



R. Aps, R. Cormier, K. Kostamo, J. Kotta, L. Laamanen, J. Lappalainen, L. Lees, A. Peterson, R. Varjopuro

Deliverable 2.3.1 “Environmental management strategy for MSP”



ABSTRACT

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Authors: R. Aps, R. Cormier, K. Kostamo, J. Kotta, L. Laamanen, J. Lappalainen, L. Lees, A. Peterson, R. Varjopuro

Abstract:

The policymaking processes are dependent on vertical governance approaches which produce a hierarchy in the development of global, ecoregion, and regional goals to guide the development of national and local objectives and to allocate responsibility for their delivery. In a course of the Maritime Spatial Planning (MSP) the potential planning options will have to abide to legislation and regulatory requirements for the planning sea area provided that there are regional, national or international agreements, which will enable and/or force the environmental management measures to be performed. The use of international standards available under the International Organization for Standardization (ISO) can avoid the need to develop a framework and debate definitions. The updated ISO 31000 2018 provides definitions, performance criteria and a common overarching process for identifying, analysing, evaluating and managing risks within a policy context initiative. Importantly, the Bow-tie as a diagrammatic representation of the complex relations between the risks and management is leading to better communication and understanding of the risks with third parties and is facilitating regulatory discussions with industry because the the Bow-tie is an ISO standard method. Facilitating adherence with unifying framework for marine environmental management is promoting the use of valuable problem-structuring DAPSI(W)R(M) (pronounced dap-see-worm) framework in which Drivers of basic human needs require Activities which lead to Pressures. The Pressures are the mechanisms of State change on the natural system which then leads to Impacts (on human Welfare). Those then require Responses (as Measures). It is suggested to enhance common understanding and language for evaluating ecosystem risk management measures in MSP. It is also suggested to establish horizontal integration of stakeholders, linked to the DAPSI(W)R(M) framework, that is composed of Regulators, Extractors, Inputters, Affectees, Influencers and Beneficiaries and to incorporate all MSP related stakeholders in the framework designed to ensure that the human activities and their pressures are managed effectively to reach the broader policy goals and objectives. The 10-tenets of adaptive environmental management and sustainability for the successful and sustainable development provide for comprehensive quality considerations and are considered as environmental management Quality Objectives for the maritime spatial plan.

The aim of the study was to outline the “Environmental management strategy for MSP” with aim to provide general guidance to planners, decision makers and stakeholders in improving the competitiveness and effectiveness of maritime planning activities existing within the national marine jurisdiction while at the same time maintaining and improving marine ecosystems resilience, conserving biodiversity and restoring degraded habitats to achieve the MSP related environmental policy objectives.

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1 Introduction

The multiple competing uses of marine and coastal areas have resulted in a rapid increase of maritime spatial planning (MSP) initiatives to safeguard sustainable use of marine resources as well as to mitigate cross-sectoral and transboundary conflicts over the use of sea space (Stelzenmüller et al. 2015). Ehler and Douvère (2009) define MSP as a public process of analyzing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that are usually specified through a political process.

EU Roadmap for Maritime Spatial Planning (EC 2008) considers MSP as a tool for improved decision-making that provides a framework for arbitrating between competing human activities and managing their impact on the marine environment with objective to balance sectoral interests and to achieve sustainable use of marine resources.

The EU Directive establishing a framework for maritime spatial planning (EC 2014) defines objectives of MSP as follows “When establishing and implementing maritime spatial planning, Member States shall consider economic, social and environmental aspects to support sustainable development and growth in the maritime sector, applying an ecosystem-based approach, and to promote the coexistence of relevant activities and uses. Through their maritime spatial plans, Member States shall aim to contribute to the sustainable development of energy sectors at sea, of maritime transport, and of the fisheries and aquaculture sectors, and to the preservation, protection and improvement of the environment, including resilience to climate change impacts”.

In a course of MSP the potential planning options will have to abide to legislation and regulatory requirements for the planning sea area provided that there are regional, national or international agreements, which will enable and/or force the environmental management measures to be performed (Cormier et al. 2015). It is stated further that the inventory of significant legislation and policies should be carried out to ensure that the management measures will be enforceable as well as to ensure that the activities can take place in compliance with existing legislation while the governance framework will also involve agreements and treaties as well as formal legislative instruments such as acts and directives. It is added also that this information is especially important during the risk analysis to determine the inherent risk of existing management measures and in risk evaluation to determine the residual risks of the management options being considered.

According to ISO 31000 (2018) the risk is the “effect of uncertainty on objectives” and an effect may be a positive or negative deviation from what is expected. It is stated further that the risk analysis is a process that is used to understand the nature, sources, and causes of the risks that are identified and to estimate the level of risk used also to study impacts and consequences and to examine the controls that currently exist. Risk evaluation is a process that is used to compare risk analysis results with risk criteria in order to determine whether or not a specified level of risk is acceptable or tolerable.

It is stated (Stelzenmüller 2018) that the marine ecosystems are increasingly threatened by the cumulative effects of multiple human pressures and the Cumulative Effects Assessments (CEAs) are needed to inform environmental policy and guide ecosystem-based management. It is shown further that a risk-based approach to CEAs decreases complexity and allows for the transparent treatment of uncertainty and streamlines the uptake of scientific outcomes into the science-policy interface by bridging the gap between science and decision-making in ecosystem-based management.

The 10-tenets of adaptive environmental management and sustainability for the successful and sustainable development (Barnard and Elliott 2015) provide for comprehensive quality considerations for the maritime spatial plan. It is suggested (Cormier et al. 2015) to use the 10-tenets of adaptive environmental management and sustainability as the MSP related environmental management Quality Objectives.

The aim of the study was to outline the “Environmental management strategy for MSP” with aim to provide general guidance to planners, decision makers and stakeholders in improving the competitiveness and effectiveness of maritime planning activities existing within the national marine jurisdiction while at the same time maintaining and improving marine ecosystems resilience, conserving biodiversity and restoring degraded habitats to achieve the MSP related environmental policy objectives.

2 Strategic priorities

2.1 Strategic Priority 1: Abide to legislation and regulatory requirements

It is stated (Cormier et al. 2019) that the “Policymaking processes are dependent on vertical governance approaches which produce a hierarchy in the development of global, ecoregion, and regional goals to guide the development of national and local objectives and to allocate responsibility for their delivery”.

This Strategic Priority is focusing on legislation and regulatory requirements related to marine protected areas, fisheries and navigation in the MSP context.

2.1.1 Marine protected areas

2.1.1.1 United Nations Convention on the Law of the Sea (LOSC)

Referring to LOSC (UN 1982) Article 192 “States have the sovereign right to exploit their natural resources pursuant to their environmental policies and in accordance with their duty to protect and preserve the marine environment”. Further, according to LOSC Article 194(1) “States shall take, individually or jointly as appropriate, all measures consistent with this Convention, that are necessary to prevent, reduce and control pollution of the marine environment from any source, using for this purpose the best practicable means at their disposal and in accordance with their capabilities and they shall endeavour to harmonize their policies in this connection”.

2.1.1.2 The United Nations Convention on Biological Diversity (CBD)

It is stated in Article 3 of the CBD (UN 1992) that “States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction”.

According to CBD (UN 1992) Article 4 the “Subject to the rights of other States, and except as otherwise expressly provided in this Convention, the provisions of this Convention apply, in relation to each Contracting Party: (a) In the case of components of biological diversity, in areas within the limits of its national jurisdiction; and (b) In the case of processes and activities, regardless of where their effects occur, carried out under its jurisdiction or control, within the area of its national jurisdiction or beyond the limits of national jurisdiction”.

Article 8 of the Convention (UN 1992) specifies the following responsibilities for Contracting Parties in relation to protected areas, ecosystems and natural habitats within national jurisdiction: (a) Establish a system of protected areas or areas where special measures need to be taken to conserve biological diversity; (b) Develop, where necessary, guidelines for the selection, establishment and management of protected areas or where special measures need to be taken to conserve biological diversity; (c) Regulate or manage biological resources important for the conservation of biological diversity whether within or outside protected areas, with a view to ensuring their conservation or sustainable use; (d) Promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings; (e) Promote environmentally sound and sustainable development in areas adjacent to protected areas with a view to furthering protection of these areas.

2.1.1.3 The United Nations Convention on environmental impact assessment in a transboundary context (Espoo Convention)

The UN Espoo Convention (UN 1991) Article 2(1) stipulates “The Parties shall, either individually or jointly, take all appropriate and effective measures to prevent, reduce and control significant adverse transboundary environmental impact from proposed activities”. Further, referring to Article 2(3) “The Party of origin shall ensure that in accordance with the provisions of this Convention an environmental impact assessment is undertaken prior to

a decision to authorize or undertake a proposed activity listed in Appendix I that is likely to cause a significant adverse transboundary impact” and according to Article 2 (5) “Concerned Parties shall, at the initiative of any such Party, enter into discussions on whether one or more proposed activities not listed in Appendix I is or are likely to cause a significant adverse transboundary impact and thus should be treated as if it or they were so listed. Where those Parties so agree, the activity or activities shall be thus treated”. Finally, as stated in Article 2(7) “Environmental impact assessments as required by this Convention shall, as a minimum requirement, be undertaken at the project level of the proposed activity. To the extent appropriate, the Parties shall endeavour to apply the principles of environmental impact assessment to policies, plans and programmes”.

2.1.1.4 International Maritime Organization (IMO) Conventions and Resolutions

A Particularly Sensitive Sea Areas (PSSA) are defined by IMO (2005) as an “area which needs special protection through action by IMO because of its significance for recognized ecological or socio-economic or scientific reasons and which may be vulnerable to environmental damage by maritime activities”.

Referring to IMO (2005) the Baltic Sea Area has some of the densest maritime traffic in the world. The Baltic Sea was designated a Particularly Sensitive Sea Area (PSSA) at IMO Marine Environment Protection Committee’s 53rd session in July 2005.

2.1.1.5 European Community

The Council Directive of 2 April 1979 on the conservation of wild birds (79/409/EEC) - Birds Directive (EC 2009) and Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora - Habitats Directive (EC 1992) are providing the legal background and the tools to be used for the establishment of MPAs. The Birds Directive promotes the establishment of Special Protected Areas (SPAs) for birds, while Special Areas of Conservation (SACs) for habitats or species are implemented through the Habitats Directive.

Directive 2008/56/EC (EC 2008b) of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive) specifies that “Programmes of measures established pursuant to this Article shall include spatial protection measures, contributing to coherent and representative networks of marine protected areas, adequately covering the diversity of the constituent ecosystems, such as special areas of conservation pursuant to the Habitats Directive, special protection areas pursuant to the Birds Directive, and marine protected areas as agreed by the Community or Member States concerned in the framework of international or regional agreements to which they are parties”. Thus the Directive proposes the use of legal instruments contributing to a structured spatial environment protection measures which essentially could be part of MSP by the Member states.

2.1.1.6 The Convention on the Protection of the Marine Environment of the Baltic Sea Area (Helsinki Convention)

Helsinki Convention, Paragraph 7(1) (HELCOM 1992) stipulates that “Whenever an environmental impact assessment of a proposed activity that is likely to cause a significant adverse impact on the marine environment of the Baltic Sea Area is required by international law or supra-national regulations applicable to the Contracting Party of origin, that Contracting Party shall notify the Commission and any Contracting Party which may be affected by a transboundary impact on the Baltic Sea Area. It is further required by Paragraph 7(2) that “The Contracting Party of origin shall enter into consultations with any Contracting Party which is likely to be affected by such transboundary impact, whenever consultations are required by international law or supra-national regulations applicable to the Contracting Party of origin.

And finally, the Paragraph 7(3) of Helsinki Convention (HELCOM 1992) is imposing on Parties a duty “Where two or more Contracting Parties share transboundary waters within the catchment area of the Baltic Sea, these Parties shall cooperate to ensure that potential impacts on the marine environment of the Baltic Sea Area are fully investigated within the environmental impact assessment referred to in paragraph 1 of this Article. The Contracting Parties concerned shall jointly take appropriate measures in order to prevent and eliminate pollution including cumulative deleterious effects”.

According to HELCOM Recommendation 15/5 (HELCOM 1994) on a System of Coastal and Marine Baltic Sea Protected Areas appropriate measures have been taken by parties to establish a system of coastal and marine Baltic Sea Protected Areas (BSPAs). It is stated in Recommendation that “management plans be established for each BSPA to ensure nature protection and sustainable use of natural resources. These management plans shall consider all possible negatively affecting activities, such as extraction of sand, stone and gravel; oil and gas exploration and exploitation; dumping of solid waste and dredged spoils; constructions; waste water from industry, municipalities and households; intensive agriculture and intensive forestry; aquaculture; harmful fishing practices; tourism; transport of hazardous substances by ship through these areas; military activities. In some areas a zoning system will be an appropriate means to facilitate the achievement of satisfactory protection”.

2.1.2 Fisheries

2.1.2.1 United Nations Convention on the Law of the Sea (LOSC)

According to LOSC Article 2(1) (UN 1982) “The sovereignty of a coastal State extends, beyond its land territory and internal waters and, in the case of an archipelagic State, its archipelagic waters, to an adjacent belt of sea, described as the territorial sea” meaning that all natural resources, including living resources found in the territorial sea or waters landward of it are under the sovereignty of the coastal State. LOSC Article 56 (1) specifies that “In the exclusive economic zone, the coastal State has: (a) sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living, of the waters superjacent to the seabed and of the seabed and its subsoil, and with regard to other activities for the economic exploitation and exploration of the zone, such as the production of energy from the water, currents and winds” (UN 1982).

Referring to LOSC Article 62 (1) (UN 1982) “The coastal State shall promote the objective of optimum utilization of the living resources in the exclusive economic zone”. LOSC Article 62 (4) stipulates that “Nationals of other States fishing in the exclusive economic zone shall comply with the conservation measures and with the other terms and conditions established in the laws and regulations of the coastal State” (UN 1982). LOSC Article 63 (1) requires that “Where the same stock or stocks of associated species occur within the exclusive economic zones of two or more coastal States, these States shall seek, either directly or through appropriate subregional or regional organizations, to agree upon the measures necessary to coordinate and ensure the conservation and development of such stocks” (UN 1982).

2.1.2.2 European Community

Referring to EU Regulation 1380/2013 of the European Parliament and of the Council on the Common Fisheries Policy Article 8 (1) (EU 2013) “The Union shall, while taking due account of existing conservation areas, endeavour to establish protected areas due to their biological sensitivity, including areas where there is clear evidence of heavy concentrations of fish below minimum conservation reference size and of spawning grounds. In such areas fishing activities may be restricted or prohibited in order to contribute to the conservation of living aquatic resources and marine ecosystems. The Union shall continue to give additional protection to existing biologically sensitive areas”. It is further added that for those purposes “Member States shall identify, where possible, suitable areas which may form part of a coherent network and shall prepare, where appropriate, joint recommendations in accordance with Article 18(7) with a view to the Commission submitting a proposal in accordance with the Treaty”. Finally, as stated in Article 18 (7) the “Member States having a direct management interest in a fishery in a defined geographical area may also make joint recommendations to the Commission on measures to be proposed or adopted by the Commission.

2.1.3 Navigation

With regard to safety of navigation the United Nations Convention on the Law of the Sea (LOSC) (UN 1982) confines itself referring to the competent international organization - the International Maritime Organization

(IMO)¹. IMO is recognized as the only international body responsible for establishing and recommending measures on an international level concerning ships' routing.

According to IMO General Provisions on Ships' Routing (GPSR) (IMO 1985) [8] the purpose of ships' routing is to improve the safety of navigation in converging areas and in areas where the density of traffic is great or where freedom of movement of shipping is inhibited by restricted sea-room, the existence of obstructions to navigation, limited depths or unfavorable meteorological conditions and the routing system is defined as any system of one or more routes or routing measures aimed at reducing the risk of casualties including the traffic separation schemes, two-way routes, recommended tracks, areas to be avoided, inshore traffic zones, roundabouts, precautionary areas and deep water routes.

The IMO GPSR Article 5.3 (IMO 1985) states that "when planning, establishing, reviewing or adjusting a routing system, the following factors shall be among those taken into account by Government: 1) their rights and practices in respect of the exploitation of living and mineral resources, 2) previously established routing systems in adjacent waters, whether or not under the proposing Government's jurisdiction, 3) the existing traffic pattern in the area concerned, including coastal traffic, crossing traffic, naval exercise areas and anchorage areas, 4) foreseeable changes in the traffic pattern resulting from port or offshore terminal developments, 5) the presence of fishing grounds, 6) existing activities and foreseeable developments of offshore exploration or exploitation of the seabed and subsoil, 7) the adequacy of existing aids to navigation, hydrographic surveys and nautical charts of the area, 8) environmental factors including prevailing weather conditions, tidal streams and currents and the possibility of ice concentrations, and 9) the existence of environmental conservation areas and foreseeable developments in the establishment of such areas".

It is generally recognized that the Baltic Sea offers a wealth of resources that can be sustainably utilized to harvest energy while ensuring that energy interests can coexist with other spheres of activity. The offshore energy production is considered to be one of the main drivers of MSP in the Baltic Sea Region. According to IMO (2016) in planning to establish multiple structures at sea, including but not limited to wind turbines "Governments should take into account, as far as practicable, the impact these could have on the safety of navigation, including any radar interference. Traffic density and prognoses, the presence or establishment of routing measures in the area, and the manoeuvrability of ships and their obligations under the 1972 Collision Regulations should be considered when planning to establish multiple structures at sea. Sufficient manoeuvring space extending beyond the side borders of traffic separation schemes should be provided to allow evasive manoeuvres and contingency planning by ships making use of routing measures in the vicinity of multiple structure areas". It is stated further that the routing system selected for a particular area should aim at providing safe passage for ships through the area without unduly restricting legitimate rights and practices and taking account of anticipated or existing navigational hazards (IMO 2016).

The Confederation of European Shipmasters' Associations (CESMA)² has provided the summary of the most important international regulations that are decisive for the minimum distance from the border of a route to the area with multiple objects, e.g. wind turbines, which can be navigated by vessels.

The IMO Maritime Safety Committee (IMO 2003), with a view to ensuring the proper development, drafting, and submission of proposals for ships' routing systems and ship reporting systems, approved a "Guidance Note on the Preparation of Proposals on Ships' Routing Systems and Ship Reporting Systems" [17]. Referring to proposals intended to protect the marine environment, the proposal should state whether the proposed routing system can reasonably be expected to significantly prevent or reduce the risk of pollution or other damage to the marine environment of the area concerned.

The IMO GPSR Article 3.8 (IMO 1985) stipulates that "A Government proposing a new routing system or an amendment to an adopted routing system, any part of which lies beyond its territorial sea, should consult IMO so that such system may be adopted or amended by IMO for international use. Such Government should furnish all relevant information, in particular with regard to the number, edition and where possible the geodetic datum of the reference chart used for the delineation of the routing system".

¹ IMO. <http://www.imo.org/en/Pages/Default.aspx>

² CESMA. International regulations and guidelines for maritime spatial planning related to safe distances to multiple offshore structures (e.g. wind farms). Confederation of European Shipmasters' Associations. <http://www.cesma-eu.org/MSP.pdf>

2.2 Strategic Priority 2: Provide knowledge to promote adaptive and sustainable Maritime Spatial Planning

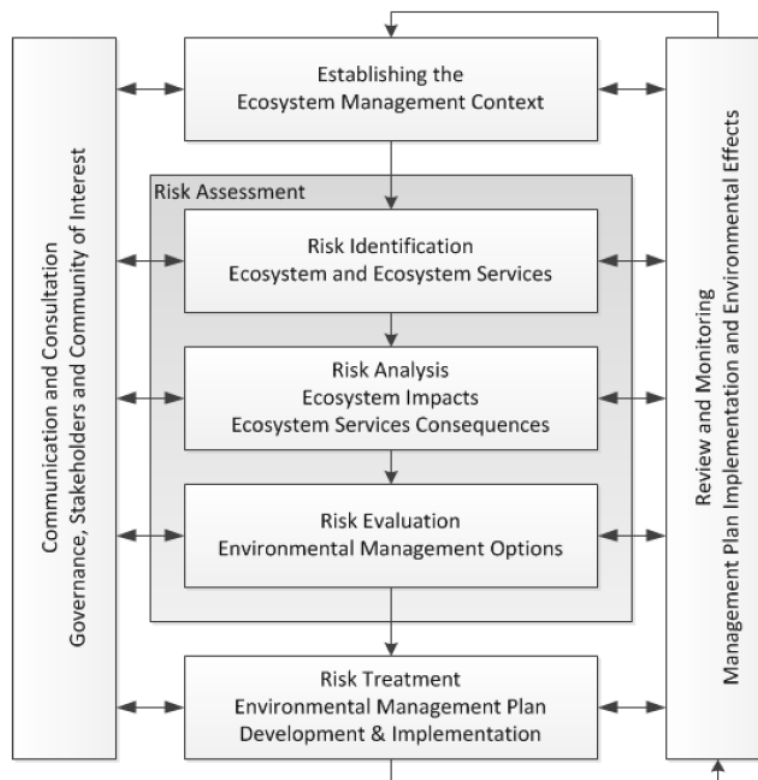
Strategic objective for data and information management is to produce knowledge products and information tools to facilitate knowledge and understanding of economic potential, the natural functioning of ecosystems, human impact on the marine environment with aim to promote the sustainable MSP activities.

This objective is achieved based on analysis of the comprehensive data sets on marine substrates, habitats and ecosystem functions as well as social/economic data on maritime human activities. Further, the existing knowledge products based on the analysis of the environmental and social/economic data are supplemented by new knowledge products such as visualizations of development trends and future scenarios. As a result, the data is transformed into useful knowledge products and information tools that are easily available, and effectively disseminated where required.

2.3 “Strategic Priority 3: Implement the ecosystem risk management framework for Maritime Spatial Planning

It is stated (Cormier and Kannen, 2019) that the objective of managing the risks in the MSP under development is to reduce the uncertainties of achieving environmental, social and economic objectives once implemented. It is added further that in risk management, the spatial and temporal allocations of a MSP should reduce the uncertainties of achieving development and conservation objectives. Finally, it is emphasized that in planning, there is a risk that the MSP does not address the development and conservation objectives that it was intended to achieve.

Based on analysis of various ecosystem risk assessment and risk management frameworks, the ISO 31000:2009 was recently linked to the ecosystem risk management approach (Cormier et al. 2013) (Figure 1).



Adapted: ISO 31000:2009

Figure 2.3.1. Ecosystem risk management framework adapted from ISO 31000:2009 risk management standard (Cormier et al. 2013).

It is argued further (Cormier et al. 2013) that “Within an ecosystem context, risk identification is used to identify the ecosystem vulnerabilities in relation to pressures generated from activities of the drivers operating within the boundaries of the ecosystem. Risk analysis is used to characterize the likelihood and magnitude of the ecosystem and socio-economic impacts, with additional consideration to existing regulations and policies used to manage the risks along the pathways of the causes and their effects. Risk evaluation is used to ascertain the severities of the risks to determine if status quo is acceptable or if there is need for additional or enhanced management measures”.

It is underlined (Cormier et al. 2018) that “Outside natural trends, the risk analysis considers that cumulative effects and impacts related to human activities reflect the effectiveness and, in some cases, the compliance of the operational control implemented through legislation, regulations, standards, and guidelines”. It is added that the cumulative effects and impacts are most likely the result of a lack of effectiveness of controls for meeting expected outcomes, a lack of consistency in the expected outcomes for the controls, a lack of coherence between the outcomes and the objectives to be met, or a lack of policy setting the objectives and goals together.

2.3.1 Establishing the ecosystem risk management context

It is argued (Cormier et al. 2015) that within the context of ecosystem-based management practices, such as the MSP, the context of the risk management initiative needs to establish the ecological and management basis for managing risks as they relate to potential environmental effects. It is further added that the geographical boundaries of the ecosystem and zone of influence of the drivers are used to define the management area and the scope of the potential environmental effects to be assessed while the risk management external context is also considered in terms of cultural, social, political, financial, technological, and economic factors, whereas the internal context includes the planner’s capacities and culture.

In the Baltic Sea Region context the MSP related Visions and Principles (Schultz-Zehden and Gee, 2013) and the HELCOM/VASAB “Baltic Sea broad-scale MSP principles” (HELCOM, 2010) are addressed and taken into account. The internal context of management includes the planner’s capacities and culture.

2.3.2 Risk assessment

Referring to ISO 31000 (ISO 2018) the “**Risk assessment** is a process that is made up of three separate processes: risk identification, risk analysis, and risk evaluation. Risk identification is a process that is used to find, recognize, and describe the risks that could affect the achievement of objectives. Risk analysis is a process that is used to understand the nature, sources, and causes of the risks that you have identified and to estimate the level of risk. It is also used to study impacts and consequences and to examine the controls that exist. Risk evaluation is a process that is used to compare risk analysis results with risk criteria in order to determine whether or not a specified level of risk is acceptable or tolerable”. The Bow-tie analysis ISO 31010:2009 (ISO 2009) is used in risk evaluation as the tools to evaluate options and make decisions as to risks that should be managed as well as the risks that will not be managed.

2.3.3 Risk treatment

Referring to Cormier et al. (2015) the ISO 31000 (ISO 2018) stipulates that “... **risk treatment** as the process of modifying risks by avoiding the risk, eliminating the sources of risk, reducing the likelihood of a risk through prevention or mitigating the consequences. Risk treatment and minimization is the practical intervention and management of human activities that will help to reduce the risks identified through planning the process. **The output of the risk treatment is the marine spatial plan.** Without the implementation of the plan, the marine spatial plan is only a conceptual or strategic document”. It is argued further that a **management measure** “... can eliminate the risks by controlling a driver’s access to the management area; can change the likelihood of the events by controlling the activities of the drivers operating in the management area; or, can change the magnitude or extent of the impacts, consequences or repercussions by mitigating the effects of the event, if it occurs”. It is

added that the new management measures should not generate new risk somewhere else in the management area or within the ecosystem boundaries. Importantly, according to ISO 31000 (ISO 2018) the “Risk treatment is a risk modification process. It involves selecting and implementing one or more treatment options. **Once a treatment has been implemented, it becomes a control or it modifies existing controls**”.

2.3.4 Review and monitoring

Referring to Cormier et al. (2015) the ISO 31000 stipulates that review and monitoring is the process of continuous checking, supervising, and critically observing the implementation of the risk management plan, the risks, and the controls to identify changes in the performance of the plan in terms of meeting requirements and expectations. **Review activities need to be conducted to determine if the plan is still suitable, adequate and effective in achieving objectives.** Accordingly, the planners and stakeholders are expected to review the MSP risk management framework and the related risk management processes focusing specifically on risk management policy and plans as well as the risks, risk criteria, risk treatments, risk management controls, and residual risks (risks left over after implementation of a risk treatment options).

2.3.5 Communication and consultation

Referring to ISO 31000 2018 (ISO 2018) “Communication and consultation is a dialogue between an organization and its stakeholders. This dialogue is both continual and iterative. It is a two-way process that involves both sharing and receiving information about the management of risk. **However, this is not joint decision making.** Once communication and consultation is finished, decisions are made and directions are set by the organization, not by stakeholders. Discussions could be about risks, their nature, form, likelihood, and significance, as well as whether or not risks are acceptable or should be treated, and what treatment options should be considered”.

It is stated by Cormier et al. (2015) that the governance and decision-making in MSP relies on extensive communication and consultation processes carried out throughout the entire planning process and also after implementation of the plan including both statutory and non-statutory consultees. It is argued further that effective communication means knowing the audience, involving the scientific experts if the discussion is of a technical nature, and differentiating between scientific and technical information from value judgments. Importantly, it is added that in contrast with value judgement such **communication and consultation processes facilitate an open exchange of factual information** allowing, in particular, the recognition of differences in terms of value judgements and the identification of associated risks that might otherwise generate strong resistance from a particular group against the plan or its measures.

2.4 Strategic Priority 4: Promote risk management to achieve and maintain good environmental status

The Maritime Spatial Planning Directive - MSPD (EU 2014) set the objectives of MSP activities within the context of environmental, economic and social aspects applying an ecosystem-based approach including preservation, protection and improvement of the environment as well as resilience to climate change. According to Article 5 of the MSPD (EU 2014) “When establishing and implementing maritime spatial planning, Member States shall consider economic, social and environmental aspects to support sustainable development and growth in the maritime sector, applying an ecosystembased approach, and to promote the coexistence of relevant activities and uses”. And it is specified further that “Through their maritime spatial plans, Member States shall aim to contribute to the sustainable development of energy sectors at sea, of maritime transport, and of the fisheries and aquaculture sectors, and to the preservation, protection and improvement of the environment, including resilience to climate change impacts. In addition, Member States may pursue other objectives such as the promotion of sustainable tourism and the sustainable extraction of raw materials”.

As mentioned in Article 1.3 of the EU Marine Strategy Framework Directive (MSFD) (EU 2008), “Marine strategies shall apply an ecosystem-based approach to the management of human activities, ensuring that the collective pressure of such activities is kept within levels compatible with the achievement of good environmental status”.

The cumulative effects assessment (CEA) is defined (Judd et al. 2015) as a “systematic procedure for identifying and evaluating the significance of effects from multiple sources/activities and for providing an estimate on the overall expected impact to inform management measures”. It is specified further that the analysis of the causes (source of pressures and effects), pathways and consequences of these effects on receptors is an essential and integral part of the process.

It is stated (Stelzenmüller 2018) that the marine ecosystems are increasingly threatened by the cumulative effects of multiple human pressures and the cumulative effect assessments (CEAs) are needed to inform environmental policy and guide ecosystem-based management. It is shown further that a risk-based approach to CEAs decreases complexity, allows for the transparent treatment of uncertainty and streamlines the uptake of scientific outcomes into the science-policy interface by bridging the gap between science and decision-making in ecosystem-based management.

It is argued (Cormier et al. 2018) that “In risk management, the risk is tied to the uncertainty of achieving objectives set by policy. Risks related to the likelihood of impacts identify and describe the potential for not achieving an objective if these risks are not managed. It is the implementation of operational controls that actually reduces the uncertainties of achieving objectives. Thus, it is the programme of measures that reduces the uncertainties of achieving and maintaining good environmental status”.

It is added (Cormier et al. 2018) that given that the output control plays a key role in defining the event in this Bowtie analysis, it implies that the collective pressures would need to be managed to meet the permitted levels set by the output controls collectively across the jurisdictions.

2.5 Strategic Priority 5: Facilitate adherence with unifying framework for marine environmental management

The marine environmental management relies on improved knowledge of the marine environment and is underpinned by a comprehensive spatial map series of the marine environment concerned. It allows move from coordinated sectoral environmental management to integrated environmental marine management and seeks to encourage, advance and expand sustainable development, conservation and protection in the sea area through an ecosystem-based management approach. MSP is seen as one of the important tools for ecosystem-based marine environmental management.

According to Elliott (2011) that “there is only one major idea in marine environmental management – to maintain and protect the ecological structure and functioning while at the same time ensure that it maintains ecosystem services from which society can obtain benefits”.

Referring to Elliott et al. (2017) the DPSIR framework being used for a long time as a valuable problem-structuring framework is extended to DAPSI(W)R(M) (pronounced dap-see-worm) in which “Drivers of basic human needs require Activities which lead to Pressures. The Pressures are the mechanisms of State change on the natural system which then leads to Impacts (on human Welfare). Those then require Responses (as Measures)” It is added further that “This recognises that the Pressures are the mechanisms of change, that it is human Activities that cause Pressures not the Drivers themselves, and that Impacts are on human Welfare”. It is specified further that “Most importantly, it is axiomatic that while we assess, measure and monitor the Pressures, State changes and Impacts (on Welfare), **we act on and manage the Drivers and Activities to prevent deleterious effects**”.

It is argued (Elliott et al 2017) that linking Bow-tie method to the DAPSI(W)R(M) framework, “... enables scoping, identification and analysis of: the Drivers leading to the main events (through Activities and Pressures); anticipatory prevention measures (management Responses as Measures), including those limiting the severity of the main event; the consequences of the events (State changes and Impacts on Welfare), and mitigation and compensation measures (management Responses as Measures) aimed at minimising those consequences”. It is added further that referring to the MSP outcome solutions for spatial and temporal management of the activities of the drivers that introduces pressures within the marine ecosystem, an event is described in terms of having

the potential of not achieving an ecosystem management objectives as they relate to ecosystem components or ecosystem services (cultural, social or economic consequences due to the loss of a valued ecosystem services). According to ICES (2014) the “Bow-tie analysis appears to be a helpful method and instrument for structuring varied and multi-faceted information. It coherently brings together information from different disciplines and different levels into a transparent, logical and defensible framework. This is important in the MSP context which necessitates the cooperation of different disciplines operating at different scales and levels (e.g. local-regional-international-ecosystem scales; operational-tactical-strategic levels). By integrating and sharing this information in a well-structured diagrammatic representation, it builds on mutual understanding between experts and practitioners from different disciplines that need to work together on the formulation and prioritisation of risk-based management options for decision-making”. It is argued further that Bow-tie is bridging the science and management by not only structuring the scientific information on risks and management options but also by documenting the legislation and policies used for management. It is added that the Bow-tie as a diagrammatic representation of the complex relations between the risks and management is leading to better communication and understanding of the risks with third parties and is facilitating regulatory discussions with industry because the Bow-tie is an ISO standard method (ICES 2014) (Figure 2).

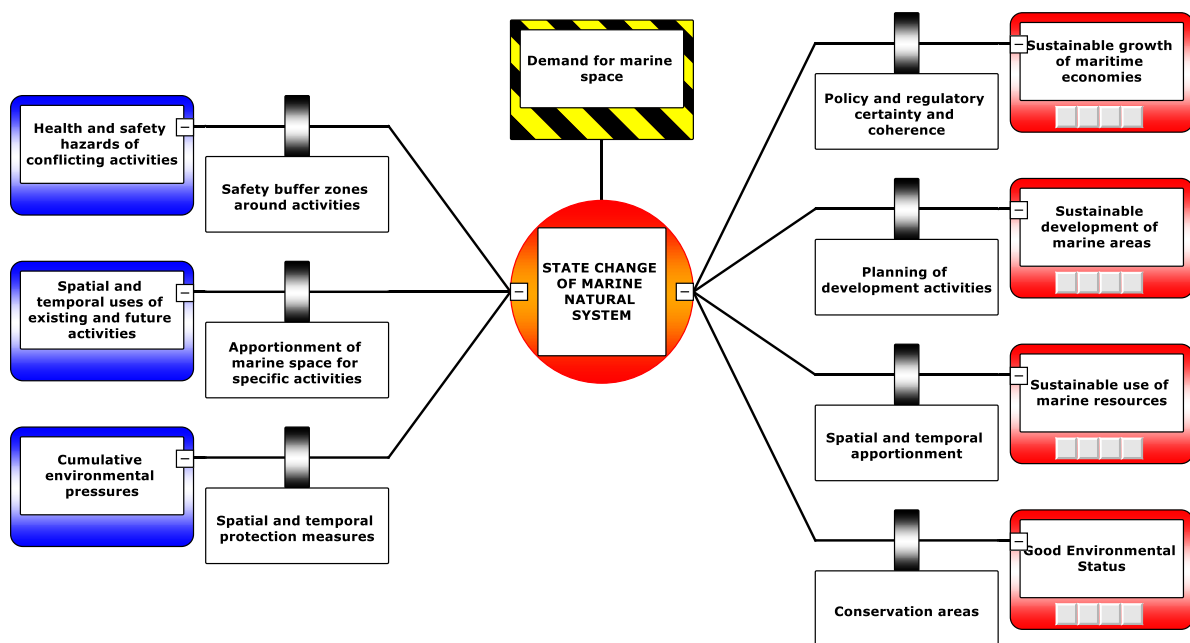


Figure 2.5.1. Bowtie diagrammatic representation of the Maritime Spatial Planning related prevention and mitigation management measures to achieve the environmental, economic and social sustainability objectives (modified from Cormier et al. 2015).

2.6 Strategic Priority 6: Enhance common understanding and language for evaluating ecosystem risk management measures in MSP

It is stated (Cormier and Kannen, 2019) that “Without standardized processes and harmonized vocabulary, the various approaches and processes used in integrated oceans management and MSP continue to propagate a broad range of definitions, concepts and understandings that are most often implied, not explicitly defined and therefore provoke misunderstandings between planners from different countries and/or sectors as well as between planners and stakeholders”. It is added that the use of international standards, such as the ones available under ISO, can avoid the need to develop a framework and debate definitions while the updated in 2018, ISO 31000 provides definitions, performance criteria and a common overarching process for identifying, analysing, evaluating and managing risks within a policy context initiatives.

2.7. Strategic Priority 7: Establish horizontal integration of stakeholders across levels of governance

Referring to predefined typology of stakeholders (Newton and Elliott 2016), it is suggested (Cormier et al. 2019) to establish horizontal integration of stakeholders, linked to the DAPSI(W)R(M) framework, that is composed of Regulators, Extractors, Inputters, Affectees, Influencers and Beneficiaries and to incorporate all stakeholders in the framework designed to ensure that sector activities and their pressures are managed effectively to reach the broader policy goals and objectives. It is further specified that the “Extractors (those taking resources such as fish, water or space out of the system) and Inputters (those putting materials and structures into the seas) are the stakeholders that generate endogenic and exogenic pressures from their activities (i.e. the D, A, P). They also play a key role in the development of prevention controls that would be led by the Regulators who manage (via the R(M)) the endogenic pressures to ensure that these controls can be efficiently implemented. The Affectees (those affected by any impacts) are the stakeholders being adversely affected by the state changes and impacts (on human welfare) (the S, I(W)) because the pressures were not effectively managed. The Beneficiaries are those benefitting from resource use and therefore having a stake in maintaining the resource availability (i.e. the benefit from the welfare being recognised by I(W)). However, both the Affectees and Beneficiaries are key consultees on the development of mitigation and recovery controls led by the Regulators who manage the impacts”. It is added that In a Bow-tie analysis, each national authority and geopolitical level constitutes a management control to coordinate the development and implementation of controls for endogenic managed pressures and exogenic unmanaged pressures to avoid a state change and achieve environmental objectives. It is specified further that the Bow-tie analysis suggests that the horizontal integration of agencies and stakeholders is enabling alignment of sector prevention controls to achieve a common objective for the acceptable level of state change while avoiding negative consequences for human well-being and the need for mitigative or recovery controls.

2.8 Strategic Priority 8: Assure the quality of the Maritime Spatial Plan

The 10-tenets of adaptive environmental management and sustainability for the successful and sustainable development (Barnard and Elliott 2015) provide for comprehensive quality considerations for the maritime spatial plan. It is suggested (Cormier et al. 2015) to use the 10-tenets of adaptive environmental management and sustainability as the Maritime Spatial Planning related environmental management Quality Objectives. Environmental management should be:

- 1) **Environmentally / ecologically sustainable:** that the measures will ensure that the ecosystem features and functioning and the fundamental and final ecosystem services are safeguarded;
- 2) **Technologically feasible:** that the methods, techniques and equipment for ecosystem protection are available;
- 3) **Economically viable:** that a cost-benefit assessment of environmental management indicates viability and sustainability;
- 4) **Socially desirable/tolerable:** that the environmental management measures are as required or at least are understood and tolerated by society as being required; that societal benefits are delivered;
- 5) **Legally permissible:** that there are regional, national or international agreements and/or statutes, which will enable and/or force the management measures to be performed;
- 6) **Administratively achievable:** that the statutory bodies such as governmental departments, environmental protection and conservation bodies are in place and functioning to enable successful and sustainable management;
- 7) **Politically expedient:** that the management approaches and philosophies are consistent with the prevailing political climate and have the support of political leaders.
- 8) **Ethically defensible:** that the environmental management measures that allow development at the risk of losing ecosystem services upon which people depend on are ethically defensible;
- 9) **Culturally inclusive:** that the environmental management measures also integrate cultural ecosystem consideration that may not have societal or economic value;
- 10) **Effectively communicable:** that the environmental management objectives are communicated and understood by all the stakeholders, especially to achieve the vertical and horizontal integration of the other nine tenets.

The environmental management Quality Objectives are addressed by the Maritime Spatial Planning process in consultation with competent authorities, industry stakeholders and communities of interest with aim to ensure the adequate integration of the ecological and socio-economic objectives and legislative requirements.

3 Executive summary

The aim of the study was to outline the “Environmental management strategy for MSP” with aim to provide general guidance to planners, decision makers and stakeholders in improving the competitiveness and effectiveness of maritime planning activities existing within the national marine jurisdiction while at the same time maintaining and improving marine ecosystems resilience, conserving biodiversity and restoring degraded habitats to achieve the MSP related environmental policy objectives.

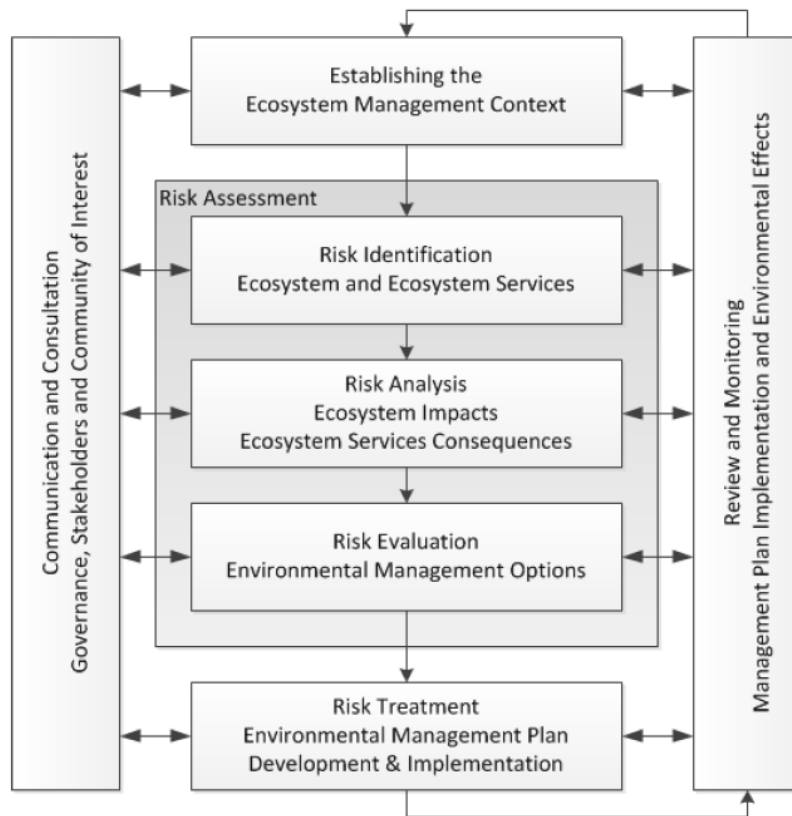
“Environmental management strategy for MSP” is comprised of eight sequential and interdependent Strategic Priorities:

1) “Strategic Priority 1: Abide to legislation and regulatory requirements”. Potential planning options have to abide to legislation and regulatory requirements for the planning area provided that there are regional, national or international agreements, which enable and/or enforce the environmental management measures to be performed.

2) “Strategic Priority 2: Provide knowledge to promote adaptive and sustainable Maritime Spatial Planning”. Strategic objective for data and information management is to produce knowledge products and information tools to facilitate knowledge and understanding of economic potential, the natural functioning of ecosystems, human impact on the marine environment with aim to promote the sustainable Maritime Spatial Planning activities.

3) “Strategic Priority 3: Implement the ecosystem risk management framework for Maritime Spatial Planning”. The aim of managing the ecosystem risks in the MSP context is to reduce the uncertainties of achieving environmental, social and economic objectives once implemented - in ecosystem risk management, the spatial and temporal allocations of a marine spatial plan should reduce the uncertainties of achieving development and conservation objectives.

Based on analysis of various ecosystem risk assessment and risk management frameworks the ISO 31000:2009 management standard was recently linked to the ecosystem risk management approach (Cormier et al 2013) (Figure 1).



Adapted: ISO 31000:2009

Figure 3.1. Ecosystem risk management framework adapted from ISO 31000:2009 risk management standard (Cormier et al. 2013).

4) “Strategic Priority 4: Promote risk management to achieve and maintain good environmental status” The risk management to achieve and maintain good environmental status is based on the implementation of operational controls that actually reduces the uncertainties of achieving objectives, and it is the programme of measures that reduces the uncertainties of achieving and maintaining good environmental status.

5) “Strategic Priority 5: Facilitate adherence with unifying framework for marine environmental management” The practical implementation of unifying framework for marine environmental management enables scoping, identification and analysis of the Drivers leading to the main events (through Activities and Pressures), anticipatory prevention measures (management Responses as Measures), including those limiting the severity of the main event, the consequences of the events (State changes and Impacts on Welfare), and mitigation and compensation measures (management Responses as Measures) aimed at minimising those consequences.

The Bow-tie as a diagrammatic representation of the complex relations between the risks and management is leading to better communication and understanding of the risks with third parties and is facilitating regulatory discussions with industry because the Bow-tie is an ISO standard method (Figure 2).

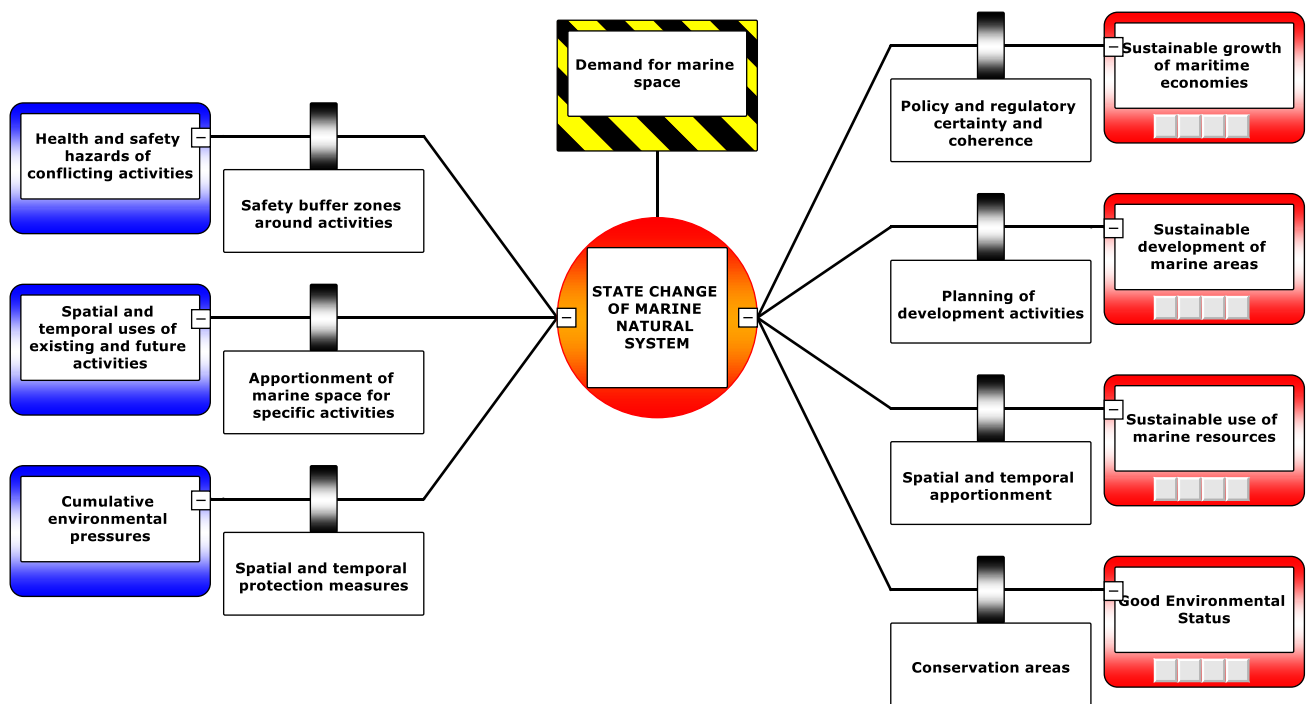


Figure 3.2. Bowtie diagrammatic representation of the Maritime Spatial Planning related prevention and mitigation management measures to achieve the environmental, economic and social sustainability objectives (modified from Cormier et al. 2015).

6) “Strategic Priority 6: Enhance common understanding and language for evaluating ecosystem risk management measures in MSP”. The use of international standards, such as the ones available under ISO, enable to avoid the need to develop a framework and debate definitions while the updated ISO 31000 2018 provides definitions, performance criteria and a common overarching process for identifying, analysing, evaluating and managing risks within a policy context initiatives.

7) “Strategic Priority 7: Establish horizontal integration of stakeholders across levels of governance”. Successful integrated marine management requires the coordination of many aspects - an assessment of the source, causes, and consequences of problems, the delivery of ecosystem services and societal benefits, the incorporation of governance from the local to the global, and implementing the ecosystem approach and the success of each of these requires the input from and often agreement with the stakeholders. The horizontal integration of stakeholders, linked to the DAPSI(W)R(M) framework, that is composed of Regulators, Extractors, Inputters, Affectees, Influencers and Beneficiaries enables to incorporate all stakeholders in the framework designed to ensure that sector activities and their pressures are managed effectively to reach the broader policy goals and objectives.

8) “Strategic Priority 8: Assure the quality of the Maritime Spatial Plan”. The 10-tenets of adaptive environmental management and sustainability for the successful and sustainable development provide for comprehensive quality considerations for the maritime spatial plan. Environmental management should be: 1) Environmentally / ecologically sustainable, 2) Technologically feasible, 3) Economically viable, 4) Socially desirable/tolerable, 5) Legally permissible, 6) Administratively achievable, 7) Politically expedient, 8) Ethically defensible, 9) Culturally inclusive, and 10) Effectively communicable. The environmental management Quality Objectives are addressed by the Maritime Spatial Planning process in consultation with competent authorities, industry stakeholders and communities of interest with aim to ensure the adequate integration of the ecological and socio-economic objectives and legislative requirements.

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