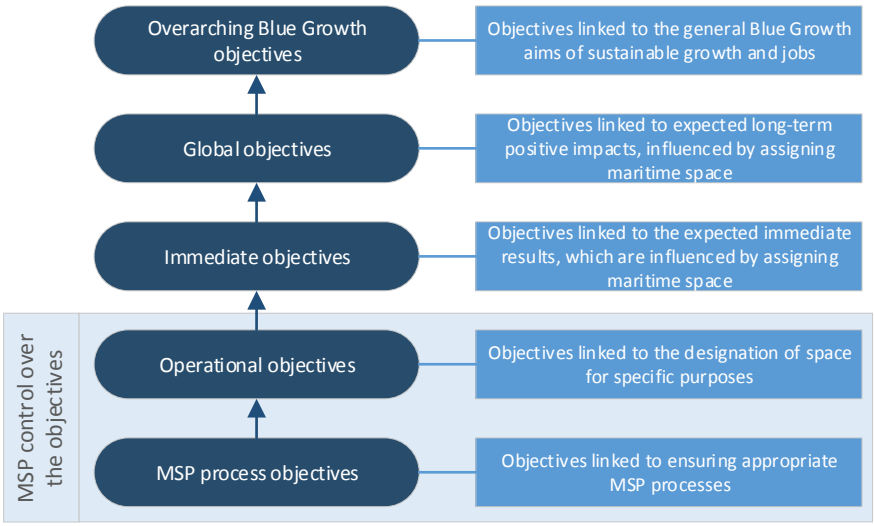


Figure 11 Links between objectives

It is noteworthy that only the MSP process objectives and the operational objectives are within the control of MSP authorities. All other levels show objectives that may be influenced by MSP, but not in a direct way. In the planning process, it is nevertheless worth considering these higher level objectives as they are usually linked to regional/national/EU strategies and policies, which set the MSP context. In the next sections, we provide examples of objectives at the different levels and their rationale, which may be considered by MSP authorities in their planning processes.

3.1.1 Overarching Blue Growth objectives

Blue Growth is 'an initiative to harness the untapped potential of Europe's oceans, seas and coasts for jobs and growth'[186]. It aims at creation of jobs and new sources of growth, while at the same time safeguarding biodiversity and protecting the marine environment. Thus, the Blue Growth objectives have two key dimensions: socio-economic (Increase jobs and gross value added) and environmental (Protect the marine environment and reduce greenhouse gas emissions). As mentioned above, these objectives may also be considered at the level of global objectives (described above). The definition of these objectives and their corresponding indicators is usually a responsibility of higher-level government bodies.

3.1.2 Global objectives

Global objectives are usually linked to long-term positive impacts. They extend beyond the scope of MSP, but they are useful nonetheless, because they show what kind of impacts may be influenced by MSP. Thus, the global objectives and impacts should also be considered during the planning process.

The global objectives would be different for the specific Blue Economy sectors, so below we provide a few general examples:

- Increase wind power generation at sea;

[186] European Commission (2012).

- Increase/maintain sustainable tourism in coastal and sea areas[187];
- Exploit stocks at maximum sustainable yield rate;
- Increase aquaculture production;
- Increase freight and passenger traffic via sea;
- Increase/maintain oil and gas production at sea;
- Increase/maintain marine aggregates extraction;
- Increase transportation of X through pipelines/cables.

As already mentioned, increasing yield/production/freight is an objective linked to effectiveness, but not to potential efficiency gains that MSP can deliver. For example, instead of increasing aquaculture production, or freight, authorities may aim at decreasing their costs through better use of maritime space. Increasing output and decreasing costs are of course not conflicting objectives and can be pursued in parallel.

3.1.3 Immediate objectives

These objectives stem directly from the operational objectives. They show the immediate results of assigning maritime space for specific purposes or setting out criteria for specific uses. Thus, it is important to note that immediate objectives already extend beyond the reach of MSP authorities. In general, they aim at decreasing incidents/conflicts and increasing capacity in a specific Blue Economy sector. Depending on the sector, increasing capacity is not always possible and/or desirable, e.g. in the sectors of Fishing or Oil and gas production. In those cases, maintaining, or even reducing[188] capacity can also be considered as a specific objective.

Examples of Objectives	Rationale
Increase / maintain positive outcomes in [Blue Economy sector X] to a sustainable level	These objectives are specific to the particular Blue Economy sectors. For example: • 'Increase wind power generation capacity at sea' • 'Increase / maintain oil and gas production capacity at sea'
Decrease spatial conflicts	This objective stems from another underlying need addressed by MSP – decreasing spatial conflicts. These conflicts may be between current, but also future human activities and nature.
Increase investment security	This objective targets the need to reduce project-planning time and to provide assurance to potential investors that certain areas are assigned for a specific Blue Economy sector.
Decrease shipping accidents	This objective is linked to the standard need to always increase safety of shipping.
Decrease oil spillages	Need to reduce pollution from oil spillages from shipping accidents.
Decrease project planning time	Need to reduce the time required to take decisions on maritime construction permits and

[187] It should be noted that this is a general objective. In practice, planners may prefer to encourage sea tourism rather than coastal tourism, or vice versa.

[188] E.g. a MSP plan could include target aiming to reduce oil and gas extraction in areas prone and vulnerable to subsidence or reduction of fishery activities if pressure on fish stock is particularly high and to ensure stocks are exploited at the maximum sustainable yield

	the number of legal claims related to conflicting permits

Table 10 Immediate objectives (examples)

3.1.4 Operational objectives

The operational objectives are linked to the outputs of the MSP process, i.e. they deal with the actual designation of space for specific purposes, which is performed in the maritime spatial plans.

Examples of Objectives	Rationale
Ensure maritime space for [Blue Economy sector X[189]]	Need to assign space for specific Blue Economy sectors, depending on their technical requirements and policy direction of the MSP. For example: • 'Ensure maritime space for wind energy at sea' • 'Ensure maritime space for the offshore oil and gas industry'
Establish criteria for sustainable development of [Blue Economy sector X]	Need to set out constraint / conditions / criteria for specific sectors, to ensure their integration with other sectors and environmental assets
Designate marine protected areas (MPAs)	Need to meet the obligations linked to the Convention on Biological Diversity, the Habitats Directive, and the Marine Strategy Framework Directive
Ensure multi-use of marine space in line with national targets	Multi-use can overall be considered as an underlying objective, but it also depends on the national contexts and targets.
Create the conditions for future generations to meet their own MSP needs	This is another underlying objective as when assigning maritime space it should be done in a way that considers also the potential needs of future generations.
Safeguard access to natural, historical, archaeological, religious, spiritual, and cultural sites	MSP processes should not lead to obstructing sites, which represent significant interest in terms of natural and/or cultural heritage.
Consider the availability of grid connections needed for offshore energy installations	Installing renewable energy installations (e.g. wind arrays) *at sea* should also take into account the availability of the necessary energy infrastructure *on land*.

Table 11 Operational objectives (examples)

3.1.5 MSP process objectives

These objectives are not classical policy/planning objectives. Instead, they are linked to ensuring appropriate MSP, i.e. planning process that is based on interaction between sectoral stakeholders and sufficient information.

Examples of Objectives	Rationale
• Ensure cooperation between relevant national authorities (national	Need for coherent planning at national level, i.e. need to ensure national policy coherence

[189] The table includes typical indicators, which can be further customised to particular sectors

governance dimension) • Disseminate information	
• Ensure coherence with plans of neighbouring countries • Disseminate information	Need for coherent planning at cross-border level
• Ensure stakeholder input / involvement • Disseminate information	Need to develop processes that engage a range of stakeholders and to allow them to express potentially conflicting interests in a timely manner
Ensure use of available / relevant data in MSP	Need to follow a multi-disciplinarily and robust science-based approach to support MSP decision-making
Ensure mapping of uses and key characteristics of the sea	Need to support the analysis of compatibility and conflicts between different current and future uses through maps showing: • important areas for each use, key interest for uses, suitable areas for uses, areas with diverse and potentially incompatible uses • the key characteristics of the sea include ecological, environmental and oceanographic specifics, e.g. mapping of sea habitats or nursery areas.
Take stock of the resources assigned to MSP processes	Need to make sure that there are sufficient financial / staff resources assigned to the planning process.

Table 12 MSP process objectives (examples)

The dissemination of information/awareness raising is considered as a standard (horizontal) objective that contributes to the transparency of the entire MSP process.

3.2 Step 2: Defining indicators

3.2.1. Step 2.1 Definition of the links to objectives and the indicator structure

The second step after defining the MSP objectives is the identification of indicators, which can measure the progress in their achievement. The different levels of objectives require different levels of indicators and the figure below (Fig. 4) presents a structure of indicators, which provides a generic structure linking MSP objectives and indicators. There is no uniform understanding on the structure and definition of indicators. For example, the Handbook for Measuring the Progress and Outcomes of Integrated Coastal and Ocean Management (Belfiore et al. 2006[190]) makes a distinction between the following **levels**: inputs, processes, outputs, and outcomes. Due to the difficulty of discerning between inputs and processes and in alignment with other standard indicator guidance (World Bank (2013)[191] and EC guidance (EVALSED[192]), this Handbook suggests merging input and process indicators. The visualised structure has five levels, but in case MSP authorities choose a hierarchy of objectives with just 2-3 levels, than the indicator structure should

[190] Belfiore, S. et al. (2006).

[191] World Bank (2013).

[192] EVALSED

also mirror this choice.

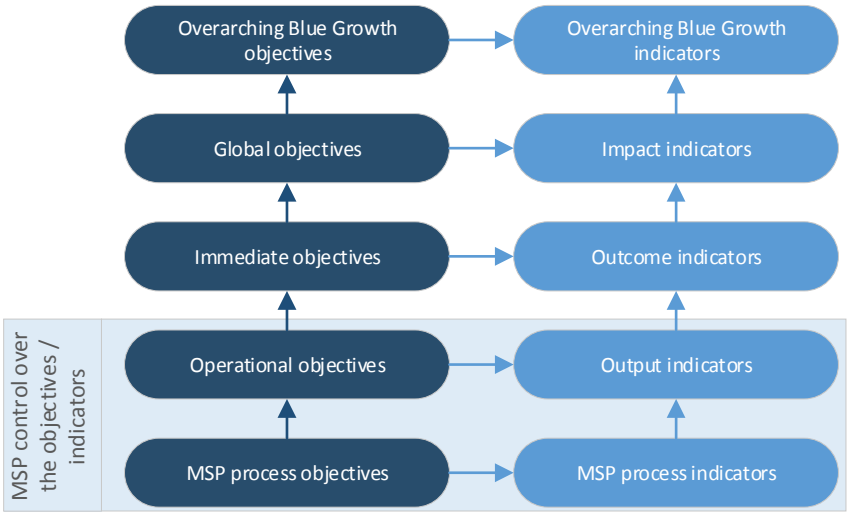


Figure 12 Link between indicators and objectives

It is important to note that MSP can create spatial preconditions for Blue Growth, but other policies are also necessary to complement MSP efforts. Thus, MSP authorities should pay particular attention to the extent to which they can influence different socio-economic and/or ecological benefits, i.e. **their control area**. It is logical that MSP authorities focus on objectives and indicators, which are within their control area. The progress in reaching the overarching Blue Growth objectives/indicators should not be entirely and directly attributed to MSP. The progress in reaching the global and immediate objectives and their corresponding indicators is also outside the control of MSP. The control of MSP authorities over the objectives and their relevant indicators is limited to the MSP processes and their operational objectives/outputs. These considerations are important when MSP authorities develop their indicator systems. This is why they are also reflected in the table below.

Another important notion that MSP authorities should consider in the design of their indicator systems are the different **MSP dimensions** that indicators have. Building on previous work by Ehler (2014)[193], they can be organised into three types: MSP process (following key MSP stages)[194], socio-economic (reflecting socio-economic benefits of human activities), and ecological indicators (monitoring key characteristics of the marine environment). It is noteworthy that these dimensions are not strictly delineated, i.e. they could partially overlap. For example, this is the case with the indicator "Shipping accidents", because the objective of decreasing accidents at sea has both socio-economic and environmental dimensions. It should also be mentioned that accidents indicators do not only apply to shipping, planners may also have objectives and corresponding indicators on reducing accidents in mining, oil and gas extraction, or on any offshore installation.

The table below provides possible indicator levels, their MSP dimension, rationale, and examples.

[193] Ehler, Charles (2014).

[194] The MSP governance indicators suggested by previous studies are a broad group that includes inputs, process, and outputs, which could be confusing. This is why instead of broad governance indicators, we propose MSP process indicators, which include only inputs and do not include the outputs of the planning process.

Objective level	Indicator level	MSP dimension	Rationale and examples	Within the control of MSP authorities
Overarching Blue Growth objectives	Overarching Blue Growth indicators (long-term impacts)	Socio-economic / Ecological	Indicators linked to overall Blue Growth objectives such as sustainable job creation, economic growth (gross added value), and greenhouse gases (GHG) reduction. These indicators are affected by a host of factors, which are external to the MSP processes, which is why they are mostly useful as an element of the context. As explained above, the definition of these objectives and their corresponding indicators is usually a responsibility of higher-level government bodies.	Overarching Blue Growth objectives
Global objectives	Impact	Socio-economic / Ecological	Usually these are longer-term results, which are linked to global objectives. For example: • MW of wind power generated at sea • Tonnes of live weight of aquaculture production • Yield per NM^2 (square nautical miles) • Million cubic meters of aggregates extracted per year	Global objectives
Immediate objectives	Outcome	Socio-economic / Ecological	Results sought by authorities, which are directly or indirectly linked to output indicators. For example: • MW of wind power generation capacity installed at sea • Capacity of oil / gas installations at sea • Length and/or capacity of pipelines operated • (decrease in the) Volume of accidental oil spills due to shipping accidents • (decrease in the) Time required to take decisions on maritime construction permits • (decrease in the) Maritime area with intense spatial conflicts out of the overall maritime space	Immediate objectives
Operational objectives	Output	Socio-economic / Ecological	Output indicators should be a direct product of the MSP processes, which can have effects in different socio-economic and ecological dimensions. For example: • NM^2 (square nautical miles) assigned to specific sectors	Operational objectives

			(e.g. wind energy) • Maritime space assigned for tidal energy installations out of the suitable (in economic and ecological sense) space • Space assigned for marine protected areas (MPAs) • Maritime space assigned for multi-use out of the overall maritime space (and/or out of the assigned maritime space) • Policies / statements developed intended to ensure cross-sectoral integration – qualitative • Extent to which development criteria are set out - qualitative	
MSP process objectives	MSP process	MSP process	These are indicators, which capture the main MSP processes. They can be both quantitative and qualitative, for example: • Consultations with key stakeholders held during all MSP stages (planning, development, implementation, Monitoring and Evaluation) – qualitative (yes/no), or quantitative (number of) • Consultations held with neighbouring countries, which are relevant to Blue Economy sectors – qualitative (yes/no), or quantitative (number of) • Consultation across government departments intended to integrate policy concerns – qualitative (yes/no), or quantitative (number of) • Consultations across different sectors held – qualitative (yes/no), or quantitative (number of) • Stakeholder satisfaction level - quantitative • Outreach of stakeholder communication activities - quantitative • Maritime space covered by a regional planning register (inventory) of coastal and maritime uses and pressures - quantitative • Maritime space mapped and showing coastal and maritime uses (and pressures) - quantitative	MSP process objectives

			• (various) Sectors/uses covered by MSP – qualitative (yes/no), or quantitative (number of) • Financial resources assigned for MSP processes – qualitative (yes/no), or quantitative (Euro) • Availability of sufficient staff assigned to MSP processes – qualitative	

Table 13 Overview of the indicator structure and examples

The examples above show that indicators can be defined for specific sectors and across specific sectors. At the level of MSP process and overarching Blue Growth, indicators are cross-sectoral, while at the level of impact, indicators are sectoral. The other two categories (output and outcome) are a mix of both sectoral and cross-sectoral indicators. The logic in this presentation is that MSP processes affect all sectors and Blue Growth is a combined effect of all Blue economy sectors.

The objectives and indicators, presented above, follow a logic, which in the MSP and Blue Growth contexts may have the following elements:

(1) Comprehensive and engaging **MSP processes** result in
(2) **Assigning maritime space**, which may lead to
(3) **Increasing, or maintaining the capacity** in a certain Blue Economy sector within sustainable limits[195], which in turn may result in
(4) **Increasing, or maintaining** yield/production in a certain Blue Economy sector within sustainable limits, which is expected to contribute to
(5) **The overarching Blue Growth objectives (growth and jobs)**, while
(6) Ensuring **environmental protection**

These elements and the links between them and the objectives/indicators are visualised below.

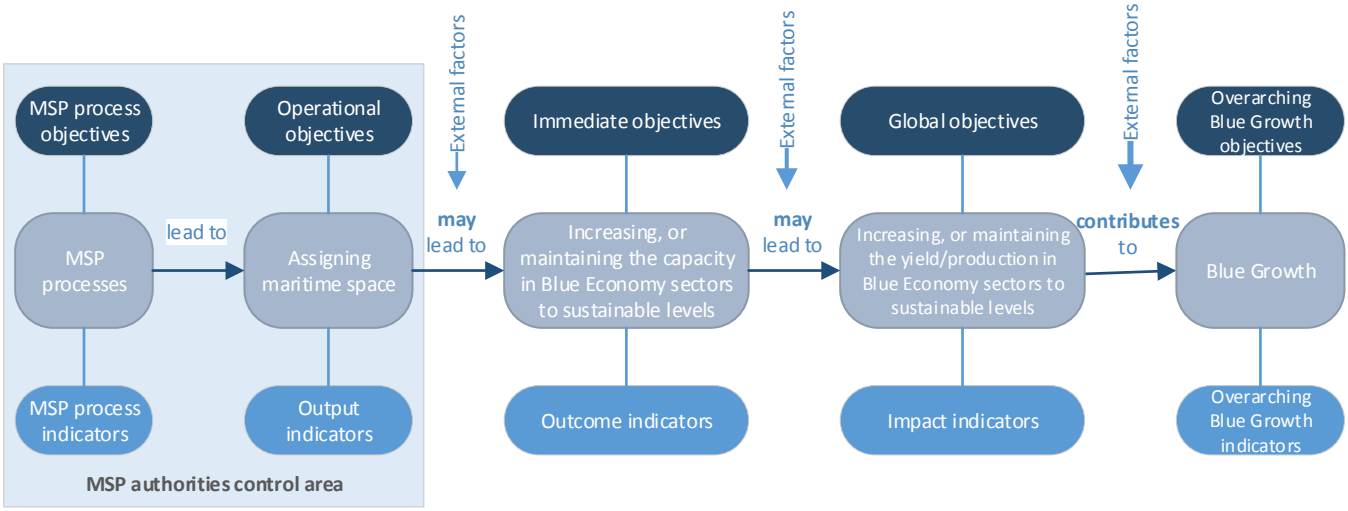


Figure 13 Objectives and indicator chains in the MSP context

The figure above follows a linear logic, which aims at simplifying the complexity of MSP. It is meant to provide an overall framework that supports MSP authorities in selecting a

[195] As mentioned above a target considering a sector reduction might be in principle possible within MSP for environmental reasons, i.e. increasing, or maintaining capacity is not always applicable.

structure of indicators that fits best to their needs. As mentioned, the choice of indicator levels is linked to the levels of objectives identified in the MSPs. For example, if they do not have global objectives, then there is no point in including impact indicators.

It is important to note that the presentation on the figure focuses on effectiveness (i.e. increasing production), but does not show the efficiency element of MSP (i.e. decreasing costs for planning and production). At the level of outcomes, this can be considered, for example, through an indicator measuring the reduction of time needed to issue construction permits. There could be increased yield/production (impact) without increase in capacity (output), if more suitable space is assigned, for example for marine aquaculture. This is why MSP authorities may also consider efficiency indicators, e.g. yield per nm^2, or MWh offshore wind energy generated per nm^2 covered by installations. Usually monitoring and consequently indicators, which are its main tool, focus on effectiveness rather than efficiency. Instead, efficiency is assessed through additional analysis/evaluations that may also consider alternative use of space instead of relying solely on indicators.

The figure also shows the MSP authorities control area. It comprises the first two steps, i.e. the MSP process objectives/indicators and the operational objectives/output indicators. The immediate and global objectives and the indicators linked to them are influenced by MSP decisions, but are also affected by many external factors. For example, assigning space for wind farms may lead to the installation of wind farms (depending on investment priorities of different public/private stakeholders), which is expected to result in increasing the overall wind power generation (even though the link between installed capacity and increased power generation may not be straightforward). The increase in renewable electricity production is expected to contribute to the sustainable growth of the coastal areas. The graph and the example show that the further one goes up the objectives/indicators chain the higher the influence of external factors becomes.

Tips:

- Aim for a limited number of indicators, ideally stemming from a limited number of objectives.

- Ideally, indicators should be based on a logical model (as the one presented on Figure 5), but MSP authorities should not create 'a false model or false relationships amongst the indicators'[196].

- Avoid indicators, which are too costly to monitor.[197]

3.2.2. Step 2.2 Identification of sources of information

The availability of information is a key factor to be considered by the MSP authorities in the process of selecting indicators. Even in the case of specific and relevant indicators, if there is no information to support their definition and monitoring, they would not be measurable. As a general rule, MSP authorities should aim to use secondary, i.e. existing, sources of information for the indicators. As mentioned in section 2.2., in some cases MSP authorities will be dependent on data from stakeholders, which is why securing their active participation in the process would facilitate subsequent data collection efforts[198].

The table below provides typical sources available for the different types of indicators:

[196] Belfiore, S., et al. (2006).

[197] World bank (2013).

[198] Ehler, Charles (2014).

Indicator level	Usual sources of information
Overarching Blue Growth indicators (long-term impacts)	National statistics institutes and Eurostat provide information on: - Employment in coastal regions - Gross Added Value in coastal regions Another source of information on indicators related to growth and employment could be macroeconomic models (e.g. HERMIN-based models) to the extent that their inputs and outputs can be customised to the MSP needs. Since MSP authorities are not expected to gather such information themselves, they could use reports with results of such modelling exercises produced by other institutions. Reports on GES and the MSFD descriptors can provide insight into the ecological dimension of Blue Growth.
Impact	Impact indicators should rely as much as possible on **official statistics**: - National statistics institutes, e.g. on 'MWh of wind power generated at sea' - Eurostat, e.g. on 'Nights spent at tourist accommodation establishments in coastal areas' In case official statistics are not identified, some **studies** may also provide information for impact indicators. In addition, Strategic Environmental Assessments (SEA), Territorial Impact Assessments (TIAs)[199] as well as Environmental Impact Assessments (EIAs) may also provide information on specific impacts. Ideally, TIAs should link output, outcome, and impact indicators in a systematic way, which is why planners are encouraged to use this tool.
Outcome	Typical sources of information for this type of indicators are **a mix of official statistics and information from authorities/other stakeholders**: - Official statistics – e.g. 'Number of establishments, bedrooms and bed-places in coastal areas' (Eurostat), or 'Gross tonnage of fishing fleet' (Eurostat) - Stakeholders – the input of stakeholders is rather important with respect to the identifying the number, area, and intensity of spatial conflicts - Information from other authorities, e.g. on the number of 'Legal claims related to conflicting permits', or on the number of 'Shipping incidents' - Units within the MSP authorities and/or other authorities, e.g. on the 'Time required to take decisions on maritime construction permits' - EIAs; SEA; TIAs where available - Studies – e.g. a study on the million cubic meters of aggregates extracted per year
Output	The sources of information for this type of indicators are expected to be **mostly the MSP authorities**: - MSP plans – on indicators showing the assigned areas, e.g. 'Maritime space assigned for wind farms' - MSP inventories, maps, registers – on indicators, which also take into account the available space, e.g. 'Maritime space assigned for wind farms out of all the available maritime space' - Information from other authorities – on indicators that consider land-sea interactions, e.g. 'Level of availability of grid connections' - Information/studies from stakeholders – this could be, for example, a study on the space needed for wind farms, which will

[199] TIAs are an assessment tool, which is usually applied at the planning stage of large-infrastructure projects (e.g. pipelines, offshore wind farms) and includes an assessment of alternative locations.

	inform the development of an indicator on 'Maritime space assigned for wind farms out of the needed space for X number of wind farm installations'.
MSP process	The source for these indicators are the **MSP authorities themselves**, as they have information on the stakeholder consultations, involvement of national/regional institutions, neighbouring countries, and communication activities. This information is usually contained in: - Minutes of meetings and participant lists - Website statistics (e.g. on number of visits) - Brochures, newsletters, flyers - HR statistics Stakeholder satisfaction surveys (if performed by MSP authorities) during and/or after the consultations also provide information for the MSP process indicators.

Table 14 Indicator sources

For the higher level indicators (outcome, impact, Blue Growth) the information is largely available from official statistics. For the indicators, which are within the control of MSP authorities (process and outputs), the sources of information are expected to be input from stakeholders, existing studies, and the authorities themselves.

Tips:

- In the identification of sources, consider if they provide data/information that is at the right geographical level, up-to-date, and available at the desired frequency.

- The sources of information on indicators should be cost-effective. If the information is not readily available and its retrieval is expected to be costly, there should be a very good case for using additional resources to retrieve this information. Keeping a contingency budget for retrieval of additional information can be considered a good practice.

- In general, indicators should be based on official (validated) data and information as much as possible. This increases their trustfulness, also within a stakeholder consultation process.

3.2.3. Step 2.3 Definition of baseline values

After linking potential indicators with objectives and having identified sources of information for the indicators, MSP authorities could define the baseline values of these indicators. A baseline is the initial value against which indicators are subsequently measured. There are two main concepts of baselines[200]:

- Static – a value of an indicator at a certain reference point in the past, or in the present;
- Dynamic – a value based on a baseline scenario, which requires a projection on how the value of the selected indicator would develop without MSP.

If feasible, the MSP authorities could aim at identifying dynamic baselines, but in most cases, it is expected that they would follow the static approach and the baselines will be measurements of the current/past state of a particular indicator in a specific country/sea-basin.

The objective of baselines is to put the objectives and targets into perspective, thus facilitating the interpretation of the achievements. For example, if a maritime spatial plan aims at decreasing the number of shipping accidents, identifying the baseline value would provide information on the severity of the problem and the positive effect that MSP is

[200] European Commission (2006).

expected to bring.

It is not always possible or necessary to have a baseline for each indicator. This table explains for which types of indicators they are needed.

Indicator level	Baselines
Overarching Blue Growth indicators (long-term impacts)	Baseline values for these indicators are recommended and should be based on the latest available information.
Impact	
Outcome	
Output	Baselines can be taken from a preceding generation of MSPs. It is possible that for some countries there is no preceding MSP and/or there are no similar indicators in previous plans. In such cases, the baseline could either correspond to the current use of the sea, or it could be set at '0', if such information is not available.
MSP process	Some baselines can be taken from a preceding generation of MSPs, but only after careful due consideration. For example, an indicator like 'Consultations held with representatives of specific Blue Economy sectors', might have been used during a previous planning process. However, previous MSP processes may not be relevant for an indicator like 'Different ministries attending consultations with neighbouring countries' in case there has been an institutional reshuffling. Setting a baseline of '0' is also possible for MSP process indicators, but this depends on the choice of indicators. For example, a baseline for 'Stakeholder satisfaction level' set at '0' does not provide meaningful information. Thus, it is better not to include a baseline for this indicator, or to use a value from a previous maritime planning process.

Table 15 Indicators – baselines

Tips:

- The process of quantification of a baseline is a quality check on the measurability of an indicator

- A baseline of '0' is preferable to a baseline that is not properly defined. If the concrete value cannot be determined, ranges may also be used.

- The baseline year should be as close as possible to the year in which the MSP is adopted.

- It should be clearly stated, if a baseline is '0', or it is 'Not applicable' / 'Not available'

- Baseline values and target values should be in the same measurement unit.

3.2.4. Step 2.4 Definition of target values and identification of external factors and assumptions

It is challenging to measure the achievement of objectives without quantified target values of indicators. Target values may have:

- Interim targets – e.g. midway to the end date of the validity of the specific MSP and/or midway to a specific timing of an indicator
- Final targets – targets at the end of the period of validity of the MSP and/or a specific year defined for an indicator

For example, if there is a final target for achieving MW of electricity generated from offshore wind farms by 2025, an interim target may be set for 2022. Interim targets are meant to ensure that the planning process is on track in achieving the expected final targets. They are also a key tool, in case of performing interim evaluations of MSPs.

The definition of targets is one of the most challenging tasks in establishing an indicator system. Ideally, it should be aligned with the defined objectives and it needs to be performed on the grounds of well-defined baseline values (where applicable). Suggestions on how to define the targets are included in the table below.

Indicator level	Target values
Overarching Blue Growth indicators (long-term impacts)	For these three levels of indicators, time series combined with a clear understanding of external factors can become the basis of an extrapolation, which takes into account the outputs of the MSP processes. Targets could also be predetermined by other strategies (e.g. an overall strategy on renewable energy may set the target for energy produced by offshore wind, ocean, and tidal installations). **NB**. If no objectives are defined at this level of indicators, there is no point in including them in maritime spatial plans. If such indicators are included in plans, it should be noted that singling out the effects of MSP on them is extremely challenging. Thus, ex ante quantification is a process that will include a great number of **assumptions**, which take into account the interplay of external factors.
Impact	
Outcome	
Output	Defining target values would depend on factors like: - Priorities defined in the plan - Availability of suitable maritime space - Needs of Blue Economy sectors
MSP process	Target values should take into account the specific MSP context in the countries / sea-basins, e.g.: - Number and interest of stakeholders representing specific Blue Economy sectors - Number and interest of bodies, which have responsibilities with regards to MSP and Blue Growth - Number and interest of neighbouring countries - Available budget for communication activities - Quality of available maritime / coastal data

Table 16 Indicators – definition of target values

External factors grow in significance from outputs to impacts (and overarching Blue Growth indicators), which is why the control of planners over the achievement of target values also decreases. Planners need to clearly state the **assumptions**, which need to hold true in order for the expected values to be reached. In other words, in addition to monitoring the reaching of target values, planners should also take into account, if the assumptions are still valid after the adoption of the plan.

Overall, for **MSP process indicators** and **outputs** the influence of external factors is expected to be much smaller when compared to the other levels of indicators, marginal unless they are affected by political events and institutional changes (e.g. merging of ministries or agencies or low interest of stakeholders). **Outcomes** are only partially within the control of planners. For example, the intensity of spatial conflicts may change over time, due to factors like the increase in trade or the increase in investor interest in renewable energy due to new legislation. This would consequently affect the achievement of target values of indicators measuring expected decreasing of the number of conflicts, or conflicted areas. Expected increases in capacity in a certain Blue Economy sector depend on the maritime space assigned, but mostly on the willingness of public/private companies to invest in infrastructure, which is influenced by factors like technological advances and overall economic and legislative frameworks. This is also the case for **impact indicators**, because they depend on the actual demand for a specific yield/production of a certain Blue Economy (e.g. the demand for gas or fish). The overarching **Blue Growth indicators** (gross added value and employment) are affected mostly by the economic cycles of countries.

Tips:

- Target values and baseline values should have the same calculation methodologies/sources. Otherwise, the monitoring information would not show properly the achievements of MSP

- Interim targets should not be set mechanically midway from MSP adoption to the date of the final target. They should also take into account what and when is feasible in terms of expected achievements.

- There is no 'golden rule' stating what percentage of deviation from the interim target values would require changes in planning, because the quality of target-setting varies. However, if there is a deviation higher than 20% from the interim target a review of the targets and the reasons for the gap/overachievement would be advisable.

- Setting targets should not be a speculative process. If no credible targets can be defined in the process of MSP drafting:

(a) their definition should be subject to additional studies, which can be performed after MSP adoption;

(b) they can be used as context indicators, i.e. monitored as a part of the MSP context, but without attributing their progress directly to MSP processes;

(c) MSP authorities should reconsider their use, even if they are relevant to the specific objectives.

- It is not possible to consider all external factors in advance, so planners can focus only on the most significant ones.

3.2.5. Step 2.5 Development of a complete indicator system

Selecting indicators, defining their sources of information and the values does not yet mean that the indicator system is established. A complete indicator system should also: determine the bodies responsible for data collection and reporting; provide a methodological description of the selected indicators; determine the frequency of collection and reporting of data; and identify the typical users of indicators.

The **MSP authorities are expected to be the main bodies responsible for data collection, analysis, and reporting**. However, depending on the selected indicators and the agreed arrangements during the stakeholder engagement process, other bodies may also have data collection responsibility. For example:

- Coastal/regional authorities, e.g. on indicators linked to land-sea interaction;
- National statistics institutes – on high-level socio-economic indicators;
- Environmental authorities at national, regional, local level – on environmental indicators;
- Institutes, associations – for specific indicators agreed in the selection process.

The indicator system should clearly define the units within authorities that are responsible for data collection, analysis, and reporting.

The **typical users of MSP indicators** may include:

- MSP authorities;
- Other national/regional authorities;
- Stakeholders from various sectors;
- Wider public, including civic organizations.

A **methodological description** of the selected indicators should include as a minimum:

- Definitions of the selected indicators;
- Detailed description of the data sources;
- Methods of calculation of the baselines and target values;
- Limitations of the indicators vis-à-vis their objectives;

- Frequency of data collection;
- Frequency of data reporting.

In case of complex indicator systems with a large number of indicators, the overall system can be described in a short and simple MSP indicator document. The description may include the indicator development process, the indicator context (e.g. strategic documents), overall indicator structure, arrangements for adjusting the indicator system, key assumptions and external factors affecting the achievement of target values, and ways of communicating the achievement of target values. For some indicators, planners may develop also an indicator fiche:

Indicator fiche element	Description
Indicator title	Full title of the indicator
ID	For example, P1 (process indicator #1)
Measurement unit	For example 'number', 'level on a scale'
Indicator level	Depending on the selected indicator structure, e.g. an output indicator
MSP dimension	Socio-economic, environmental, process indicator
Indicator type	Quantitative, or qualitative
Link to specific objective	Description of the link to a relevant MSP objective
Baseline year	Year selected as a baseline
Baseline value	Value of the indicator in the baseline year
Interim target	(if any)
Final target value	Expected value of the indicator at a pre-defined moment
Source of information	For example, MSP authority, Eurostat
Definition of the indicator	A definition explaining what the indicator includes and aims to measure.
Method of calculation	The way the indicator values should be calculated
Data storage and format	Description on where the data is stored and in what format
Reporting arrangements	Reporting frequency and means
Communication arrangements	Way in which the indicator will be communicated to stakeholders

Table 17 Indicator fiche structure

Tips:

- The frequency of data collection and reporting should not be too ambitious, but should be aligned to the data availability and reporting needs.

- Developing indicator fiches for each indicator requires additional time and effort, but they are a very useful tool for ensuring consistency of data gathering and calculation of target values.

- If a certain indicator relies on information from surveys, the sampling, indicative questions, and manner of holding the surveys should be clearly described.

- A good indicator provides information that both the MSP authorities and the indicator users can easily understand.

- Lack of a specific document describing the selected indicators leaves room for interpretation, which usually leads to poor quality and consistency of monitoring. If such a document is available it would allow stakeholders to have the same level of common understanding. At the same time, a heavy indicator Manual would be counterproductive and would inflict additional burden on planners.

3.3 Step 3: Monitoring and reporting of indicators

Monitoring means observing whether the intended processes, outputs, results, and impacts are delivered. The indicators included in the plans should be monitored throughout their implementation and information on their changes should be delivered to the relevant multilevel stakeholders.[201] The systematic collection of data on the selected indicators provides managers and stakeholders with indications of the extent of progress toward the achievement of the set objectives.[202] Indicators 'form the basis for measuring performance and determining the effectiveness of the MSP process'.[203]

The monitoring and reporting arrangements should be defined in Step 2.5 described above. The results of monitoring should be communicated to the indicator users and they could lead to changes in the indicator systems and to redefining the objectives, thus closing the loop visualised on Fig. 2. Furthermore, the information on indicators should feed into evaluations on MSPs.

Tips:

- Indicators do not provide a full picture of performance. This is why evaluations are usually needed to explain why and how objectives have been achieved or not.

4 SUGGESTIONS ON CHOOSING SPECIFIC INDICATORS AND EXAMPLES OF POSSIBLE INDICATORS

In this section, the Handbook provides further suggestions on how MSP authorities may choose specific indicators. The proposed indicators in this section serve an illustrative purpose only (i.e. they might inspire planning authorities to search for similar ones adjusted to the needs of their MSP process). All indicators can be interpreted only in the context of country-specific tasks, targets, goals and objectives. Such targets and goals can evolve over time, so also information provided by the given indicator to the planning process might change its meaning accordingly.

4.1 Overarching Blue Growth indicators

In the Blue Growth context, jobs, added value, and GHG reduction can be considered as **overarching indicators**, which are also considered in the Blue Growth Communication. More specifically, these indicators are:

Typical objective	Typical indicator	Measurement unit	Within the control of MSP authorities
Maintain a productive economy in the coastal regions	Gross value added in coastal regions (Eurostat - mare_10r_3gva)	million Euro	☐

[201] Matczak M., et.al. (2014).

[202] Ehler, Ch. and F. Douvere. (2009).

[203] TPEA. Transboundary Planning in the European Atlantic. Evaluation Process Report

Increase employment in coastal regions	Employment rates by sex, age and coastal regions (Eurostat - mare_lfe3emprt) or Employment by NACE Rev. 2 activity and coastal regions (Eurostat - mare_10r_3emp)	%	☐
Reduce greenhouse gas (GHG) emissions	Greenhouse gas emissions reduced	million tonnes of CO_2 equivalents	☐

Table 18 Overarching Blue Growth indicators (examples)

The above indicators combine input for all Blue Economy sectors. However, depending on the MSP objectives, MSP authorities may also choose to have them customised to a specific Blue Economy sector, e.g. employment in Aquaculture. A specific example is the East Inshore and East Offshore Marine Plans, which consider the national gross value added and employment among different sectors (e.g. oil and gas).[204] The more recent Economic baseline assessment for the North East, North West, South East and South West marine plans contains very specific figures on employment and GVA in more than 10 marine sectors.[205] To an even greater extent than with the impact indicators, these indicators are mostly useful as context indicators rather than indicators of MSP success.

4.2 Impact indicators

Impact indicators are linked to global objectives and take stock of the developments of Blue Economy sectors. Outputs and outcomes have influence over these indicators, but they extend fully beyond the control of MSP authorities. If MSPs include high-level objectives linked to the overall economic development of Blue Economy sectors, authorities may consider including indicators, which are similar to the ones presented below. However, the following considerations need to be taken into account:

- the trends of economic development in the Blue Economy sectors is heavily influenced by factors, which are external to maritime spatial planners, such as technological development and overall economic trends
- only evaluations (further analyses) could potentially disentangle the potential link between assigning maritime space and the trends in Blue Economy sectors, e.g. in terms of MWh of energy generated, or number of tourists
- MSPs should be very clear on the limits of attribution of plans to the economic trends and should also include an analysis of the external factors that affect them.

As a whole impact indicators are mostly useful as context variables rather than as indicators showing the success of MSP.

Typical objective	Typical indicator	Measurement unit	Within the control of MSP authorities
Increase wind power generation at sea	MWh of wind power generated at sea	MWh	☐

[204] MMO (2014a).

[205] MMO (2016).

Increase tidal and wave energy generation	MWh of tidal and wave energy generated at sea	MWh	☐
Increase/maintain tourism in coastal and sea areas	Nights spent at tourist accommodation establishments in coastal areas	Number	☐
Increase/maintain marine aggregates extraction	Million cubic meters of aggregates extracted per year	Millions of m^3	☐
Increase freight and passenger traffic via sea	Passengers transported to/from main ports Gross weight of goods transported to/from main ports	Number of passengers / millions of tonnes	☐
Increase/maintain oil and gas production at sea	Tonnes of oil per day extracted Cubic meters of gas per day extracted	Tonnes / m^3 per day	☐
Increase transportation of X through pipelines/cables	Tons of oil transported Cubic meters of gas transported Terabits per second transmitted Megawatts connected to the grid	Depending on the concrete indicator	☐
Exploit stocks at maximum sustainable yield rate	Catches	tonnes live weight	☐
Increase aquaculture production	Production from aquaculture excluding hatcheries and nurseries	tonnes live weight	☐

Table 19 Impact indicators (examples)

Similarly to the outcome indicators, MSP authorities may also take into account the efficiency of production/yield by linking it to the size of space assigned. For example, a potential indicator could be 'MWh of wind power generated at sea per nm^2 used' or 'Marine aquaculture yield per nm^2 used'.

4.3 Outcome indicators

Outcome indicators are one level above output indicators. They should also be linked to the relevant Blue Economy sectors and have both socio-economic and ecological dimensions. As shown in Table 12, some of them are only partially within the control of MSP authorities, while most are beyond their control.

Typical objective	Typical indicator	Measurement unit	Within the control of MSP authorities	Rationale
Horizontal indicators, i.e. indicators not linked to specific Blue Economy sectors				
Decrease spatial conflicts / Increase investment security	Spatial conflicts (between current / future human activities and nature)	Number	partially	The rationale of this indicator is to show potential decreasing number of spatial conflicts as a result of MSP. However, MSP authorities should take

Typical objective	Typical indicator	Measurement unit	Within the control of MSP authorities	Rationale
				into account that it may be challenging to reach an agreement on a precise number of conflicts due to different understanding on what a conflict is. This is especially relevant for future (planned) human activities. Furthermore, this indicator also has an important qualitative dimension – intensity of conflicts. It is likely to be unrealistic to strive towards zero conflicts, but rather to have the acute ones solved.
	Conflicted maritime area out of the overall maritime space	%	partially	This indicator has similar limitations to the above one, but may be useful as an approximation of the conflicted maritime area and the potential decrease of this area as a result of MSP.
	Maritime area with intense spatial conflicts out of the overall maritime space	%	partially	The above indicator may provide an approximation of the percentage of conflicted area, but does not consider the qualitative dimension (intensity of conflicts). This is why planners may also add an indicator on the percentage of the maritime area with intense conflicts. A difficulty with such an indicator would be to have a common understanding on what an intense conflict is. Nevertheless, similarly to the above indicator, it can provide an approximation of the potential decrease in the maritime areas with acute spatial conflicts as a result of MSP.
Decrease project planning time	Time required to take decisions on maritime construction permits (within	Days	partially	The rationale of these two indicators is to show potentially decreasing time for decisions on maritime construction

Typical objective	Typical indicator	Measurement unit	Within the control of MSP authorities	Rationale
	preapproved areas)			permits and number of legal claims related to conflicting permits as a result of MSP.
	Legal claims related to conflicting permits	Number	partially	
Decrease shipping accidents	Shipping accidents	Number	☐	Decreasing shipping accidents is an underlying objective of MSP, which is why authorities may consider including such an indicator in their plans. At the same time it should be taken into account that there are many factors affecting this indicator, e.g. weather conditions and types of accidents.
Decrease oil spillages	Volume of accidental oil spills due to shipping accidents	m^3	☐	This is an indicator, which is linked to the number of shipping accidents and it adds an environmental dimension to shipping accidents.
Indicators linked to specific Blue Economy sectors[206]				
Increase wind power generation capacity at sea	MW of wind power generation capacity installed at sea[207]	MW	☐	It is clear that all of these indicators are already way beyond the influence of MSP authorities. The rationale for monitoring or considering such indicators is their usefulness as an indication of changing capacities in the specific sectors. Capacity is a middle step between assigning maritime space (outputs) and actual expected positive production, yield, etc. (impacts).
Increase tidal and wave energy generation capacity	MW of tidal and wave energy generation capacity installed	MW	☐	
Increase/maintain sustainable tourism in coastal and sea areas	Number of establishments, bedrooms and bed-places in coastal areas	number	☐	
Increase / maintain shipping capacity	Gross tonnage of vessels in the main ports	Gross tonnage	☐	

[206] No suitable examples of objectives have been identified for this level for the Marine aggregates sector.

[207] For instance the German Renewable Energy Sources Act (2014) specifies binding trajectories for the several individual technologies of production of energy from renewable sources stating among others that offshore wind energy should have by 2020: 6.5 GW and by 2030: 15 GW of installed capacity at German marine waters.

Typical objective	Typical indicator	Measurement unit	Within the control of MSP authorities	Rationale
Increase / maintain oil and gas production capacity at sea	Capacity of oil / gas installations at sea	Capacity (measured in Tonnes of oil per day or Cubic meters of gas per)	☐	As repeatedly mentioned, however, for certain sectors and sea-basins increasing, or maintaining capacity may not be objectives defined in plans. It could even be an objective to decrease tourism activities, or gas production, for example. Objectives and indicators should always consider what is the sustainable level of capacity.
Increase / maintain capacity of cables and pipelines	Length and/or capacity of pipelines operated Length and/or capacity of cables (IT, electricity) operated	Meters and/or capacity	☐	
Ameliorate the fishing fleet capacity to exploit stocks in a sustainable way	Gross tonnage of fishing fleet	Gross tonnage	☐	
Increase / maintain aquaculture capacity	Number / capacity of aquaculture farms on the coasts	Number / capacity	☐	

Table 20 Outcome indicators (examples)

MSP authorities may also take into account the efficiency of capacity by linking it to the size of space assigned. For example, a potential indicator could be 'capacity of oil/gas installations per nm^2 used' or 'MW of wind power generation capacity per nm^2 used'.

4.4 Output indicators

As mentioned, output indicators should be a direct product of the MSP processes, which can have effects in different socio-economic and ecological dimensions. Thus, MSP authorities might consider the Blue Economy sectors, if appropriate in a given country. At the same time, they should be linked to operational ecological objectives (e.g. on designating marine protected areas). Another aspect that needs to be considered is that land-sea interactions, which is a requirement of the MSP Directive. These interactions are difficult to translate into indicators, but to a certain extent this can be done through the use of qualitative indicators (e.g. on availability of grid connections needed for offshore installations). Suggestions for possible output indicators are presented in the table below.

Objective	Indicator	Measurement unit	Within the control of MSP authorities	Rationale
Ensure maritime space for [Blue Economy sector X[208]]	Maritime space assigned for [Blue Economy sector X]	nm^2	☒	The purpose of this indicator is to show how much space has been assigned to a particular Blue Economy sector, e.g.

[208] The table includes typical indicators, which can be further customised to particular sectors

Objective	Indicator	Measurement unit	Within the control of MSP authorities	Rationale
				for wind farms, or tidal energy installations. MSP authorities need to consider that the indicator may not be applicable to all Blue Economy sectors, e.g. it may have limited applicability for the Tourism and Marine aggregates sectors. Multi-use should also be taken into account.
	Maritime space assigned for [Blue Economy sector X] out of all the available maritime space	%	☒	This indicator goes a step further than the above one as it considers the share of space assigned for a particular Blue Economy sector out of all available maritime space. Thus, it could show relative prioritisation among the different Blue Economy sectors. However, the analytical value of this indicator is limited, because it does not consider how much space is suitable for this specific sector. It should also be considered that the sum of the different values of the indicator (for the different sectors) is not expected to be 100%, because multi-use should also be taken into account and also because some sea space might be kept empty, i.e. for future uses of to preserve the seascape.
	Maritime space assigned for [Blue Economy sector X] out of the suitable (in economic and ecological sense) space for the [Blue Economy sector]	%	☒	The indicator has a bigger analytical value as compared to the above ones as it also takes into account the suitable space for the actual Blue Economy sector. Its limitations are:

Objective	Indicator	Measurement unit	Within the control of MSP authorities	Rationale
				- It may be difficult to assess how much is the suitable space. Input from stakeholders may be valuable in this regard. - Suitable space is not the same as needed space, which is why MSP authorities may also consider adding the indicator below.
	Maritime space assigned for [Blue Economy sector X] out of the needed space for the [Blue Economy sector]	%	☒	The logic of this indicator is to show to what extent the space assigned meets the needs in the specific sector. For example, if the space assigned for wind farms is more than 100% of the space needed for installing an X MW capacity, then it shows that there is potentially even more room for growth in the particular sector or that there may be a planning failure.
	Overall maritime space assigned out of all available maritime space	%	☒	The indicator may be used to indicate how much space is available for potential future uses or to preserve the seascape and its tangible and un-tangible values.
	Maritime space assigned for immovable uses[209] out of the overall maritime space	%	☒	This indicator may be used to indicate the extent of flexibility of the planning process, i.e. the smaller the percentage assigned for immovable uses,

[209] These are uses that require a very specific area and cannot be moved to alternative locations, e.g. NATURA 2000 sites and ports

Objective	Indicator	Measurement unit	Within the control of MSP authorities	Rationale
				the bigger the flexibility.
Establish criteria for sustainable development of [Blue Economy sector X]	Extent to which development criteria are set out	Level on a scale	☒	This is a qualitative indicator, which can be used in case the MSP does not explicitly assign maritime space for [Blue Economy sector X]. A level on a scale can consider, e.g. the specificity, rigidity, quantification of the criteria. A binary Yes/No indicator may also be used.
Designate marine protected areas (MPAs)	Space assigned for MPAs	nm^2	☒	The indicator shows how much space has been specifically designated for MPAs, thus taking into account the ecological dimension of MSP. In addition to assigning space for MPAs, having a working plan for management of the MPA is also rather important and may be considered as a qualitative element of the indicator.
	Space assigned for MPAs out of the overall maritime space	%	☒	The indicator may be used to show what is the relative weight attributed to MPAs as compared to uses for Blue Economy sectors. What is important to consider is that the indicator also has a qualitative dimension – the contribution to environmental protection of different zones is not the same. In other words, it is not only a matter of the amount of space reserved for MPAs, but it is rather a question of protecting the most important (from ecological perspective) areas.

Objective	Indicator	Measurement unit	Within the control of MSP authorities	Rationale
Ensure multi-use of marine space in line with national targets	Maritime space assigned for multi-use out of the overall maritime space (and/or out of the assigned maritime space)	%	☒	This indicator may show the relative weight of the space assigned for multi-use, which is an indication of efficiency.
Create the conditions for future generations to meet their own MSP needs	Maritime space unassigned and maintained for future generations[210]	%	☒	It should be noted that space for future generations might be maintained also if all the marine space is currently assigned to uses. If marine space is currently used in a sustainable way, without exceeding carrying capacity and regeneration rate and therefore without spoiling the environment and the ecosystem functions, future generation could continue using the space we are currently using. This interpretation of the "future-generation" principle of sustainability is very important for those countries with limited marine area. Both perspectives (unassigned space and current sustainable use of the marine space enabling future generation use of the same space) shall be somehow considered when developing indicators. Maritime space unassigned may not be a relevant indicator, if the space unassigned could be a 'dead zone', which does not contribute to

[210] An example can be one of the drafts of the Polish MSP in which the biggest part (55,3%) of the planned Polish sea space (18 027,37 km^2 out of 32 601 km^2) was reserved for the decisions of future generation – only mobile and reversible uses are allowed there.

Objective	Indicator	Measurement unit	Within the control of MSP authorities	Rationale
				environmental protection.
Safeguard access to natural, historical, archaeological, religious, spiritual, and cultural sites	Level of access to coastal and marine natural, historical, archaeological, religious, spiritual, and cultural sites Scale of use, e.g.: no access, low accessibility, high accessibility, full access	Level on a scale	☒	This is a qualitative indicator relevant to land-sea interactions. Its main limitation is the aggregation of different coastal and marine sites, which may not always be possible. For example for a historical coastal site there may be full access, while for a natural underwater site there could be low accessibility due to introduction of installations.
Consider the availability of grid connections needed for offshore installations	Level of availability of grid connections Scale of use, e.g.: no availability, low availability (grid connections capacity cover a part of the installation needs), sufficient availability (grid connections capacity cover all of the installation needs), excellent availability (grid connections capacity is higher than the planned installation needs)	Level on a scale	☒	This is also a qualitative indicator, which considers another element of land-sea interactions – availability of grid connections.

Table 21 Output indicators (examples)

4.5 MSP process indicators

There are two possible approaches concerning MSP process indicators: qualitative and quantitative. **Qualitative indicators** may take the form of binary (Yes / No) indicators like the ones suggested in other studies (see Ehler, 2014), e.g. presence of legislative framework, institutional set-up, evaluations performed, or availability of an evaluation plan. They could also have appropriate scales, e.g. measuring the quality of stakeholder consultations. **Quantitative indicators**, on the other hand, focus on measurable elements of the MSP processes (stock-taking, coordination, securing resources, stakeholder perspective) and quantify them as much as possible. The pitfall of using qualitative indicators is that they are simplistic in nature and in essence provide only a basic 'checklist' that may support MSP processes. The main disadvantage of quantitative indicators for MSP

processes is that they may be mechanical and could disregard the quality of the processes. That is why a combination of qualitative and quantitative indicators should ideally be considered by MSP authorities. If feasible, for the scoring on the scales of qualitative indicators, planners may also involve external experts and stakeholders.

Some examples of possible MSP process indicators are presented below. It is important to note that these indicators are not limited to specific Blue Economy sectors, but to the overall MSP process as a whole.

Objective	Quantitative Indicator	Measurement unit	Qualitative indicator	Yes / No and / or Scale	Within the control of MSP authorities	Rationale
Ensure cooperation between relevant national authorities (national governance dimension)	Institutionalised or non-institutionalised platforms/fora linking relevant national authorities, which have responsibilities with regards to MSP and Blue Growth (e.g. cross sectoral MSP expert working groups, advisory boards)	Number	Existence of institutionalised or non-institutionalised platforms/fora linking relevant national authorities responsible for MSP and Blue Growth	Yes/No Scale of frequency/quality of interaction e.g. (1) High; (2) Medium; (3) Low	☒	These indicators have the objective of indicating, whether the relevant national bodies are involved in the MSP processes. Preferably, this should be indicated via qualitative indicators on the frequency and/or quality of interaction between the national bodies.
Ensure coherence with plans of neighbouring countries (cross-border governance dimension)	Consultations[211] held with neighbouring countries, which are relevant to Blue Economy sectors (e.g. bi- and multilateral meetings, workshops, conferences)	Number	• In-depth consultations held with all neighbouring countries, which are relevant to Blue Economy sectors (e.g. meetings, workshops, conferences, bi-	Yes/No	☒	The quantitative indicator can show, if all neighbouring countries have been consulted, which is an important aspect in the MSP processes. However, it does not show whether their input in the planning process is taken into account,

[211] Establishing informal contacts prior to and outside the formal consultation is also considered rather important, but it cannot be captured through the indicator system.

			lateral meetings, calls) • Reactions of neighbours have been taken on board			which is a problem that can be amended by using a qualitative indicator.
	Different ministries attending consultations with neighbouring countries	Number	All relevant ministries attend and contribute to the consultations with neighbouring countries	Yes/No	☒	This indicator goes further than considering whether all neighbouring countries have been involved. It is meant to indicate whether the level of discussions is sufficiently high, i.e. whether the key ministries are involved in the discussions with neighbouring countries. In most cases, mechanically counting the number of ministries attending these discussions would not provide meaningful information, which is why a qualitative indicator would be preferable.
Ensure cooperation with sub-national authorities (sub-national governance	Institutionalised or non-institutionalised platforms/fora linking relevant sub-national authorities, which	Number	Existence of institutionalised or non-institutionalised platforms/fora linking relevant sub-national (e.g. regional) authorities responsible for MSP and	Yes/No Scale of frequency/quality of interaction e.g. (1) High; (2) Medium; (3) Low	☒	Same as above, but at the level of sub-national authorities, e.g. counties, municipalities, regions.

dimension)	have responsibilities with regards to MSP and Blue Growth (e.g. County Administrative Boards)		Blue Growth			
Ensure stakeholder input / involvement	Consultations held with representatives of specific Blue Economy sectors (e.g. bi- and multilateral stakeholder meetings, workshops, conferences, seminars) during all MSP stages (planning, development, implementation, M&E)	Number	• Consultations with key representatives of specific Blue Economy sectors, i.e. public authorities, private business, NGOs, general public • Consultations with key stakeholders held during all MSP stages (planning, development, implementation, M&E) • Response provided to all comments received • Stakeholders provided relevant data.	Yes/No Scale of coverage/frequency/quality of interaction e.g. (1) High; (2) Medium; (3) Low (Questions to support this qualitative assessment - Did we reach across society? Are we reaching everyone we should reach? Have we missed anyone?)	☒	The number of consultations held and the number of stakeholders involved provides an overview of the level of participation in consultations. However, these indicators do not measure the quality of the consultation process and whether they have been started at the early stage of planning to avoid sunk cost fallacy (i.e. the tendency to stick to planning decisions due to unwillingness to make changes in the plans). The quality can be measured either quantitatively through a survey, or via qualitative indicators, which take into account whether the key stakeholders were
	Stakeholders from various stakeholder	Number	-	-	☒	

	groups (i.e. public authorities, private business, NGOs, general public) involved in consultations during the development of the MSP					involved and when.
	Stakeholders from various stakeholder groups (i.e. public authorities, private business, NGOs, general public) providing feedback / comments after the adoption of the MSP	Number	-	-	☒	
	Stakeholder satisfaction level (surveys during and/or after the consultations would be needed for defining the value of this indicator)	% of respondents expressing satisfaction with the consultation process	-	-	☒	
Improve awareness of MSP issues	Outreach of stakeholder communication activities (newsletters,	Number of people (potentially) reached Number of	Use of diverse communication channels to disseminate MSP-related information	Yes/No	☒	Quantifying awareness is always a challenge. One way to assess the outreach of communication activities

	flyers, exhibitions and fairs, websites and media cooperation)	visits at the relevant website				is, for example, by counting recipients of newsletters and participants in events. A relatively easy way of assessing the number of people reached is through the visits of a webpage that contains the MSP, its draft, and/or key elements that need to be consulted with the stakeholders. The transparency of MSP updates and the diversity of communication channels can be followed through qualitative indicators.
	-	-	Transparency of the plan updates	Scale e.g. (1) fully transparent – published online and disseminated to stakeholders; (2) transparent – published on the website/portal; (3) partially transparent - upon request; (4) not transparent – available only internally	☒	
Ensure use of available / relevant data in MSP	Maritime space covered by a regional planning register (inventory) of coastal and maritime uses and pressures	%	Availability of MSP relevant information on coastal and maritime uses and pressures High quality of MSP relevant information on coastal and maritime uses and pressures	Yes/No Scale of coverage, e.g. (1) High – coverage of most coastal and maritime uses and pressures; (2) Medium - coverage of some coastal and maritime uses and pressures; (3) Low - coverage of a limited number of coastal and maritime uses and pressures Scale of quality, e.g. (1) High – availability of up-to-date detailed information; (2) Medium – information,	☒	Having a database containing spatially relevant information on a wide range of uses and pressures is a useful tool for structuring MSP data. The marine space covered by such a database can be measured quantitatively. The availability and quality of the MSP data can also be assessed qualitatively by using scales on coverage/quality.

				which is not up-to-date, or not detailed enough; (3) Low – lack of up-to-date detailed information		
Ensure mapping of uses and key characteristics of the sea	Maritime space mapped and showing coastal and maritime uses (and pressures)	%	Availability of maps showing coastal and maritime uses (and pressures)	Yes/No Scale of coverage, e.g. (1) High – maps of most coastal and maritime uses, characteristics, and pressures; (2) Medium - maps of some coastal and maritime uses, characteristics, and pressures; (3) Low - maps of a limited number of coastal and maritime uses, characteristics, and pressures Scale of quality, e.g. (1) High – availability of up-to-date maps with proper scales; (2) Medium – maps, which are not up-to-date, or not in proper scales; (3) Low – lack of up-to-date maps with proper scales	☒	Obviously, maps are another key tool in the MSP processes. Similarly to the above indicator, the coverage of the maps can be assessed quantitatively and qualitatively. Equally important is the quality of the maps, which can be considered through a scale like the one suggested in this table.
			Level of use of existing instruments and tools for data collection (such as those developed in the context of the Marine Knowledge 2020 initiative e.g. EMODNET data portals and Directive 2007/2/EC of the European	Scale of use, e.g.: no use, low, medium, significant use	☒	MSP authorities should make the best use of existing instruments and tools for data collection. A qualitative indicator on this use can be developed, in case considered useful, but to a large extent this also

			Parliament and of the Council e.g. INSPIRE geoportal).			depends on how applicable the existing instruments/tools are.
Take stock of the resources assigned to MSP processes	Financial resources assigned for MSP processes[212]	Euro	• Availability of sufficient financial resources assigned for MSP processes • Diversity of financial resources assigned for MSP processes (e.g. national funds in combination with EU funds)	Yes/No	☒	The rationale for this indicator is to inform MSP authorities on the adequacy of financial resources assigned for MSP. The quantitative indicator may provide the actual available budget, while based on previous experience and expert judgement, MSP authorities may determine, if these resources are expected to be sufficient (qualitative indicators). Having a diversity of financial resources provides further reassurance that the MSP processes have the necessary resources.
	Staff assigned to MSP processes	FTE (full time equivalent)	• Availability of sufficient staff assigned to MSP processes • Availability of a	Yes/No	☒	Human resources are another element of the inputs assigned to MSP processes in addition to financial resources (see

[212] All financial resources channelled into the MSP process at its various stages from public and private sources including also EU funds and EU projects if used directly for MSP purposes, e.g. for training MSP staff, for making cross-border consultations etc.

				multi-disciplinary team (e.g. planning, data management, GIS, marine science)			the previous indicator). They can be monitored quantitatively through the number of full time equivalents assigned to MSP processes. The judgement on whether the staff is sufficient is, however, also important and can be based on previous experience (if existent) and expert judgement.

Table 22 MSP process indicators (examples)

4.6 Additional Ecological indicators

There may be particular ecological objectives identified in the MSP processes (for example the objectives reviewed in the previous sections - Designate marine protected areas and Decrease oil spillages), but typically these are broader and can be considered as horizontal objectives, which are linked to other Blue Economy sector objectives.

Broad ecological objectives are defined in the framework for community action in the field of marine environmental policy included in the Marine Strategy Framework Directive (MSFD)[213]. It establishes a framework within which Member States shall take the necessary measures to achieve or maintain good environmental status (GES) in the marine environment by the year 2020 and refers to an ecosystem-based approach (Art. 1), which is also included as a minimum requirement for MSP in the EU MSP Directive (2014/89/EU). Thus, a clear link can be established between the proposed MSP ecological indicators, good environmental status and the descriptors referred to in the MSFD.

The descriptors can be used as indicators, which provide summary information on relevant ecological parameters that are usually affected by Blue Economy sectors, as shown in Table 15. The list is not exhaustive per sector, but instead indicates the descriptors, which are typically influenced the most by the particular sectors. It is important to note that **the link between concrete descriptors and specific Blue Economy is country-specific**.

Descriptors / sectors	Renewable energy (wind, tidal, wave)	Coastal and maritime tourism	Fishing	Marine aquaculture	Ports and shipping	Oil and gas production	Marine aggregates	Pipelines and cables
D1. Biodiversity	☒	☒	☒	☒	☒	☒	☒	☒
D2. Non-indigenous species	☐	☒	☒	☒	☒	☐	☐	☐
D3. Commercial fish / shellfish	☐	☐	☒	☐	☒	☐	☐	☐
D4. Marine food webs	☐	☐	☒	☒	☐	☐	☐	☐
D5. Eutrophication	☐	☒	☒	☒	☒	☐	☐	☐
D6. Sea-floor integrity	☒	☐	☒	☒	☒	☒	☒	☒
D7. Hydrographical conditions	☒	☐	☐	☐	☒	☒	☒	☐
D8. Contaminants	☐	☒	☐	☐	☒	☐	☐	☐
D9. Contaminants in seafood	☐	☐	☐	☐	☒	☐	☐	☐
D10. Marine litter	☐	☒	☒	☒	☒	☐	☒	☐
D11. Introduction of energy	☒	☒	☐	☐	☒	☒	☐	☒

Table 23 Blue Economy sectors / descriptors (possible links)

Table 15 could serve the purpose of providing umbrella indicators on general objectives such as reducing climate change impacts, zero eutrophication, decreasing toxicity, increasing / maintaining biodiversity, etc., if such objectives are envisaged in the MSP Plans. In addition to the GES descriptors, indicators for air quality can also be applied, e.g.:

[213] European Commission (2008).

decreasing greenhouse gases (GHG) from shipping and / or decreasing GHG through measures in renewable energy. The difficulty would be to link these to MSP processes.

5 FURTHER SOURCES ON INDICATORS

The guidance on indicators can be divided into two main categories: guidance on MSP indicators and general indicator guidance.

Further MSP indicator guidance

Several studies provide detailed guidance on the development and use of MSP indicators. One of the most widely used guides was developed by Charles Ehler[214]. It provides a description of several steps of monitoring and evaluating the performance of marine spatial plans, including the identification of indicators, establishing baselines, defining targets, monitoring indicators.

Another detailed guide is the Handbook for Measuring the Progress and Outcomes of Integrated Coastal and Ocean Management (ICOM). [215] It offers a step-by-step guide on developing, selecting and applying governance, ecological and socioeconomic indicators to measure, evaluate and report on the progress and outcomes of ICOM interventions.

The Guidebook of Natural and Social Indicators for Evaluating Marine Protected Area Management Effectiveness[216] provides a good overview of the process of selecting MPA indicators. The importance of choosing specific indicators for the control variables to monitor changes in ecosystem models is discussed also in the study on 'Planetary boundaries for a blue planet' by Nash, et.al.[217]

In addition to the studies mentioned above, there are also some projects, which provide tools that may support the development of MSP indicators. For example, the BONUS BaltCoast project designed a tool to measure the sustainable development in coastal areas and to evaluate the success of different ICZM 'best-practice' examples applied throughout Europe through indicators. The spreadsheet tool, developed under the project includes a set of 45 indicators that are grouped into four categories: Environmental Quality, Economics, Social Well-Being, Governance (Process indicators).

The Transboundary Planning in the European Atlantic (TPEA) project provides a checklist for assessing transboundary MSP processes. This checklist also offers a list of indicators, which may contribute to defining MSP process indicators. The Baltic Scope Collaboration also provides a list of evaluation criteria and indicators to support evaluation and monitoring of transboundary collaboration in MSP.

General indicator guidance

The EVALSED[218] guidance provides a good overview on how to create indicators and indicator systems and includes a definition of indicators, main types of indicators, and tips on selecting indicators. Another good source of general guidance on indicators is the

[214] Ehler, Charles (2014).

[215] Belfiore, S., J. et al. (2006).

[216] Pomeroy, R., J. et al. (2004).

[217] Nash, K. et.al. (2017).

[218] EVALSED (2013).

Results Framework and M&E Guidance Note of the World Bank[219]. It provides a description of a results chain, quality checks and types of indicators

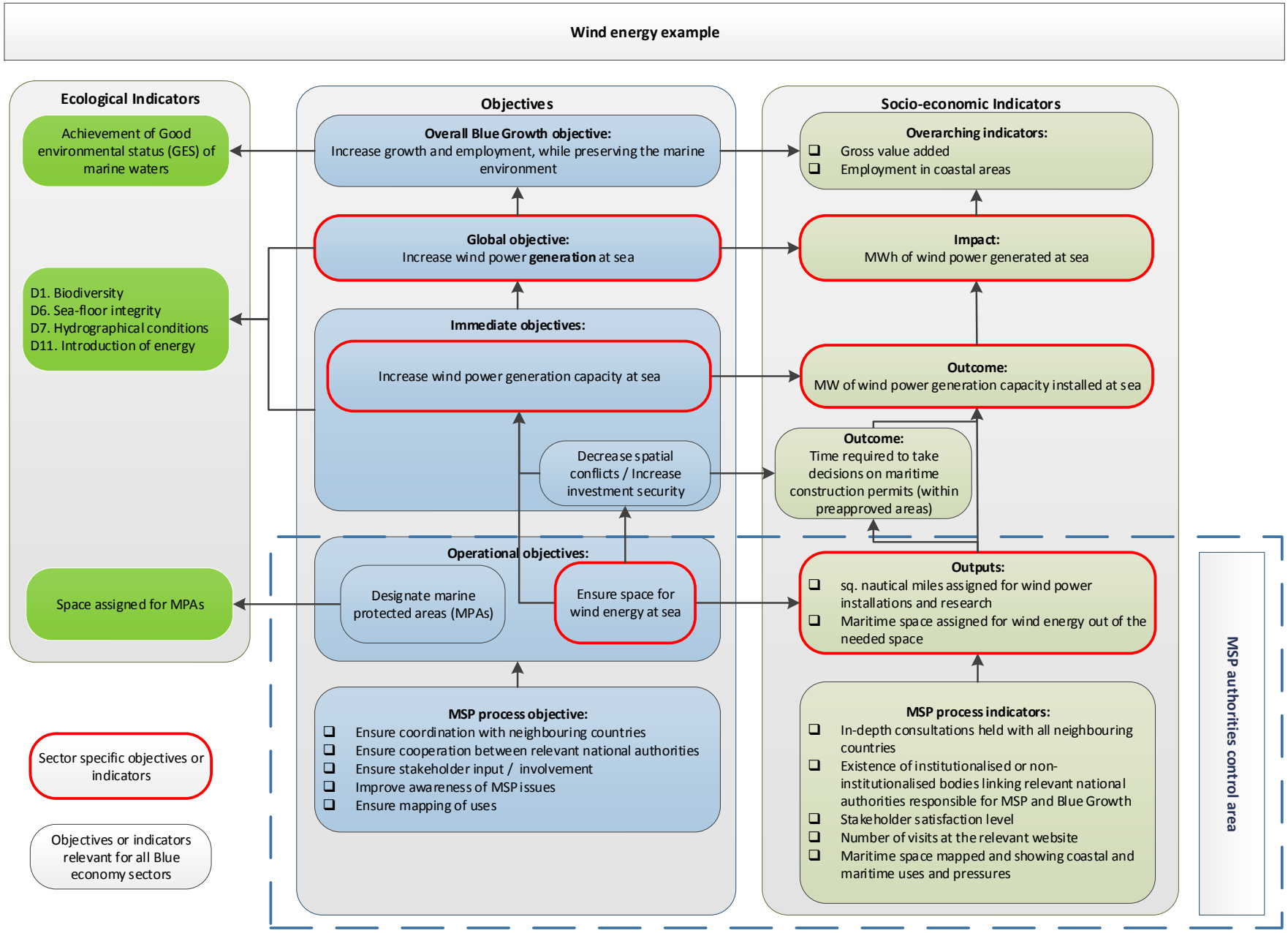
The Monitoring and Evaluation Indicators Guidance documents of the European Commission for the 2007-2013[220] and for the 2014-2020[221] period offer a good introduction into the methodology of indicator systems and provide practical guidance for the authorities and stakeholders in Member States that are responsible for Structural and Cohesion Fund programmes, in particular for the creation of indicator systems.

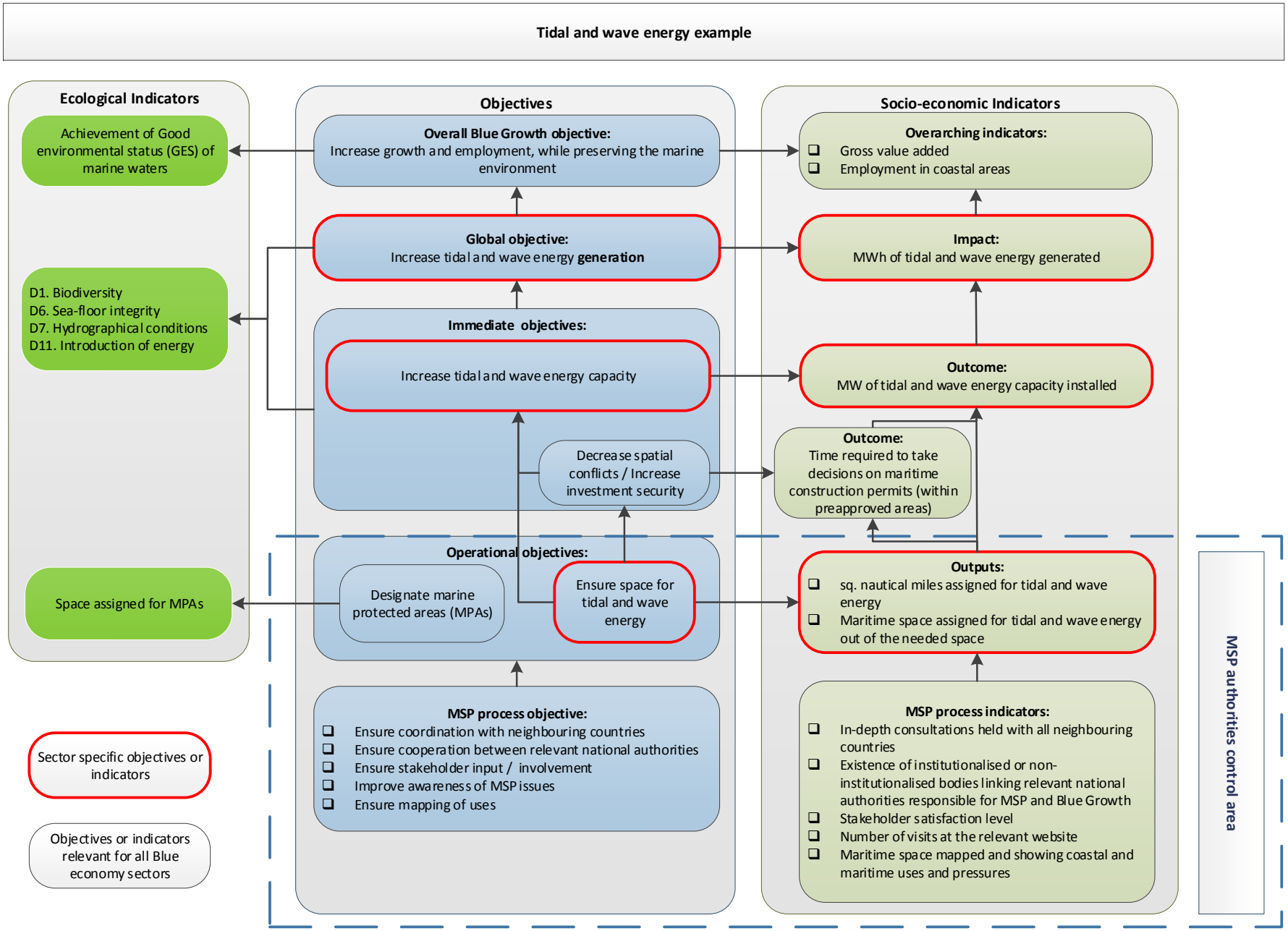
[219] World bank (2013).

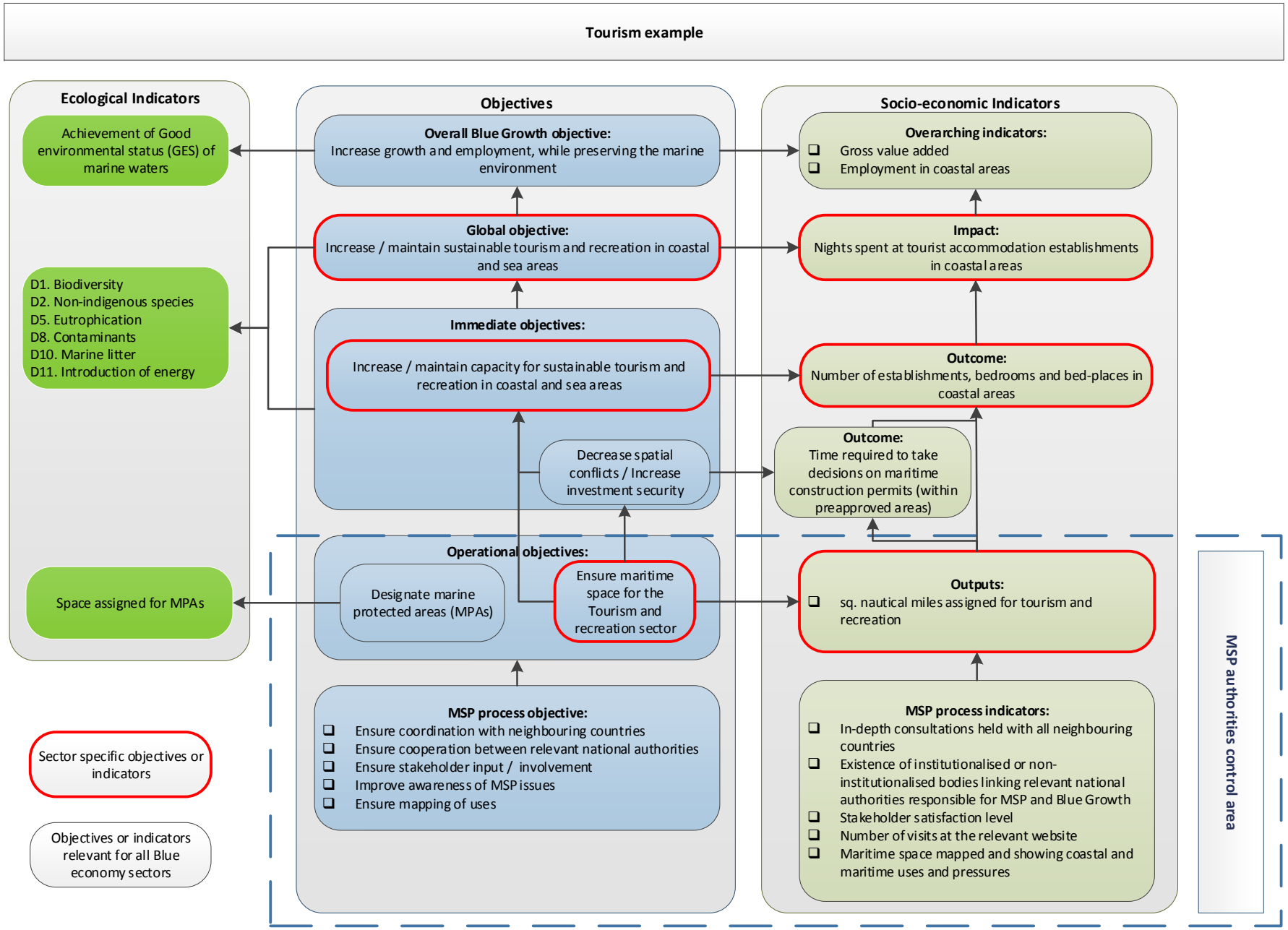
[220] European Commission (2006).

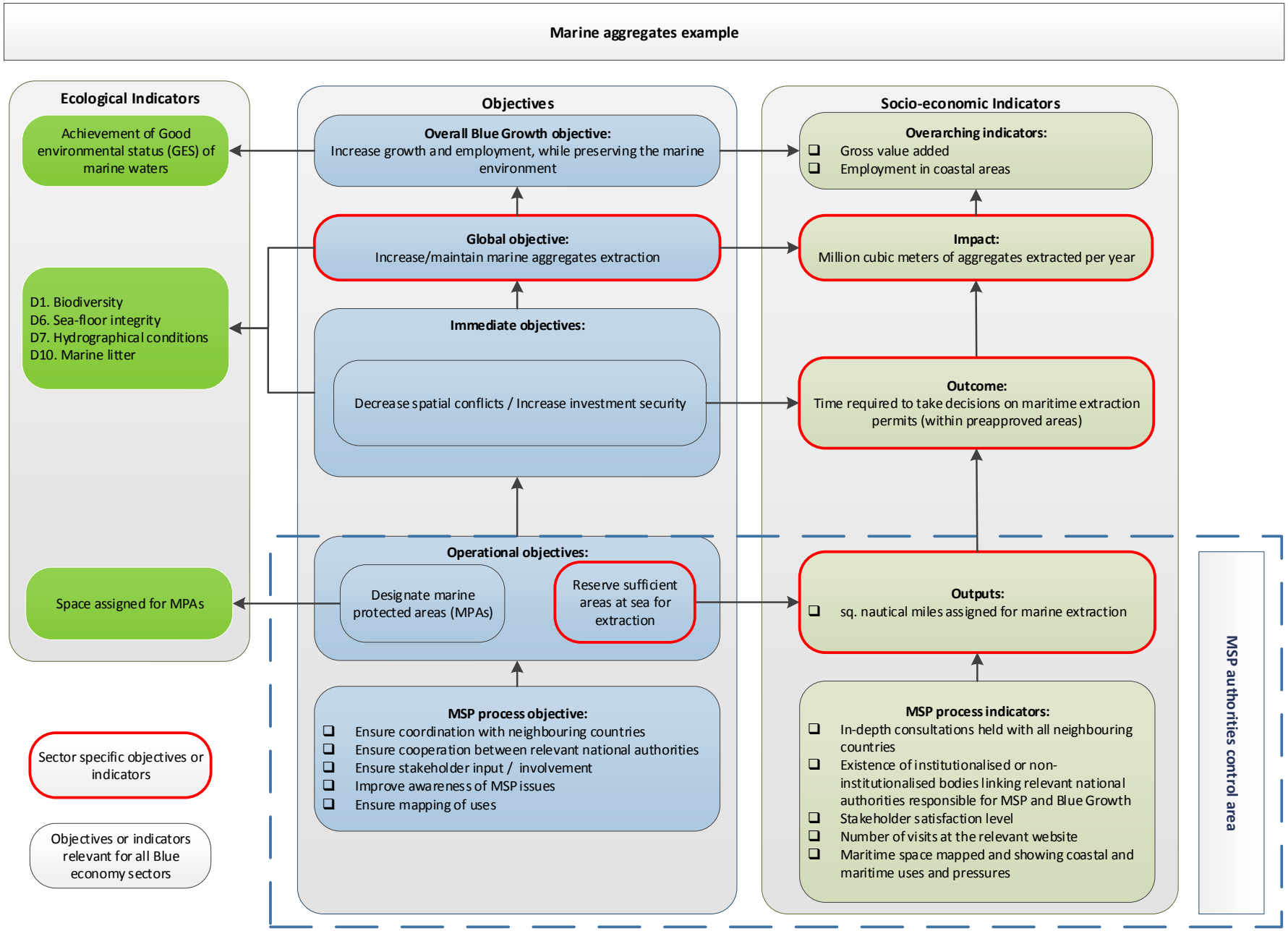
[221] European Commission. (2014).

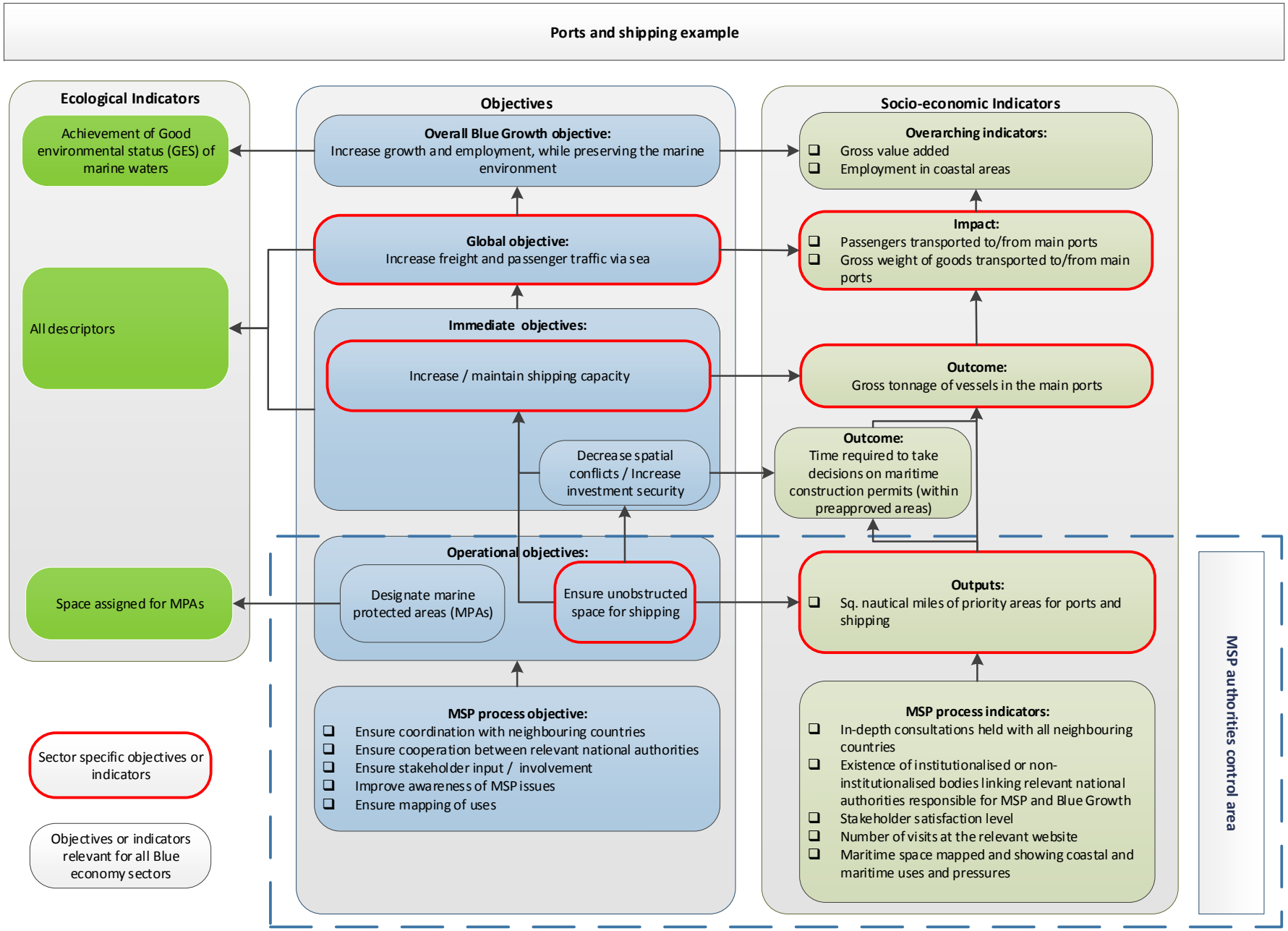
APPENDICE 1: EXAMPLES OF FRAMEWORKS OF INDICATORS PER SECTOR

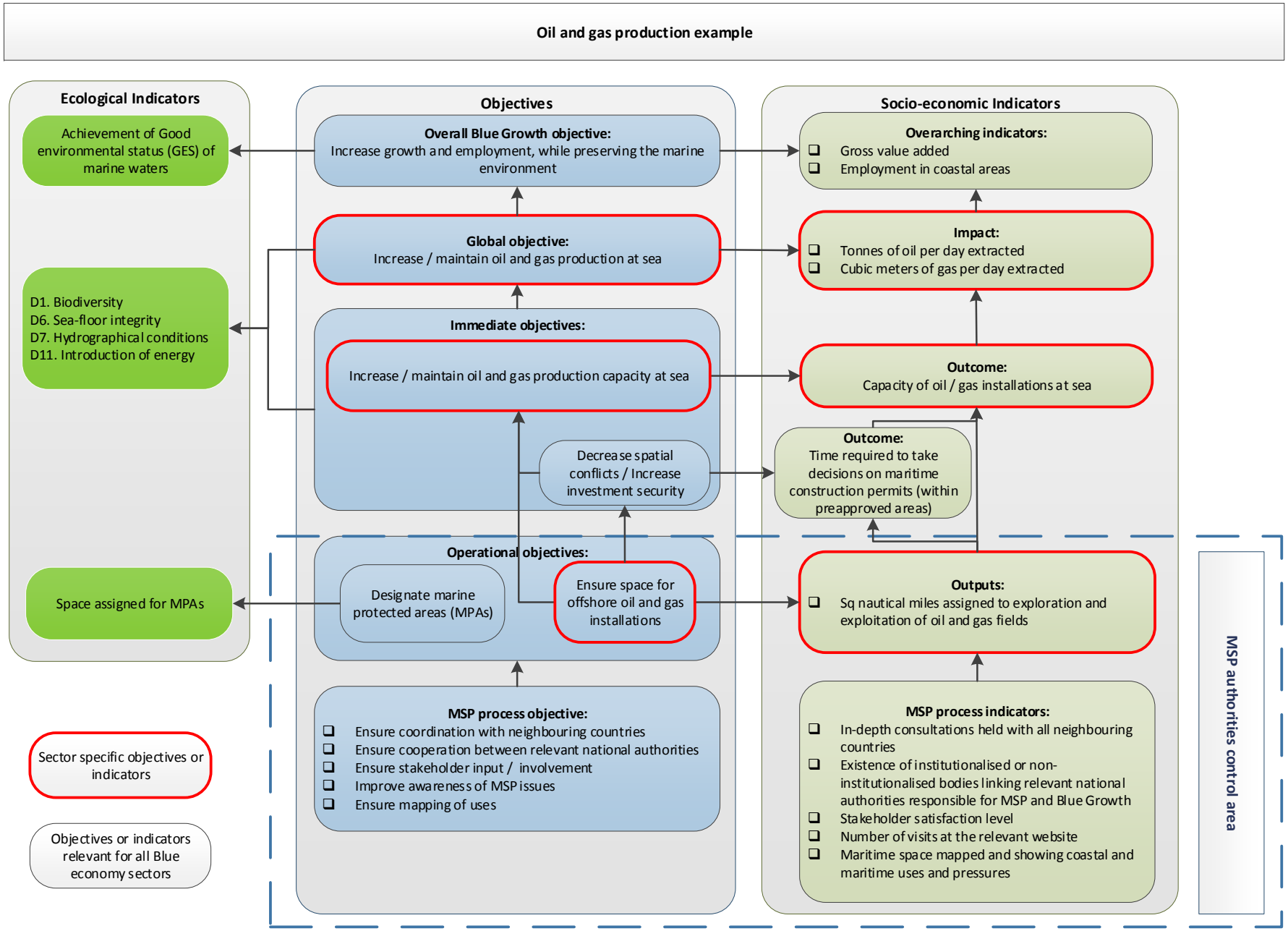

Wind energy example
Ecological Indicators
Achievement of Good environmental status (GES) of marine waters
D1. Biodiversity
D6. Sea-floor integrity
D7. Hydrographical conditions
D11. Introduction of energy
Space assigned for MPAs
Objectives
Overall Blue Growth objective:
Increase growth and employment, while preserving the marine environment
Global objective:
Increase wind power generation at sea
Immediate objectives:
Increase wind power generation capacity at sea
Decrease spatial conflicts / Increase investment security
Operational objectives:
Designate marine protected areas (MPAs)
Ensure space for wind energy at sea
MSP process objective:
Ensure coordination with neighbouring countries
Ensure cooperation between relevant national authorities
Ensure stakeholder input / involvement
Improve awareness of MSP issues
Ensure mapping of uses
Socio-economic Indicators
Overarching indicators:
Gross value added
Employment in coastal areas
Impact:
MWh of wind power generated at sea
Outcome:
MW of wind power generation capacity installed at sea
Outcome:
Time required to take decisions on maritime construction permits (within preapproved areas)
Outputs:
sq. nautical miles assigned for wind power installations and research
Maritime space assigned for wind energy out of the needed space
MSP process indicators:
In-depth consultations held with all neighbouring countries
Existence of institutionalised or non-institutionalised bodies linking relevant national authorities responsible for MSP and Blue Growth
Stakeholder satisfaction level
Number of visits at the relevant website
Maritime space mapped and showing coastal and maritime uses and pressures
MSP authorities control area
Sector specific objectives or indicators
Objectives or indicators relevant for all Blue economy sectors

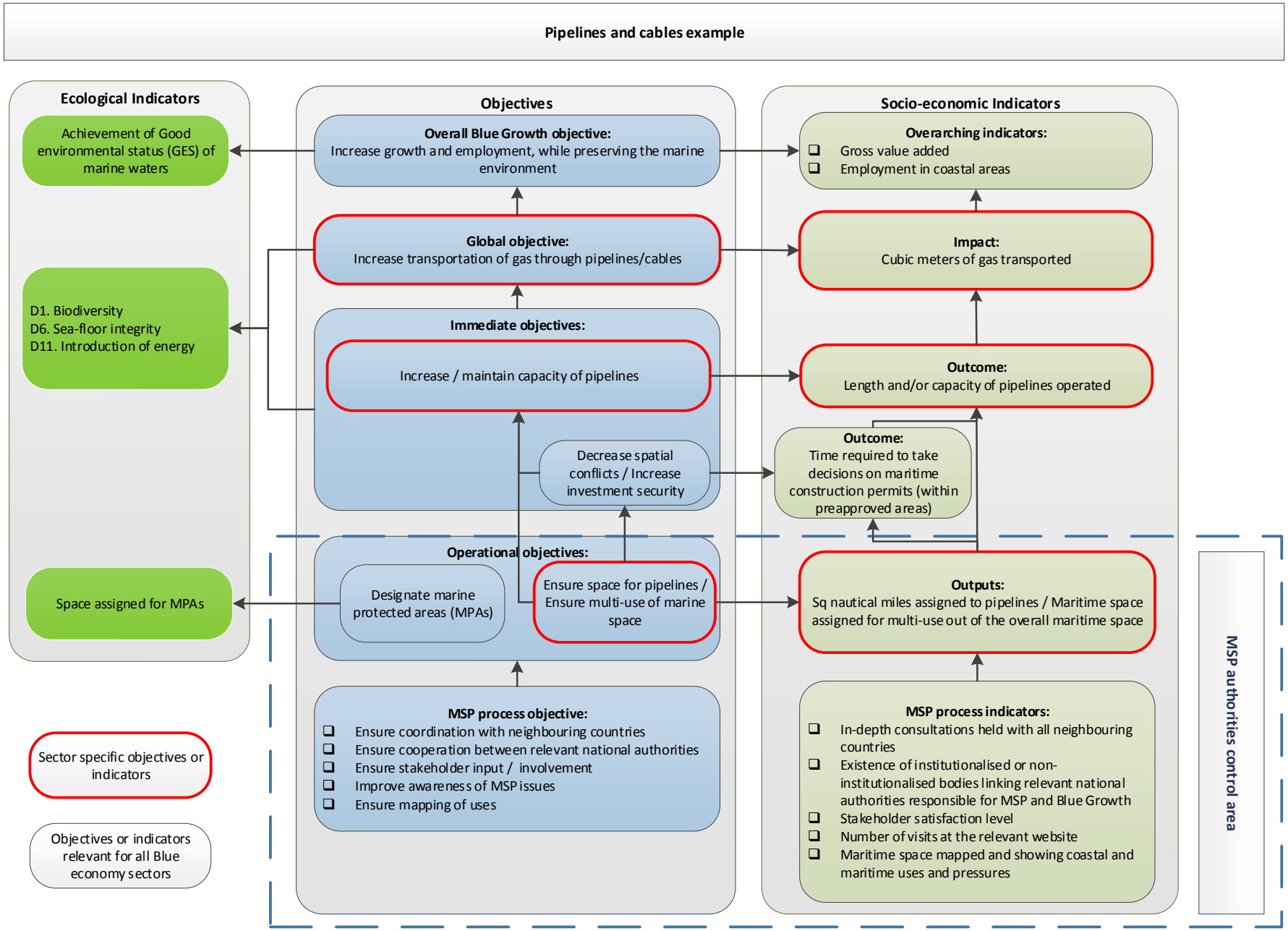

Tidal and wave energy example
Ecological Indicators
Achievement of Good environmental status (GES) of marine waters
D1. Biodiversity
D6. Sea-floor integrity
D7. Hydrographical conditions
D11. Introduction of energy
Space assigned for MPAs
Objectives
Overall Blue Growth objective:
Increase growth and employment, while preserving the marine environment
Global objective:
Increase tidal and wave energy generation
Immediate objectives:
Increase tidal and wave energy capacity
Decrease spatial conflicts / Increase investment security
Operational objectives:
Designate marine protected areas (MPAs)
Ensure space for tidal and wave energy
MSP process objective:
Ensure coordination with neighbouring countries
Ensure cooperation between relevant national authorities
Ensure stakeholder input / involvement
Improve awareness of MSP issues
Ensure mapping of uses
Socio-economic Indicators
Overarching indicators:
Gross value added
Employment in coastal areas
Impact:
MWh of tidal and wave energy generated
Outcome:
MW of tidal and wave energy capacity installed
Outcome:
Time required to take decisions on maritime construction permits (within preapproved areas)
Outputs:
sq. nautical miles assigned for tidal and wave energy
Maritime space assigned for tidal and wave energy out of the needed space
MSP process indicators:
In-depth consultations held with all neighbouring countries
Existence of institutionalised or non-institutionalised bodies linking relevant national authorities responsible for MSP and Blue Growth
Stakeholder satisfaction level
Number of visits at the relevant website
Maritime space mapped and showing coastal and maritime uses and pressures
MSP authorities control area
Sector specific objectives or indicators
Objectives or indicators relevant for all Blue economy sectors

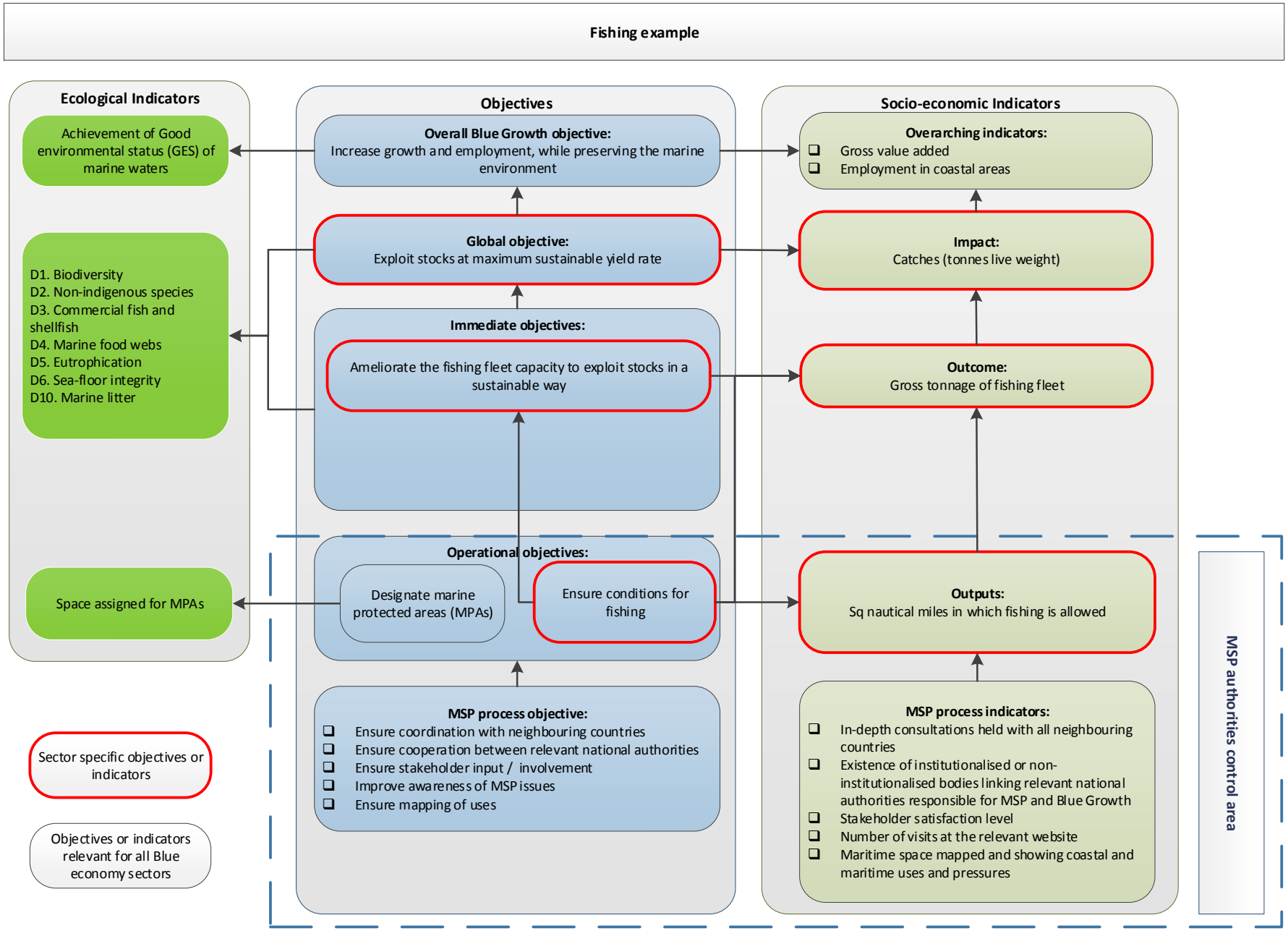

Tourism example
Ecological Indicators
Achievement of Good environmental status (GES) of marine waters
D1. Biodiversity
D2. Non-indigenous species
D5. Eutrophication
D8. Contaminants
D10. Marine litter
D11. Introduction of energy
Space assigned for MPAs
Objectives
Overall Blue Growth objective:
Increase growth and employment, while preserving the marine environment
Global objective:
Increase / maintain sustainable tourism and recreation in coastal and sea areas
Immediate objectives:
Increase / maintain capacity for sustainable tourism and recreation in coastal and sea areas
Decrease spatial conflicts / Increase investment security
Operational objectives:
Designate marine protected areas (MPAs)
Ensure maritime space for the Tourism and recreation sector
MSP process objective:
Ensure coordination with neighbouring countries
Ensure cooperation between relevant national authorities
Ensure stakeholder input / involvement
Improve awareness of MSP issues
Ensure mapping of uses
Socio-economic Indicators
Overarching indicators:
Gross value added
Employment in coastal areas
Impact:
Nights spent at tourist accommodation establishments in coastal areas
Outcome:
Number of establishments, bedrooms and bed-places in coastal areas
Outcome:
Time required to take decisions on maritime construction permits (within preapproved areas)
Outputs:
sq. nautical miles assigned for tourism and recreation
MSP process indicators:
In-depth consultations held with all neighbouring countries
Existence of institutionalised or non-institutionalised bodies linking relevant national authorities responsible for MSP and Blue Growth
Stakeholder satisfaction level
Number of visits at the relevant website
Maritime space mapped and showing coastal and maritime uses and pressures
MSP authorities control area
Sector specific objectives or indicators
Objectives or indicators relevant for all Blue economy sectors

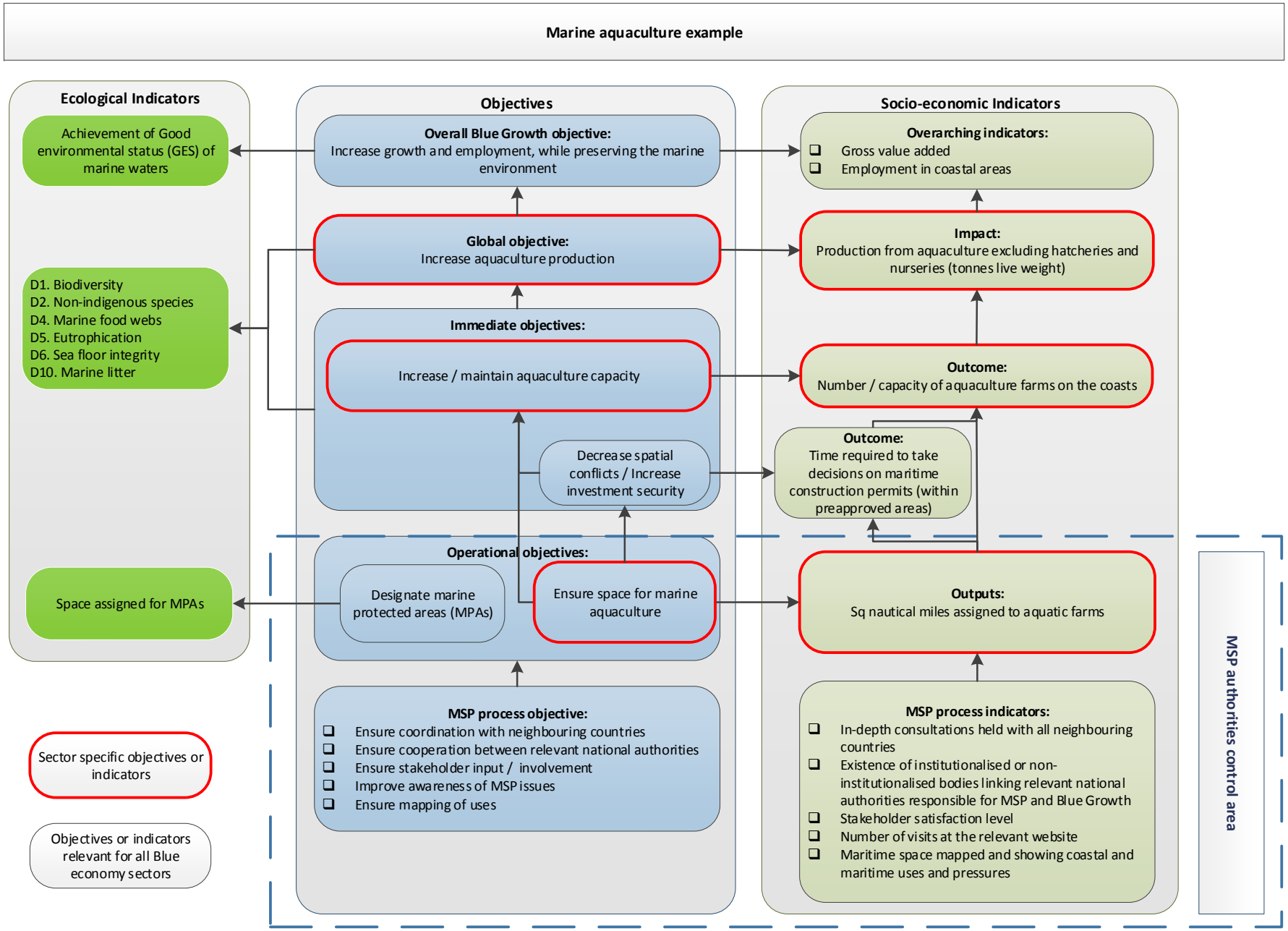

Marine aggregates example
Ecological Indicators
Achievement of Good environmental status (GES) of marine waters
D1. Biodiversity
D6. Sea-floor integrity
D7. Hydrographical conditions
D10. Marine litter
Space assigned for MPAs
Objectives
Overall Blue Growth objective:
Increase growth and employment, while preserving the marine environment
Global objective:
Increase/maintain marine aggregates extraction
Immediate objectives:
Decrease spatial conflicts / Increase investment security
Operational objectives:
Designate marine protected areas (MPAs)
Reserve sufficient areas at sea for extraction
MSP process objective:
Ensure coordination with neighbouring countries
Ensure cooperation between relevant national authorities
Ensure stakeholder input / involvement
Improve awareness of MSP issues
Ensure mapping of uses
Socio-economic Indicators
Overarching indicators:
Gross value added
Employment in coastal areas
Impact:
Million cubic meters of aggregates extracted per year
Outcome:
Time required to take decisions on maritime extraction permits (within preapproved areas)
Outputs:
sq. nautical miles assigned for marine extraction
MSP process indicators:
In-depth consultations held with all neighbouring countries
Existence of institutionalised or non-institutionalised bodies linking relevant national authorities responsible for MSP and Blue Growth
Stakeholder satisfaction level
Number of visits at the relevant website
Maritime space mapped and showing coastal and maritime uses and pressures
MSP authorities control area
Sector specific objectives or indicators
Objectives or indicators relevant for all Blue economy sectors


Ports and shipping example
Ecological Indicators
Achievement of Good environmental status (GES) of marine waters
All descriptors
Space assigned for MPAs
Objectives
Overall Blue Growth objective:
Increase growth and employment, while preserving the marine environment
Global objective:
Increase freight and passenger traffic via sea
Immediate objectives:
Increase / maintain shipping capacity
Decrease spatial conflicts / Increase investment security
Operational objectives:
Designate marine protected areas (MPAs)
Ensure unobstructed space for shipping
MSP process objective:
Ensure coordination with neighbouring countries
Ensure cooperation between relevant national authorities
Ensure stakeholder input / involvement
Improve awareness of MSP issues
Ensure mapping of uses
Socio-economic Indicators
Overarching indicators:
Gross value added
Employment in coastal areas
Impact:
Passengers transported to/from main ports
Gross weight of goods transported to/from main ports
Outcome:
Gross tonnage of vessels in the main ports
Outcome:
Time required to take decisions on maritime construction permits (within preapproved areas)
Outputs:
Sq. nautical miles of priority areas for ports and shipping
MSP process indicators:
In-depth consultations held with all neighbouring countries
Existence of institutionalised or non-institutionalised bodies linking relevant national authorities responsible for MSP and Blue Growth
Stakeholder satisfaction level
Number of visits at the relevant website
Maritime space mapped and showing coastal and maritime uses and pressures
MSP authorities control area
Sector specific objectives or indicators
Objectives or indicators relevant for all Blue economy sectors


Oil and gas production example
Ecological Indicators
Achievement of Good environmental status (GES) of marine waters
D1. Biodiversity
D6. Sea-floor integrity
D7. Hydrographical conditions
D11. Introduction of energy
Space assigned for MPAs
Objectives
Overall Blue Growth objective:
Increase growth and employment, while preserving the marine environment
Global objective:
Increase / maintain oil and gas production at sea
Immediate objectives:
Increase / maintain oil and gas production capacity at sea
Decrease spatial conflicts / Increase investment security
Operational objectives:
Designate marine protected areas (MPAs)
Ensure space for offshore oil and gas installations
MSP process objective:
Ensure coordination with neighbouring countries
Ensure cooperation between relevant national authorities
Ensure stakeholder input / involvement
Improve awareness of MSP issues
Ensure mapping of uses
Socio-economic Indicators
Overarching indicators:
Gross value added
Employment in coastal areas
Impact:
Tonnes of oil per day extracted
Cubic meters of gas per day extracted
Outcome:
Capacity of oil / gas installations at sea
Outcome:
Time required to take decisions on maritime construction permits (within preapproved areas)
Outputs:
Sq nautical miles assigned to exploration and exploitation of oil and gas fields
MSP process indicators:
In-depth consultations held with all neighbouring countries
Existence of institutionalised or non-institutionalised bodies linking relevant national authorities responsible for MSP and Blue Growth
Stakeholder satisfaction level
Number of visits at the relevant website
Maritime space mapped and showing coastal and maritime uses and pressures
MSP authorities control area
Sector specific objectives or indicators
Objectives or indicators relevant for all Blue economy sectors


Pipelines and cables example
Ecological Indicators
Achievement of Good environmental status (GES) of marine waters
D1. Biodiversity
D6. Sea-floor integrity
D11. Introduction of energy
Space assigned for MPAs
Objectives
Overall Blue Growth objective:
Increase growth and employment, while preserving the marine environment
Global objective:
Increase transportation of gas through pipelines/cables
Immediate objectives:
Increase / maintain capacity of pipelines
Decrease spatial conflicts / Increase investment security
Operational objectives:
Designate marine protected areas (MPAs)
Ensure space for pipelines / Ensure multi-use of marine space
MSP process objective:
Ensure coordination with neighbouring countries
Ensure cooperation between relevant national authorities
Ensure stakeholder input / involvement
Improve awareness of MSP issues
Ensure mapping of uses
Socio-economic Indicators
Overarching indicators:
Gross value added
Employment in coastal areas
Impact:
Cubic meters of gas transported
Outcome:
Length and/or capacity of pipelines operated
Outcome:
Time required to take decisions on maritime construction permits (within preapproved areas)
Outputs:
Sq nautical miles assigned to pipelines / Maritime space assigned for multi-use out of the overall maritime space
MSP process indicators:
In-depth consultations held with all neighbouring countries
Existence of institutionalised or non-institutionalised bodies linking relevant national authorities responsible for MSP and Blue Growth
Stakeholder satisfaction level
Number of visits at the relevant website
Maritime space mapped and showing coastal and maritime uses and pressures
MSP authorities control area
Sector specific objectives or indicators
Objectives or indicators relevant for all Blue economy sectors


Fishing example
Ecological Indicators
Achievement of Good environmental status (GES) of marine waters
D1. Biodiversity
D2. Non-indigenous species
D3. Commercial fish and shellfish
D4. Marine food webs
D5. Eutrophication
D6. Sea-floor integrity
D10. Marine litter
Space assigned for MPAs
Objectives
Overall Blue Growth objective:
Increase growth and employment, while preserving the marine environment
Global objective:
Exploit stocks at maximum sustainable yield rate
Immediate objectives:
Ameliorate the fishing fleet capacity to exploit stocks in a sustainable way
Operational objectives:
Designate marine protected areas (MPAs)
Ensure conditions for fishing
MSP process objective:
Ensure coordination with neighbouring countries
Ensure cooperation between relevant national authorities
Ensure stakeholder input / involvement
Improve awareness of MSP issues
Ensure mapping of uses
Socio-economic Indicators
Overarching indicators:
Gross value added
Employment in coastal areas
Impact:
Catches (tonnes live weight)
Outcome:
Gross tonnage of fishing fleet
Outputs:
Sq nautical miles in which fishing is allowed
MSP process indicators:
In-depth consultations held with all neighbouring countries
Existence of institutionalised or non-institutionalised bodies linking relevant national authorities responsible for MSP and Blue Growth
Stakeholder satisfaction level
Number of visits at the relevant website
Maritime space mapped and showing coastal and maritime uses and pressures
MSP authorities control area
Sector specific objectives or indicators
Objectives or indicators relevant for all Blue economy sectors


Marine aquaculture example
Ecological Indicators
Achievement of Good environmental status (GES) of marine waters
D1. Biodiversity
D2. Non-indigenous species
D4. Marine food webs
D5. Eutrophication
D6. Sea floor integrity
D10. Marine litter
Space assigned for MPAs
Objectives
Overall Blue Growth objective:
Increase growth and employment, while preserving the marine environment
Global objective:
Increase aquaculture production
Immediate objectives:
Increase / maintain aquaculture capacity
Decrease spatial conflicts / Increase investment security
Operational objectives:
Designate marine protected areas (MPAs)
Ensure space for marine aquaculture
MSP process objective:
Ensure coordination with neighbouring countries
Ensure cooperation between relevant national authorities
Ensure stakeholder input / involvement
Improve awareness of MSP issues
Ensure mapping of uses
Socio-economic Indicators
Overarching indicators:
Gross value added
Employment in coastal areas
Impact:
Production from aquaculture excluding hatcheries and nurseries (tonnes live weight)
Outcome:
Number / capacity of aquaculture farms on the coasts
Outcome:
Time required to take decisions on maritime construction permits (within preapproved areas)
Outputs:
Sq nautical miles assigned to aquatic farms
MSP process indicators:
In-depth consultations held with all neighbouring countries
Existence of institutionalised or non-institutionalised bodies linking relevant national authorities responsible for MSP and Blue Growth
Stakeholder satisfaction level
Number of visits at the relevant website
Maritime space mapped and showing coastal and maritime uses and pressures
MSP authorities control area
Sector specific objectives or indicators
Objectives or indicators relevant for all Blue economy sectors

APPENDICE 2: REFERENCE LIST

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