Pan Adriatic Scope

Adriatic-Ionian cooperation towards MSP

PAP/RAC

UN environment
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MINISTERO DELL'AMBIENTE E DELLA TUTELA DEL TERRITORIO E DEL MARE

ADRIATIC
Implementation of the ecosystem approach in the Adriatic through marine spatial planning

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List of acronyms

ABMT	Area-Based Management Tool
ABNJ	Area Beyond National Jurisdiction
AIR	Adriatic-Ionian Region
ALB	Albania
AZA	Allocated Zone for Aquaculture
BC	Barcelona Convention
B&H	Bosnia and Herzegovina
CAMP	Coastal Area Management Programme
CBD	Convention on Biological Diversity
CEA	Cumulative Effects Assessment
CF	Conceptual Framework
CKAN	Comprehensive Knowledge Archive Network
COP	Conference of the Parties
CP	Contracting Parties to the Barcelona Convention
CPMR	Conference of Peripheral Maritime Region
CRF	Common Regional Framework
CRO	Croatia
CSPD/BSR	Committee on Spatial Planning and Development of the Baltic Sea Region
DCM	Decision of the Council of Ministers
DPCM	(Italian) Prime Ministerial Decree
DPSIR	Driver, Pressure, State, Impact, Response
DPSWR	Drive, Pressure, State, Welfare, Response
DST	Decision Support Tool
EBSA	Ecologically or Biologically Significant Area
EC	European Commission
EEZ	Exclusive Economic Zone
EO	Ecological Objective
EU	European Union
EUSAIR	European Union Strategy for the Adriatic-Ionian Region
FAO	Food and Agriculture Organisation
FRA	Fisheries Restricted Area
GES	Good Environmental Status
GFCM	General Fisheries Commission of the Mediterranean
GIS	Geographic Information System
GRE	Greece
GSA	Geographical Sub-Area
H&BD	Habitat and Bird Directive
HD	Habitat Directive
HELCOM	Helsinki Commission
HOD	Heads of Delegation
ICZM	Integrated Coastal Zone Management
ICOM	Integrated Coastal and Ocean Management
IMAP	Integrated Monitoring and Assessment Programme
IMELS	Italian Ministry for Environment, Land and Sea Protection
IMO	International Maritime Organisation
ITA	Italy
LSI	Land-Sea Interaction
MAP	Mediterranean Action Plan
MES	Marine Ecosystem Service
MON	Montenegro
MPA	Marine Protected Areas
MSFD	Marine Strategy Framework Directive
MSP	Maritime Spatial Planning
MSPD	Maritime Spatial Planning Directive
MSPKC	Maritime Spatial Planning Knowledge Catalogue
MUC	Marine Use Conflicts
MTS	Mid-Term Strategy
NAPA	North Adriatic Ports Association
NGO	Non-Governmental Organisation
OECM	Other Effective Area-Based Conservation Measure
PAP/RAC	Priority Actions Programme/Regional Activity Centre
PoM	Programme of Measures
PSSA	Particularly Sensitive Sea Area
O&G	Oil and Gas
OG	Official Gazette
R&D&I	Research, Development and Innovation
SDS	Spatial Development Strategy
SEA	Strategic Environmental Assessment
SLO	Slovenia
SPA/BD	Protocol: Protocol concerning Specially Protected Area and Biological Diversity
SPAMI	Specially Protected Areas of Mediterranean Importance
UCH	Underwater Cultural Heritage
UNCLOS	United Nations Convention on the Law of the Sea
UNEP	United Nations Environment Programme
VASAB	Vision and Strategies around the Baltic Sea
WFD	Water Framework Directive

1 Introduction

1.1 Scope and objectives of the study

The main purpose of the present study is to provide indicative information on cross-border and transboundary Maritime Spatial Planning (MSP) in the Adriatic-Ionian region (AIR), and on possible relevant topics for further reflection and discussion among the respective countries. From this perspective, the study is of informative nature and does not identify elements meant to provide any legal effect at the national or regional level.

The following definitions will be used for the purpose of this study [1]:

- Cross-border cooperation: the collaboration involving two or more entities (at the national and/or sub-national levels) sharing common borders. Cross-border cooperation in MSP can help ensure that marine spatial plans are coherent and coordinated across national borders.
- Transboundary cooperation: the collaboration among entities (usually, but not exclusively, countries) that are not necessarily adjacent and that share a common region or sub-region (in our case, the Adriatic or the Ionian seas), or an ecosystem, as well as the responsibility for managing its resources.

Paying attention to the issues that emerge from these considerations, the study aims to delineate common principles and elements for MSP implementation in the Adriatic-Ionian region, coherently with the "Conceptual Framework for Marine Spatial Planning" in the Mediterranean Sea, adopted by the 20th Ordinary Meeting of the Contracting Parties to the Barcelona Convention, held in December 2017 in Tirana (Albania) (UNEP(DEPI)/MED IG.23/23) [2], and in line with the "Common Regional Framework (CRF) for Integrated Coastal Zone Management (ICZM)" and its methodological guidelines[1], adopted by the 21th Ordinary Meeting of the Contracting Parties to the Barcelona Convention, held in December 2019 in Naples (Italy).

The study also aims to identify issues and areas where planning and/or management also need to be approached through cross-border and/or transboundary cooperation. Furthermore, information included in this study could be used to better justify related decisions and/or to identify and support project proposals in different relevant contexts. The objective is that these suggestions will eventually support the future development of cooperation initiatives, both project-based and more formal ones.

1.2 Legal and policy framework

While MSP is a relatively new term coined within the framework of the Barcelona Convention (BC), several BC Protocols regulate key maritime sectors. This particularly refers to:

- the Protocol for the Protection of the Mediterranean Sea against Pollution Resulting from Exploration and Exploitation of the Continental Shelf and the Seabed and its Subsoil (Offshore Protocol), adopted in 1994 and entered into force on 24 March 2011;
- the Protocol for the Prevention and Elimination of Pollution of the Mediterranean Sea by Dumping from Ships and Aircraft or Incineration at Sea (Dumping Protocol), adopted in 1995 but not yet in force;
- the Protocol concerning Cooperation in Preventing Pollution from Ships and, in Cases of Emergency, combating Pollution of the Mediterranean Sea (Prevention and Emergency Protocol), adopted in 2002 and entered into force on 17 March 2004; and
- the Protocol on the Prevention of Pollution of the Mediterranean Sea by Transboundary Movements of Hazardous Wastes and their Disposal (Hazardous Wastes Protocol), adopted in 1996 and entered into force on 19 January 2008.

Besides, planning of the marine space is a concept already taken on board by the Integrated Coastal Zone Management (ICZM) Protocol[2]. Spatial planning of the coastal zone is regarded as an essential instrument of the implementation of the said Protocol. One of the main objectives of ICZM is to "*facilitate, through the*

[1] Methodological guidance for achieving the good environmental status through ICZM.

[2] Protocol on Integrated Coastal Zone Management (ICZM) in the Mediterranean, adopted on 21 January 2008, in Madrid, Spain.

rational planning of activities, the sustainable development of coastal zones by ensuring that the environment and landscapes are taken into account in harmony with economic, social and cultural development" (ICZM Protocol, Art. 5). Planning is also reiterated in other parts of the Protocol, as is the case of articles dealing with the protection of wetlands, estuaries and marine habitats (Art. 10) or the protection of coastal landscape (Art. 11).

According to Art. 3, the area to which the Protocol applies (i.e. the coastal zone) is the area between:

- the **seaward limit of the coastal zone**, which shall be the external limit of the territorial sea of the Parties; and
- the **landward limit of the coastal zone**, which shall be the limit of the competent coastal units as defined by the Parties.

The Protocol also extends its geographical scope to both the land and the sea, therefore, the planning process should equally address both components of the coastal zones. It also has to be borne in mind that the ICZM Protocol is part of the European legal system, as the European Union ratified it in its Decision 2010/631/EU of 13 September 2010[3].

From this perspective, MSP can be considered as an integral part of the implementation of ICZM in the marine component of the coastal zone – corresponding to the external limit of the territorial sea of the Parties according to the ICZM Protocol – and specifically its sustainable planning and management. Land-sea interactions could be regarded as part of the definitions given in Art. 2 and serve as a basis for the principles outlined in Art. 6.

As reported in the UN Environment Programme (UNEP)/Mediterranean Action Plan (MAP) Mid-Term Strategy 2016-2021 (MTS), at the 18th Conference of the Parties (COP), the Contracting Parties (CP) recommended to strengthen the MAP activities in the field of MSP in order to contribute to the Good Environmental Status (GES), investigate the connections between land and sea areas in more detail and propose coherent and sustainable land and sea-use planning frameworks related with key economic sectors and activities that may affect the coastal and marine resources. Based on this request a Conceptual Framework (CF) for MSP in the Mediterranean has been prepared [1], in line with the process of elaboration of the CRF for ICZM in the Mediterranean. The CF for MSP has the following two main objectives:

- To introduce MSP in the framework of the Barcelona Convention, and, in particular, link it to ICZM, considering MSP as the main tool/process for the implementation of ICZM in the marine part of the coastal zone, specifically for planning and managing maritime human activities according to ecosystem approach goals.
- To provide a common context to CPs for the implementation of MSP in the Mediterranean Region.

1.3 The MSP process in the Adriatic-Ionian region

Despite being legally binding for the EU countries only, there is no doubt that the European Union (EU) MSP Directive (2014/89/EU) helped maritime spatial planning as a processes gain momentum. Nowadays, MSP is gradually progressing in all European countries of the Adriatic-Ionian Region, and non-EU countries are embarking upon the initial steps of MSP as well. Depending on the specific country, actions implemented or those in implementation phase concern different aspects: definition of the legal and institutional framework supporting MSP, establishment of horizontal and vertical coordination mechanisms to deal with the multi-scalar essence of MSP, data collection and structuring, elaboration of guidelines, development of MSP methodologies, stocktaking of maritime uses and activities, elaboration of overarching vision/strategic elements, delimitation of the planning areas and initial elaboration of marine spatial plans [3]. Notwithstanding this common trend, differences among countries are significant and need to be addressed to come up with coherent planning processes and marine spatial plans across countries. Table 1-1 illustrates some of those differences, in particular those concerning competent authorities, the legal basis and the status of the MSP process.

[3] Council Decision of 13 September 2010 concerning the conclusion, on behalf of the European Union, of the Protocol on Integrated Coastal Zone Management in the Mediterranean of the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean.

Table 1-1 Condensed view of the status of implementation of the MSP process in the Adriatic-Ionian countries.

Country	MSP competent authority	Legal basis	Status of the MSP process
Albania	Not defined	MSP not included in the legal framework	Officially has not been started yet
Bosnia and Herzegovina	Not defined	MSP not included in the legal framework	Officially has not been started yet
Croatia	Ministry of Construction and Physical Planning	The Physical Planning Act was amended in July 2017 (OG 153/13, 65/17, 114/18, 39/19, 98/19), with the EU Maritime Spatial Planning Directive (MSPD) fully transposed	Existing spatial plans on state, county and local level cover sea area up to the outer border of territorial waters. Other two marine spatial plans will be developed: the Spatial Plan of the Ecological and Fisheries Protection Zone[4] and the Spatial Plan of the Continental Shelf, covering sea area over which the Republic of Croatia exercises special rights. Furthermore, a "new generation" of spatial plans will be developed, beginning with the State Plan for Spatial Development for the entire terrestrial and marine area (up to the external limit of territorial waters). Spatial plans on all levels will be fully developed using GIS and will cover topics assigned by the Physical Planning Act and special regulations, without overlapping.
Greece	Ministry of Environment and Energy	Law 4546 (GG 101/A/12-June-2018) transposing the EU MSPD	Greece will develop its National Maritime Spatial Strategy in 2020. The main responsibility for (Maritime) Spatial Planning lies with the competences of the Ministry of Environment and Energy. The National Maritime Spatial Strategy will define strategic directions based on the characteristic conditions of the country as a prerequisite for the development of marine spatial plan(s). MSP issues are addressed in Special Frameworks for Spatial Planning covering specific sectors. In particular, sectoral plans have been elaborated so far for aquaculture, industry and renewable energy. These plans include spatial planning guidelines for the land-based, coastal and marine segments of each sector. Additionally, in the recently revised Regional Spatial Frameworks, the MSP elements concern marine transport and connectivity between ports, the development of aquaculture, the protection of marine resources and the management of coastal area.
Italy	Ministry of Infrastructure and Transport	Legislative Decree 17 October 2016, n. 201, transposing the EU MSPD.	An Inter-Ministerial Coordination Table was established. It issued guidelines for the MSP process and plans (Decree of the Presidency of the Council of Ministers 01.12.17). The guidelines identify three areas for the development of marine spatial plans: (i) the Western Mediterranean Sea, (ii) the Adriatic Sea, (iii) the Ionian Sea and the Central Mediterranean Sea. A technical committee, coordinated by the Ministry of Infrastructure and Transport, was established to develop the marine spatial plans.

[4] In 2003, the Croatian Parliament established a regime concerning the Croatian rights of exploration and exploitation, conservation and management of living natural water resources beyond the boundaries of the territorial sea, and jurisdiction over scientific marine research and the protection and conservation of the marine environment. This decision established the Ecological and Fisheries Protection Zone (EFPZ). Its application for the Members of the European Union has been postponed (source: "Maritime Spatial Planning. Country Information – Croatia" (updated on 30.08.2018). https://www.msp-platform.eu/countries/croatia).

Country	MSP competent authority	Legal basis	Status of the MSP process
Montenegro	Ministry of Sustainable Development and Tourism	Spatial Planning and Construction Act (64/17, 44/18, 11/19)	Marine spatial plan should be part of the Spatial Plan of Montenegro as well as the Plan of General Regulation for the coastal region of Montenegro. The MSP is currently being prepared as part of the GEF funded "Adriatic" project and will be integrated in the above mentioned plans.
Slovenia	Ministry of the Environment and Spatial Planning	The EU MSPD in Slovenia is implemented in the framework of the Spatial Planning Act adopted in 2017 (OG No. 61/17 – ZUreP-2)	Slovenia is currently working on the revision of the Spatial Development Strategy (SDS) 2050, a strategic document which applies to both land and sea. One marine spatial plan is expected for Slovenia; the marine spatial plan will be designed in the form of an Action Programme of the SDS 2050. The elaboration of the baseline knowledge, supporting cartography and MSP methodology was completed, while the preparation of the plan has been initiated.

A parallel and, in some cases, intersecting stream has been occurring in the Adriatic-Ionian region. A long and wide project-based experience of cooperation on MSP developed here (Figure 1-1) has provided a diversified and rich knowledge and practice base that needs to be integrated in the know-how in the formal processes. Although MSP essentially remains a national/sub-national process, a key challenge is moving from projects to more formalised experience of cross-border and transboundary cooperation, able to deal with major common problems and opportunities and jointly approaching planning and management of shared marine areas. An essential driver and framer role for more structured cooperation initiatives can be played by the European Union Strategy for the Adriatic-Ionian Region (EUSAIR) and, by UNEP/MAP in the entire Mediterranean Basin.

It is often noted that, as other strategic planning processes (e.g. climate change adaptation), MSP requires the adoption of a multi-scalar approach. The progressive alignment and cross-fertilization of the national and transboundary streams of project-based and formal MSP initiatives is indeed needed.

1.4 Research methods

Methodologically, the study is based on the consultation of the extensive literature available on MSP topics for the Adriatic-Ionian region. Examples of practices developed for some specific aspects in other European regions (e.g. Baltic Sea and North Sea) are also reported, when they fit specific needs and features of the Adriatic-Ionian context. MSP is a site-specific process; in this regard, it has to be noted that transfer of tools and practices from other regions to the Mediterranean Sea and specifically the Adriatic-Ionian sub-region requires an evaluation of their real adequacy and applicability. This might imply a process of calibration and customization of tools and practices, based on the specific characteristics of the Adriatic-Ionian context.

National experts (for Albania, Bosnia and Herzegovina, Croatia, Greece, Italy, Montenegro, and Slovenia) were initially consulted through a survey on some specific aspects: (i) transboundary MSP challenges and opportunities (see chapter 1), (ii) how cooperation can be used in practice to improve coherence among national plans and effectively tackle relevant issues at sea basin level (see section 3.3.2); (iii) national areas with highly intense land-sea interaction (LSI), which also have implications for the Adriatic and Ionian region (see chapter 1) (iv); areas in the Adriatic-Ionian Region where cross-border or transboundary cooperation on MSP can create added value and that might be considered for the development of future cooperation initiatives (see chapter 1). National experts also contributed to the overall process by sharing their comments and suggestions since the early stage of this study.

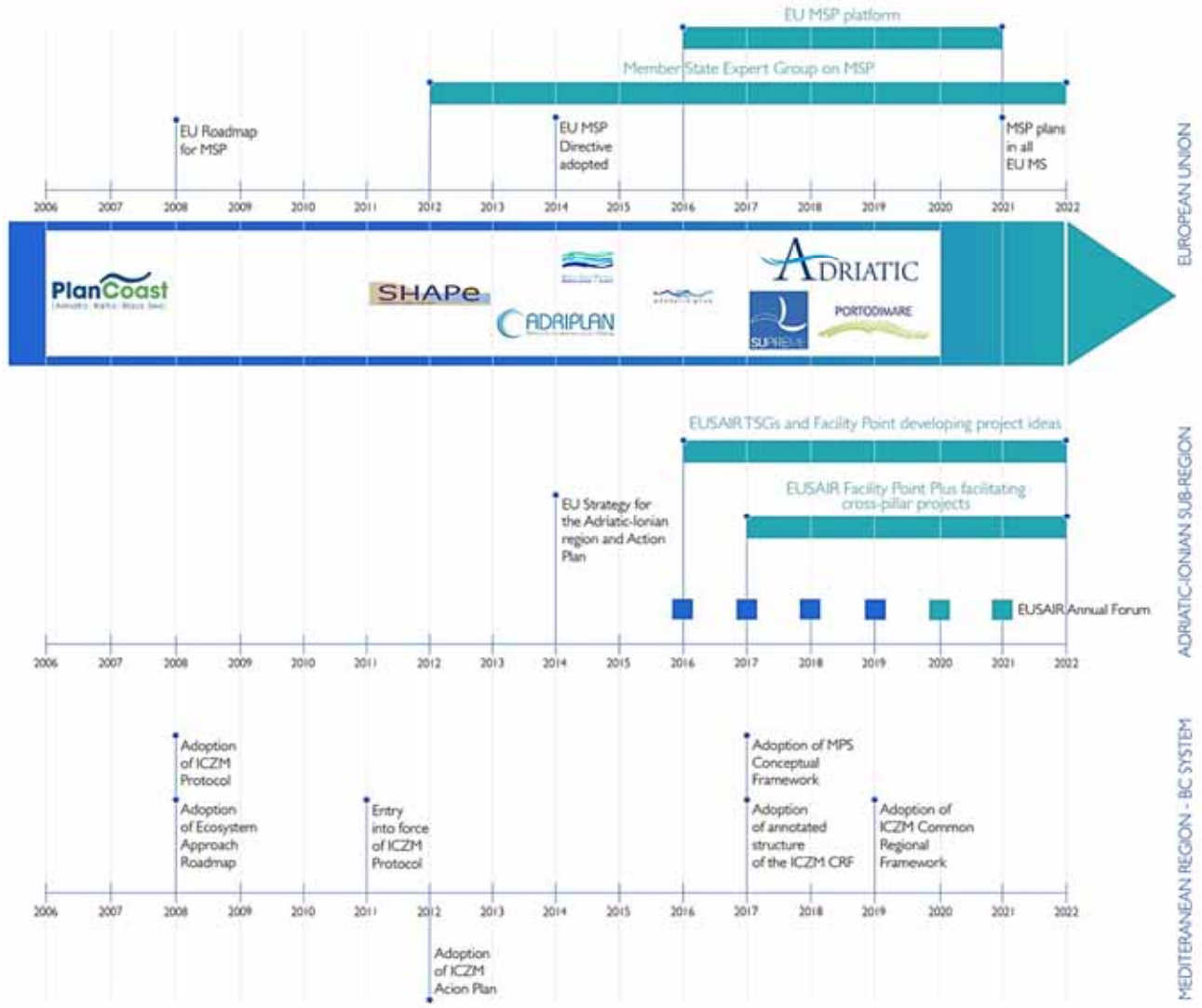


Figure 1-1. Evolution of MSP and MSP-related initiatives relevant for the Adriatic-Ionian Region.

2 Transboundary and cross-border marine challenges in the Adriatic-Ionian Region

The Adriatic Sea is a mostly shallow, semi-enclosed and elongated basin located in the Mediterranean Sea between the Italian and the Balkan peninsulas. It is over 800 km long and around 150–200 km wide, with major axis in a northwest–southeast direction. The Adriatic Sea receives large amounts of fresh water from numerous rivers. Most of the river input comes from Po River and the Italian coast. The highest area of inflow of fresh water is between the Po and the Isonzo (Soča) rivers, where roughly 40% of riverine water enters into the Adriatic Sea [4]. This freshwater input substantially contributes to the uniqueness and/or rarity of a variety of specific ecosystems. There are more than 50 million people living within the Adriatic Sea catchment area and about 20% of them live on the coastline itself.

The Blue Economy represents an important asset for the Adriatic-Ionian Region. The region hosts a large variety and a high concentration of sea uses. For example, the maritime transport sector has fundamental economic importance for the whole region and its relevance is expected to grow in the future. In particular, the container shipping sub-sector is expected to increase steadily in the North Adriatic ports within the next 20 years due to the intensifying transport routes of goods to emerging eastern European economies and the doubling of the Suez Canal. Also, oil and gas activities (O&G) are relevant in the area. The Adriatic is one of the sub-regions of the Mediterranean with the highest concentration of O&G activities with most of the extraction historically occurring in Italian waters, but under expansion now in the region [5]. Fisheries represent a traditional, important economic sector in the AIR. Fisheries in the area are diverse, largely made up of small-scale fisheries, and have an important role in many national economies. The sector is following different trends for each country, and it is strongly influenced by regional and national policies, particularly the Common Fisheries Policy [5]. Aquaculture has been developing fast over the past decades and it is expected to continue developing and diversifying, in parallel with the decline of wild stocks and the increasing demand for fish products for human consumption. The lack of suitable areas for the installation of new aquaculture farms is the main constraint to further development of this sector, together with the potentially increasing conflicts with the tourism and fisheries sectors [5]. Finally, the AIR is among the top tourist destinations in the Mediterranean Sea. Tourism is mainly concentrated in Italy, Croatia and Greece, however, it is also expanding in other countries in the region. Development of coastal tourism, cruise tourism and recreational boating in the region is generally expected to increase as it has in recent years [5]. Given its characteristics, the environmental status of the sea is very much influenced by land-sea natural processes, as well as by human activities carried out on land and at sea by the communities facing its shores. From both a natural and an anthropogenic point of view, the entire Adriatic-Ionian area is highly interconnected on land, along the coast and at sea. Therefore, many relevant activities and issues in the area have a transboundary dimension. These issues can hardly be taken only at the national level and call for enhanced cooperation among countries.

Although MSP is essentially a national process, the need for transboundary cooperation is particularly relevant for all countries facing this sea. In fact, the EUSAIR Action Plan indicates several issues to be approached at the regional level. A selection of marine- and maritime-related issues was compiled and submitted to the national experts engaged in this study in order to identify the most relevant ones for transboundary cooperation that can possibly be faced within a MSP process. According to the survey, the most relevant issues are:

- Protection of highly sensitive and high-value natural marine areas;
- Improving eco-connectivity of coastal and Marine Protected Areas (MPA);
- Sustainable fisheries;
- Marine litter pollution.

The relevance of these challenges in the Adriatic-Ionian transboundary context is briefly discussed in the following sections. Issues related to shipping (shipping operation and safety), oil and gas (extraction, pipelines) and other energy-related activities (e.g.

energy grid) were also indicated as relevant transboundary issues by experts from all the countries, but in general, with a priority lower than the previous ones. Additionally, other specific national priorities calling for transboundary approach have been identified, as illustrated in section 2.5.

2.1 Protection of highly sensitive and high-value marine areas

The opportunity to protect high-value marine areas, also in a transboundary perspective, represents an important challenge in the Adriatic-Ionian Region where marine ecosystems and species are subjected to a variety of pressures deriving from a high concentration of sea uses. In such a context, the ecosystem approach represents the overarching principle for the planning and management of the marine space and the needed protection of high-value areas, and ICZM and MSP can be used as tools to implement it. As the ICZM Protocol considers the seaward of the coastal zone to stretch to the limit of the territorial sea up to 12 nm from the baselines, MSP can be intended as the main tool and process for the implementation of ICZM in the marine part of the coastal zone (see the CF for MSP [1]). However, with the aim of strengthening the protection of high-value marine areas also beyond these limits, MSP could be intended and used as an orientation approach (e.g. improving co-existence and synergies, limiting pressures, reducing cumulative impacts), not necessarily related to the definition of specific spatial measures (e.g. zoning identification for uses).

From this perspective, cross-border and transboundary cooperation on ICZM and MSP can play a role in facilitating coordination and cooperation between States, institutions and stakeholders. Examples of potential areas of interest for starting activities of cooperation on relevant transboundary issues are described in chapter 1. In these areas, protection of valuable zones is also considered.

EBSAs (Ecologically or Biologically Significant Areas) as defined under the Convention on Biological Diversity (CBD) represent a possible tool to deal with the protection of marine areas, also in a sub-regional, or even regional perspective. The EBSAs were originally driven by the need to develop MPAs in areas beyond national jurisdictions [6]. One of the eight EBSAs, proposed for the Mediterranean Sea, includes the northern Adriatic Sea [6]. This portion of the Adriatic was selected for having a high natural productivity, supporting an extensive food web, including sea birds, loggerhead sea turtles and several shark species, and its selection was based on the criteria of biological productivity, special importance for life-history stages of species, and importance for threatened, endangered or declining species and/or habitats [7] (Figure 2-1). The AIR includes the other two EBSAs. The first is located in the Middle Adriatic Sea and encompasses the Jabuka/Pomo Pit; it plays a key role as critical spawning area and nursery zone for important demersal fish (fish that live and feed on or near the bottom of seas) resources. The South Adriatic Ionian Straight EBSA also contains important habitats and hosts significant density of marine megafauna; this EBSA also hosts deep-sea cold-water coral communities and deep-sea sponge aggregations.

Through the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean (SPA/BD Protocol), the Contracting Parties to the Barcelona Convention established the List of Specially Protected Areas of Mediterranean Importance (SPAMI's List) to promote cooperation in the management and conservation of natural areas, as well as in the protection of threatened species and their habitats. The conservation of the natural heritage is then the basic aim that must characterize the SPAMIs. According to the provisions of the SPA/BD Protocol, SPAMIs may be established in the marine and coastal zones subject to the sovereignty or jurisdiction of the Parties and in areas situated, partly or wholly, on the high sea. The SPAMI's List may include the following sites:

- areas of importance for conserving the components of biological diversity in the Mediterranean;
- areas that contain ecosystems specific to the Mediterranean or the habitats of endangered species;
- areas of special interest at the scientific, aesthetic, cultural or educational levels.

Other forms of protection can be provided through the definition of (spatially-based) transboundary regulation for specific sectors, in particular as far as the interactions with fragile and sensitive habitats and species are concerned. This is the case of maritime transport through the establishment of a particularly sensitive sea area (PSSA) under the International

Maritime Organization (IMO). The PSSA proposal for the Adriatic was submitted to the IMO in 2006 [8]. With the proposed expansion of the ports of Northern Adriatic and the recognition of the status of the Adriatic as a geographically important trading route between Asia and Europe, the creation of an Adriatic PSSA appears to make increasing sense [9]. The PSSA proposal for the Adriatic was scheduled for submission to the IMO in 2009, but one of the six states in the region withdrew support for the proposal and it has stalled [9].

Transboundary or cross-boundary Fisheries Restricted Areas (FRAs) can be proposed and established to improve sustainable management of shared fisheries areas and fish stocks [10]. As discussed in more detail in chapter 1, this is the case of the Jabuka/Pomo pit in the central area of the Adriatic Sea, which is the subject of a specific General Fisheries Commission for the Mediterranean (GFCM) recommendation proposing the establishment of a FRA, with a consequent demersal fishing ban.

Figure 2-1. Locations of 5 polygons referring to areas scored for one or more of the CBD criteria for the identification of EBSAs in the Adriatic Sea. Polygons refer to areas important for marine turtles, nursery areas for elasmobranchs, suitable areas for small pelagics, and deep-sea coral reefs. The overlap and clustering of polygons can only be a first, rough indication of the presence of an EBSA; in such areas, finer-scale analyses should be conducted as soon as possible for more accurate assessments (source: [7]).

2.2 Improving eco-connectivity of coastal and MPAs

Both the Adriatic and the Ionian Seas are characterised by rich biodiversity. The importance of these issues also lies in the sensitivity of MPAs to anthropogenic pressures common to the entire Adriatic-Ionian Region. In fact, eco-connectivity is tackled as a priority issue from the EUSAIR Action Plan.

MPAs in the AIR are located in the coastal zone. Currently, they are 25 (including all coastal protected areas with a marine component) in the Adriatic Sea, altogether covering less than 1% of its surface. Four additional MPAs are planned: two in Albania (Kepi i Rodonit and Porto Palermo), and two in central Italy (Costa del Monte Conero and Costa del Piceno) [10]. The current siting of Adriatic MPAs is not distributed homogeneously: 21 out of the 25 existing MPAs are along the eastern coast of the basin, 17 of them in Croatia (though only six of them are managed MPAs).

MPAs are also widely heterogeneous in their regime of legal protection. There are national parks (e.g. Brijuni, Kornati and Mljet in Croatia, Zakynthos in Greece), nature parks (e.g. Telašćica and Lastovo Islands in Croatia), nature reserves (e.g. Miramare in Italy) and natural monuments (e.g. Debeli Rtic in Slovenia). Furthermore, in the Adriatic and Ionian Seas, there is a number of marine and marine/coastal areas included in the NATURA 2000 Network of the EU, identified as protected areas, but not declared as MPAs.

A network of MPAs would normally cover large geographical areas in order to ensure ecosystem resilience, increasing the resistance against natural and human-driven impacts. In this regard, the often limited size of MPAs is a major shortcoming in terms of their efficacy. Protecting a minimal part of the marine environment is in vain, while leaving the rest unmanaged and unprotected. To cope with this problem, and to include the high and deep seas into management actions aimed at protecting biodiversity, it is necessary to build networks of MPAs that are ecologically coherent and that use the MPAs as nodes of a much wider area. Furthermore, networks of MPAs can improve coordination towards common management approaches to MPAs, for example, through exchange of good practices [11]. The latter role is in particular provided by MedPAN, the network of MPA managers in the Mediterranean, and by the related AdriaPAN network in the Adriatic Sea.

The Barcelona Convention gives special attention to MPAs networking. The proposal regarding a regional working programme for the Coastal and MPAs in the Mediterranean Sea was formulated [12], including elements to design ecological networks of MPAs in the region. A three-step hierarchical planning approach has been proposed, starting on a large scale and focusing on ever-smaller scales:

- On the largest scale of the Mediterranean Basin, the baseline for designing an ecological network will involve the identification of large-scale ecological units, ensuring comprehensiveness and representativeness of all sub-regions.
- On the next scale, priority conservation areas should be identified within each ecological unit. These areas would not constitute MPAs themselves, but would be focal areas for individual MPA networks.
- Once such priority conservation areas have been identified, the task of identifying sites to develop true ecological networks can be initiated. Individual MPAs within these networks should focus on habitats where a concentration of ecological processes results in a high species diversity. To become a network, it will be important not only to establish MPAs to protect the key areas, but also to maintain the ecological linkages between those areas.

To further support the creation of a network of MPAs, a Roadmap was adopted under the Barcelona Convention [13].The Roadmap has been prepared as a tool providing detailed recommendations and proposing steps, principles and activities to decision-makers, MPA managers, sea users and other stakeholders in order to strengthen the Mediterranean MPAs with the view of having them evolve towards a more coherent, representative and efficient network. The Roadmap targets the following objectives:

- Strengthen networks of protected areas at national and Mediterranean levels, including in the high seas and in Areas Beyond National Jurisdiction (ABNJ), as a contribution to the relevant globally agreed goals and targets.
- Improve the network of Mediterranean MPAs through effective and equitable management.
- Promote the sharing of environmental and socio-economic benefits of the Mediterranean.
- Ensure the stability of the network of Mediterranean MPAs by enhancing their financial sustainability.

Besides ensuring connectivity of MPAs, connectivity among areas with high natural value in coastal zones should also be considered. In such cases, blue-green corridor approach can be applied. The last decade saw a significant rise in the number of green, or what is now called "blue-green" corridors, established in dense urban environments in order to enhance and maintain existing habitats by connecting fragmented and isolated ecosystems. The blue-green corridor approach can help reduce pollution, improve the quality of life for coastal communities and help preserve protected areas. Blue-green corridors would bring multiple benefits to the area, including further protection of sensitive environment and protected areas and species, as well as facilitated circulation of species. Blue-green corridors would help minimise negative effects of climate change, reduce risks and, on the other hand, enhance biodiversity and GES. Green corridors are an opportunity to develop, connect and enhance green infrastructure in urban and rural areas, thus contributing to improved and balanced LSI from ICZM perspective.

MSP and ICZM are helpful tools for implementation of green and blue corridors and for addressing land-sea interface for sustainable solutions. They can help implement a "smart-ecoregion" model, focusing on green and blue economy and taking into account land, coastal and sea interfaces. A good example of application of such a tool can be seen in Slovenia, where the road between Izola and Koper[5] was closed, and the results of this action show how such measures can help improve eco-connectivity.

2.3 Fisheries management

Fishery is a well-developed maritime activity in the entire Adriatic and Ionian region [13]. The Adriatic Sea has been exploited for centuries by a variety of fishing activities, ranging from small-scale artisanal fisheries and recreational fishing to commercial fisheries using hydraulic and trawled dredges for clams and scallops, otter trawling for exploiting demersal resources, mid-water trawls and purse seines for pelagic species, and pelagic longlines for tuna.

Owing to these activities, this region has been intensively exploited, causing the widespread degradation of marine habitats, decline of target and non-target species, food-web alterations ([15], [16], [17], [18], [19]), and major losses of ecosystem services [20]. The yields of several important commercial fisheries – most of them having stocks shared among different countries – have sharply declined in the past 6–7 decades ([21], [22], [23])[6]. The basin-scale management of the Adriatic Sea and its resources is challenging because of the presence of a large array of multiple interacting pressures, in addition to fishing. Moreover, marine resource management and ecosystem restoration are further complicated by the exceptional proximity of the various countries bordering the Adriatic Sea, each with their economic interests and cultural and legal approaches to marine management. The situation is considerably worse in the extraterritorial waters of the Adriatic Sea, where fishing efforts are most intense and where the most important nursery and spawning areas for a large number of economically important species are located.

The Adriatic and Ionian Seas are examples of marine areas, limited in size, where shared stocks are exploited by fleets of surrounding riparian countries. That being said, regulatory framework imposed by a single state has little to no effect on unique fish populations migrating across the sea and habitats (such as nursing and spawning sites) under the jurisdiction of different states. The issues related to shared stocks and their management can lead to transboundary conflicts over fishery resources, especially when common fishing grounds become overexploited in the absence of adequate protection of recruitment and spawning areas. In this regard, cooperation between UNEP/MAP and GFCM on common key priority areas for the two organisations (e.g. harmonization of existing criteria for identifying SPAMIs and FRAs) has been formalised through a Memorandum of Understanding signed back in 2012.

In such a framework, a transboundary approach to fishery (and key habitats for commercial species)

[5] https://www.youtube.com/watch?v=Ka1CfYhWXDg&t=126s

[6] For example, a significant decline in the proportion of Chondrichthyes in the fish community from 15.9% to 4.6% was observed between 1800 and 2000. Significant declines were also observed for the proportion in the large demersal fish community from 24.4% to 8.5%, medium-sized species (maximum body length between 55 and 120 cm) from 31.8% to 17.3%, large-sized species (maximum body length between 120 and 250 cm) from 18.3% to 5.8% and late-maturing species (species that reach sexual maturity between 4 and 6 years of life) from 11.4% to 4.6%) [22].

management across the Adriatic-Ionian region would be the best way to conserve and sustainably exploit commercial fish species.

For the management of fisheries-related issues, the following elements should be considered: (i) location of shipping lanes; (ii) the impacts of bottom trawling on seafloor; (iii) exploitation of natural resources (gas exploration and extraction); (iv) dumped waste and litter, in particular discarded/lost fishing gears and plastic debris. Besides, seasonal changes in spatial distribution of fish species should also be considered. Useful tools have already been introduced by GFCM and should continue to be applied: joint fishery management plans, including FRA; the close season and protection of nursery areas of several species.

The identification of existing good practices (in terms of management, monitoring and related transboundary cooperation) seems to be a good starting point.

2.4 Marine litter management

Marine litter is an important global concern, but it is also important at the regional and sub-regional scale. Beach and marine litter has drawn a lot of attention and extensive surveys and corresponding campaigns have been organized. Some of the non-governmental organizations (NGOs) have been very active in tackling the problem, raising awareness around environmental issues among the citizens, along with engaging them in marine litter surveys, events and activities. The economic value from coastal recreation is considerable. Clean seas and beaches are key to attract local and international tourism and are an integral part of the UN Environment/MAP Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast and related Assessment Criteria (IMAP) and the European Marine Strategy Framework Directive (MSFD), in which marine litter is one of the key indicators to assess GES and the effectiveness of policy measures. Beach marine litter have been argued to pose a significant cost to society, in particular in the way they affect coastal tourism and recreation ([24] and references included herein).

The DeFishGear project [25] has given an overview of the presence of this type of pollution in the Adriatic-Ionian region. The average **beach litter density** of 0.67 items/m^2 found in the area is relatively high and is comparable to the values provided by UNEP/MAP [26].

Aggregated results on national level showing the abundance of beach litter reveal that most affected beaches are those surveyed in Croatia (2.91 items/m^2), followed by beaches in Slovenia (0.50 items/m^2), Montenegro (0.37 items/m^2), Italy (0.28 items/m^2), Greece (0.24 items/m^2), Albania (0.22 items/m^2) and Bosnia and Herzegovina (0.17 items/m^2). The average density of **floating macro-litter** (items > 2.5 cm) in coastal Adriatic waters was found to be 332 ± 749 items/km^2, with the highest average abundances recorded in the coastal waters of Hvar (Croatian coast), in the Gulf of Venice and in Cesenatico (a port town along the Adriatic coast in Italy, 30 km south of the city of Ravenna). All these areas are directly affected by the major urban tourist destinations located in their vicinity and by pathways such as Po River. Regarding **seabed litter**, a total of items/km^2 were recorded on an aggregated basis in the AIR, with a mean weight per haul found at 65 ± 322 kg/km^2. The highest litter density was found in the North Corfu (or Kerkyra as it is known in Greek) area (Greece) with the average density ranging from 1,099 ± 589 items/km^2, followed by the South area of the Western Gulf of Venice with 1,023 ± 616 items/km^2. In terms of weight, the highest amount of litter was found in the South area of the Gulf of Venice (average density 339 ± 910 kg/km^2).

The presence of waste at sea and on the coast, traditionally studied and addressed as an environmental problem, has become an important economic problem (e.g. in fisheries and tourism industries in Italy, the costs of marine litter are beginning to be quantified and are considerable), requiring the identification of efficient management solutions, also in a cooperative transboundary context. Quite significant data have been recently provided by UNEP/MAP through the implementation of Fishing for Litter pilots, as stipulated in the Regional Plan on Marine Litter Management. In general, information about the amounts and types of litter in the Adriatic and Ionian seas is still rather limited, as well as information about the ecological impacts of litter on marine wildlife, needing further boost in transboundary monitoring and research cooperation.

Different tools have been developed under the Barcelona Convention system and by the EU to drive and underpin the ongoing implementation of measures aiming to reduce and possibly eliminate marine litter. These tools include: (i) the Regional Plan

on the Management of Marine Litter in the Mediterranean[7] (Decision IG.21/7 COP 18), providing for legally binding measures and timetables for their implementation; (ii) the ecosystem approach Roadmap providing for a set of Ecological Objectives (EO), GES definitions and targets, including EO10 on marine litter; (iii) the Integrated Monitoring and Assessment Programme (IMAP), based on Common Indicator for coastal and landscape protection; and the EU Marine Strategy (Marine Strategy Framework Directive 2008/56/EC), which includes the marine litter as one of the descriptors of GES. Furthermore, these tools represent an opportunity to manage the phenomenon at the basin level and to share experiences through new activities and projects.

In the framework of UNEP/MAP and with support from the Cooperation Agreement with IMELS, marine litter activities focusing on the Adriatic area have been undertaken, i.e. those about the development of updated baseline and threshold values for marine litter, the implementation of IMAP-compatible monitoring programmes, etc. This is valuable information that should be taken into consideration in future transboundary MSP processes [27].

Moreover, in the framework of the Bilateral Agreement between IMELS and UNEP/MAP for the biennium 2018-2019, and based on the operative proposal drafted by IMELS, INFO/RAC has received the mandate to develop the SEAWatcher App. This is a platform for data management and smartphone application to collect marine litter data. The application, which will be integrated into the InfoMAP system, aims to acquire from citizens, professional organisations and civil associations geo-referenced data on marine litter, compatible with IMAP Ecological Objective EO10 and Descriptor 10 of the MDFD.

Managing the issues of land-based pollution should be focused on finding the best solutions in each country (both in terms of legal framework and practice) for solid waste management, wastewater (including stormwater) collection and treatment, building infrastructure and large scale public awareness about the consequences of their actions. Cooperation between countries, especially between neighbouring ones, is of great importance because the sea borders do not have any influence on how pollution will spread.

Transboundary cooperation should generate (i) joint efforts to remediate the existing pollution and (ii) measures preventing future pollution. For transboundary management of marine litter pollution, the following issues should be taken into consideration:

- identification of hotspots for litter generation and accumulation, including port areas and sea routes leading to the ports; industrial and urban accumulation points along the coast (industrial outfalls, municipal wastewater, water drains); beaches and marine areas exposed to maritime tourism (especially yachting and cruising); marine areas that might be of interest to the fisheries and aquaculture sectors; offshore extraction areas;
- marine litter pollution is an environmental as well as an economic problem, which transcends land and sea borders, and calls for an integrated land-sea pollution prevention;
- waste found in the marine and coastal environments comes mainly from activities that take place on land;
- there is a close link between proper waste management and the presence of marine litter.

2.5 Other challenges calling for cooperation

The survey enabled involved national experts to identify other MSP-related challenges, which might require cross-border and/or transboundary cooperation:

- Safeguarding of underwater cultural heritage (UCH) sites;
- Sustainable tourism management;
- Development of an Adriatic-Ionian network of ports;
- Further development of joint scientific research programs.

Safeguarding of underwater cultural heritage (UCH)

UNESCO Convention on the Protection of the Underwater Cultural Heritage (Paris 2001) defines cultural heritage as "*... all traces of human existence and activities having a cultural, historical or archaeological character which have been partially or*

[7] https://www.cbd.int/doc/meetings/mar/mcbem-2014-03/other/mcbem-2014-03-120-en.pdf.

totally under water, periodically or continuously, for at least 100 years …". Despite numerous legal provisions in place in developed countries around the world, and exerted monumental efforts to preserve shipwrecks and UCH, underwater archaeological sites are unfortunately constantly endangered on a daily basis due to human activities, in addition to natural environmental stress. In the Adriatic and the Ionian Seas, shipwrecks can be traced back to the ages of ancient Greece, Roman and Byzantine periods, as well as the two World Wars.

Two main types of pressures threaten the UCH resources, and sometimes those threats may co-occur:

- Lack of concrete legislation and management, monitoring and control, often due to limited resources in combination with the large extension of the marine area and a large number of ancient UCH sites. This leaves room for looting (treasure hunting) and illicit trade in antiquities. Fishing and sport diving are often used as a pretext for such misuse. Furthermore, commercial fishing and fish farming may lead to considerable damage to UCH, if not carefully regulated and controlled. Fishermen and divers, if kept properly informed and fully aware, could become good allies in an effort to monitor and protect the UCH.
- Constructions and technical works in areas with UCH sites (e.g. construction of ports and marine terminals O&G exploration and/or pipelines). In the Adriatic-Ionian Region, underwater excavation, drilling, laying of pipelines and cables lead to an even greater risk of damage, or even destruction of shipwrecks and underwater antiquities. Proper and timely MSP and SEA (also by considering UCH aspects) could contribute to avoiding such risks or minimising their negative impacts, if there are no other reasonable alternatives.The most vulnerable areas are those within the territorial waters (6 or 12 nautical miles from the coast, depending on the country). This is the zone of greatest archaeological potential, but also the area where this potential is at greatest risk and the most vulnerable.

Considering the seriousness of the problem as well as its transboundary character, the involvement of institutions from different countries is needed to identify common protection approaches, standards and actions, as well as to exchange good practices. Reconciling private and public interests to protect underwater cultural resources should be governed by international law and the preservation of these resources should be defined as a key element of economic, social, and cultural development [28].

Examples of cooperation actions include: (i) shared efforts for the identification of UCH sites in still unexplored areas of the Adriatic and Ionian seas; (ii) definition of common legal protection regimes for registered UCH sites; (iii) sharing good practices about monitoring, protection and implementation of mitigation measures for endangered UCH. Generally, there is a need to develop a regional perspective aiming to ensure both protection and valorisation of UCH sites, also through the combination with other marine activities, including particularly sustainable tourism and environmental protection [29]. From this perspective, organised diving could become an ally in the fight for UCH protection and valorisation.

Sustainable tourism management

Under the aegis of the EUSAIR policy, Sustainable Tourism is considered a specific pillar. The specific objectives for this pillar are a) diversification of the macro-region's tourism products and services along with tackling seasonality of inland, coastal and maritime tourism demand; and b) improving the quality and innovation of tourism offer and enhancing the sustainable and responsible tourism capacities of the tourism actors across the macro-region.

By integrating sustainability approaches into their activities, tourism stakeholders can increase the value of their business by protecting the competitive advantages (intrinsic diversity, variety of landscapes and cultures) that make the Adriatic-Ionian Region an attractive tourist destination. On the one hand, coastal tourism is a key component of coastal and marine economies and it depends on the quality and diversity of effective coastal management policies. On the other hand, there is a great opportunity for crafts, agriculture, tourism, retailing and the rural economy as a whole. National and local governments need to pursue creative strategies to promote the qualities of their territories in the broadest sense, trying to leverage landscape, nature, maritime areas, cultural heritage, regional products, regional gastronomy and quality traditional products [30].

On the other hand, coastal and maritime tourism poses problems for environmental sustainability that calls for transboundary management. The cruise ship tourism segment undoubtedly leaves an enormous

environmental impact. Cruise activities in the Mediterranean and its adjoining seas are developing fast: in 2007 there were 8.7 million cruise passengers in the Mediterranean, in 2018 there were more than 25 million. The Adriatic and Ionian seas represent the second most visited area in the Mediterranean (17% of passengers) with more than 30 cruise ports, the most popular of which are Venice (with 31.7% of passenger share, > 1,600.000 in 2016); Dubrovnik (with 16.5% of passenger share); and Corfu (with 14.8% of passenger share, >700,000) [31]. These trends are putting increasing pressure on marine and coastal ecosystems and some of the MPAs. Cruises operate near and sometimes within many Mediterranean MPAs. In the case of Venice, the cruise port is in fact located inside a marine Natura 2000 site. Cross-border, sub-regional and regional cooperation between public authorities is particularly important, given the geographical scale across which the cruise sector operates; coordinated solutions are essential if they aim to have wide-ranging and long-lasting benefits across the Mediterranean. Also, other segments of the tourism sector call for a sustainable management approach, including specifically (i) beach tourism, causing high concentration of tourists and related infrastructures in coastal areas; (ii) yachting, tour boats and related activities (e.g. scuba diving, snorkelling, wildlife watching) determining the proliferation of marinas and aiming at entering the pristine environments and protected species, causing a variety of impacts (e.g. damage to benthic habitats caused by anchors) [32]. Transboundary cooperation would help identify common actions and harmonize management practices, providing more effective measures.

Development of an Adriatic-Ionian network of ports

Complementarity of ports has been argued as a necessary condition for effective port cooperation and ports in the Adriatic and Ionian are making increasing efforts to forge mutually beneficial cooperation strategies [33].

Within its Pillar 2 "Connecting the Region", the EUSAIR Action Plan encourages connectivity within the Adriatic-Ionian Region and with the rest of Europe. The key objectives of this Pillar are to strengthen maritime safety, develop a competitive regional intermodal port system, reliable transport networks and intermodal connections with the hinterland. To achieve these objectives, the Action Plan recommends clustering port activities and services throughout the region.

Positive examples, to be further developed according to the EUSAIR Action Plan, are port associations that can help share strategic functions and harmonise common procedures and standards on key topics, such as safety at sea and sustainability.

For the Northern Adriatic Region, the North Adriatic Ports Association (NAPA[8]) is a clear example of this action. It was created in 2010 and currently connects five seaports located at the northern tip of Adriatic Sea: Ravenna, Venice, Trieste (Italy), Koper (Slovenia) and Rijeka (Croatia). More than 100 million tonnes of waterborne cargo are handled in the NAPA seaports every year, including general cargo, containers, cars, ores and minerals, fossil fuels, and chemicals. According to NAPA's vision, the association is working to form a European logistics platform, in particular concerning servicing the markets of the Far East as well as those in Central and Eastern Europe. Owing to the location of its ports, NAPA provides the cheapest naval route from the Far East through the Suez Canal to Europe with shorter distance than other North-European ports. A huge variety of logistic services and an extensive traffic network supports a multimodal gateway to the key European markets. Since its creation, the NAPA region has attracted considerable attention from the industry point of view and a research perspective, drawing greater research attention to the region [33].

Extending cooperation of NAPA to other Adriatic ports (e.g. Southern Adriatic Sea Port Authority, unifying ports of Bari, Brindisi, Manfredonia and Monopoli) or associations (e.g. Croatian Association of Ports) can provide added value, for example, in terms of definition of a common vision and common strategies, adoption and implementation of common rules, exchange of good practices, also in relation to conflicts with environmental protection and other uses of the sea and coastal spaces. Overall, an extended network of Adriatic-Ionian ports would also provide benefits for the management of closely related challenges, such as those connected with shipping operations and safety.

[8] http://www.portsofnapa.com/

Further development of joint scientific research programs

Strengthening research and innovation is a cross-cutting issue of the entire EUSAIR Strategy [34]; its importance for a more innovative, smart and sustainable region is also highlighted by the cooperation INTERREG Adrion programme [35].

The EUSAIR Action Plan stresses the important role that a stronger focus on research and innovation can play in fostering blue growth (Pillar 1), e.g. (i) the development of R&D&I platforms on deep-sea resources, green sea mobility and marine biotechnology can boost innovation in blue technologies; (ii) increased scientific cooperation is considered essential for a more sustainable fisheries and fish stocks management; (iii) data knowledge and sharing are important components of the set of actions aiming to improve maritime and marine governance and services (including MSP).

Many of the actions listed in the EUSAIR Action Plan under Pillar 3 on Environmental quality depend on research and innovation for reliable and up-to-date data for identifying baseline situations and for monitoring progress and future development. Further development of scientific cooperation, notably through innovative integrated observatory infrastructure and data exchange platforms across the region and across sectors is a clearly identified need.

Indeed, the Adriatic-Ionian region can rely on a long-standing tradition of cooperation on scientific research. Starting with PlanCoast in 2006, at least 8 projects directly dealing with MSP and ICZM in a cross-border and/or transboundary perspective have been implemented or are under implementation up until now (Figure 1-1). Although some of these projects include a research component, they mainly tend to focus on knowledge transfer from science to policy and practice, e.g. through the development of tools and streamlined knowledge, creation of interoperable data sharing platforms, development and testing of methodologies, elaboration of pilot plans, etc. In parallel, a vast set of scientific research projects have been developed through the cooperation between major Adriatic and Ionian institutions, covering a wide range of topics relevant for coastal and marine planning and management (e.g. ecosystem approach, environmental pressures and status, coastal and marine vulnerability, MPAs, sustainable aquaculture, fisheries, coastal tourism, coastal dynamics and protection, shipping operations and shipping safety, multi-use of the marine areas, climate change, etc.).

Cooperation is needed to continue along this fruitful pathway, aiming to jointly shape and implement future common research programmes focusing directly both on the cross-cutting nature of MSP and ICZM, as well as on the essential building blocks of the scientific knowledge forming the basis for science-based marine and coastal planning and management. Strengthened efforts are also needed to improve knowledge transfer from science to policy and practice, in particular providing real benefits to the statutory national MSP processes (see section 3.3.2), as well as to better streamline communication with the civil society.

3 Common MSP principles and elements

3.1 Ecosystem approach as a guiding principle for MSP

Chapter overview

The ecosystem approach is the guiding principle of all policy developments and programmes implemented under the auspices of the UN Environment/MAP Barcelona Convention (BC), including MSP. Its application is also required by the EU MSP Directive.

The ecosystem approach is well conceptualised. In the Mediterranean, it has been underpinned by durable processes, specifically the Ecosystem Approach Roadmap of the BC system. Nonetheless, the full application of this approach within MSP is still at an early stage in the Mediterranean, as well as in the entire Europe.

Within the BC system, the ecosystem approach is operationalized through IMAP, which share many themes with the EU MSFD. Alignment between IMAP/MSFD and MSP could be improved, e.g. through data sharing, LSI assessment, evaluation of cumulative impacts, possibly considering ecosystem boundaries instead of administrative ones, regular assessment and plans updates based on new monitoring results, etc.

SEA is an important tool for integrating environmental considerations in the preparation of marine spatial plans and, more generally, in implementing the ecosystem approach. Therefore, SEA and MSP should be implemented simultaneously to ensure that SEA relies on the most up-to-date plan and that SEA outcome is embedded in the planning process and used to optimize the plan.

Transboundary data exchange is crucial to ensure the ecosystem approach is applied within MSP. Coherence and harmonisation of data across boundaries should be strengthened, based on the relevant initiatives already taken in the AI region.

A large number of tools that can help operationalize the ecosystem approach within MSP are available for the Adriatic-Ionian region. There is a need to improve their usability and to develop new tools to cope with the aspects that have still remained uncovered.

The ecosystem approach is the guiding principle in all policy implementation and development undertaken under the auspices of the UN Environment/MAP Barcelona Convention. It is further operationalized through the implementation of the Integrated Monitoring and Assessment Programme (IMAP), with its ecological objectives and related indicators, to achieve the GES.

As recalled in the UNEP/MAP CF for MSP [1], the ecosystem approach can be defined as the integrated management of land, water and living resources that equitably provides sustainable delivery of ecosystem services. It goes beyond examining specific issues, species, or ecosystem functions in isolation. Instead, it recognizes ecological systems for what they are: rich mixes of elements in continuous interaction. This also applies to the ICZM Protocol and the related planning of land and sea-based marine activities, including MSP implementation. The ecosystem approach is particularly important for the management of coasts and seas, where the nature of water keeps systems and functions highly connected. As the ecosystem approach extends beyond national borders, its application relies on transboundary cooperation.

Application of the ecosystem approach is also envisaged by the EU MSP Directive (EU-MSPD). According to this directive, MSP shall follow the ecosystem approach, which means – among other requirements – that MSP shall be based on the best available scientific knowledge about the ecosystem and its dynamics.

Although the MSP Directive (MSPD) does not directly define the ecosystem approach, the requirement to implement it is stated in the Preambles (3), (14), (22), as well as directly in Article 5 on the objectives of MSP:

- MSPD Preamble (3): *"…The application of an ecosystem-based approach will contribute to promoting the sustainable development and growth of the maritime and coastal economies and the sustainable use of marine and coastal resources."*
- MSPD Preamble (14): "*In order to promote the sustainable growth of maritime economies, the sustainable development of marine areas and the sustainable use of marine resources, maritime spatial planning should apply an ecosystem-based approach as referred to in Article 1(3) of Directive 2008/56/EC with the aim of ensuring that the collective pressure of all activities is kept within levels compatible with the achievement of GES and that the capacity of marine ecosystems to respond to human-induced changes is not compromised,*

while contributing to the sustainable use of marine goods and services by present and future generations." and "*an ecosystem-based approach should be applied in a way that is adapted to the specific ecosystem and other specificities of building on existing knowledge and experience."*

- MSPD Preamble (22): "*…maritime spatial planning as a tool to support the ecosystem-based approach to the management of human activities in order to achieve good environmental status…"*
- MSPD Article (5): "*When establishing and implementing maritime spatial planning, Member States shall consider economic, social and environmental aspects to support sustainable development and growth in the maritime sector, applying an ecosystem-based approach, and to promote the coexistence of relevant activities and uses."*
- Preamble 14 of the MSP Directive also notes that the ecosystem-based approach within MSP should be adapted to specific ecosystems and should be based on an adaptive management approach, considering the availability of new data as well as the precautionary principle (Directive 2014/89/EU). MSP can also create a framework for transparent evidence-based decision-making processes, which are reflected in the principles of ecosystem-based approach [36].

Besides, the MSP Directive sets out 10 key principles for MSP seeking to encourage the development of a common approach among Member States. These principles are closely linked to the ecosystem approach defined by UN Environment/MAP, also based on 10 principles, the Malawi principles (CBD COP 5 Decision V/6 2003. Ecosystem approach; [37]) (Figure 3-1).

PRINCIPLES OF THE ECOSYSTEM APPROACH (CBD COP-5 Decision 6)		MSP KEY PRINCIPLES (EC COM (2008) 7)	
E1	The objective of management of land, water and living resources are a matter of societal choice	M1	Using MSP according to areas and type of activity
E2	Management should be decentralized to the lowest appropriate level	M2	Defining objectives to guide MSP
E3	Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems	M3	Developing MSP in a transparent manner
E4	Recognizing potential gains from management, there is usually a need to understand and manage the ecosystem in an economic way	M4	Stakeholder participation
E5	Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the EcAp	M5	Coordination with Member States – simplifying decision process
E6	Ecosystem must be manged within the limits of their functioning	M6	Ensuring the legal effect of national MSP
E7	The EcAp should be undertaken at the appropriate spatial and temporal scale	M7	Cross-border cooperation and consultation
E8	Recognising the varying temporal scales and lag-effects that characterize ecosystem processes, objectives for ecosystem management should be set for long term	M8	Incorporating monitoring and evaluation in the planning process
E9	Management must recognize that change is inevitable	M9	Achieving coherence between terrestrial planning and MSP – relation with ICZM
E10	The EcAp should seek the appropriate balance and integration of conservation and use of biological diversity	M10	A strong data and knowledge base
E11	The EcAp should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovation and practices		
E12	The EcAp should involve all relevant sectors of society and scientific disciplines		

Figure 3-1. Links between the ecosystem (Malawi principles) and MSP principles (source: redrawn from [37]).

The Adriatic Sea is a well-studied area from the point of view of the physical environment and oceanographic features, including marine ecosystems. This knowledge represents a fundamental asset the countries with the Adriatic coast can start from and rely on to implement the ecosystem approach in MSP. This can include:

- Supporting further development and implementation of the sub-regional monitoring and assessment through IMAP indicators and other socio-economic indicators addressing drivers, with the view to ensuring that the MSP fully complies with environmental objectives to achieve and/or maintain GES; and
- Promoting cross-cutting tools related to cumulative impact assessment and similar tools, which can support the contribution of the environmental pillar to the implementation of MSP.

3.1.1 Elements needed for an ecosystem approach to MSP

Ensuring the right balance between socio-economic development and environmental protection is one of the major challenges for MSP. ICZM and MSP have been acknowledged as fundamental processes for the sustainable development of coastal and marine areas [38], [39] and a practical way to support the ecosystem-based management [40], [41]. However, many of the current MSP processes are more about the growth of the blue economy, rather than focusing on balanced conservation and development objectives. In these cases, marine conservation is often perceived as just "another" spatial use of the sea—being treated at the same level as fisheries, shipping, renewable energy, etc.—and the balance is heavily weighted towards economic development, with a real risk of social and economic factors overshadowing the importance of environmental conservation [42].

Still, health is the priority in some MSP initiatives ensuring ecosystems, and ecosystem goods and services are the basis, or foundation, of the entire planning process. These "ecosystem-based" MSP processes start by developing a "conservation plan"—that is, establishing how to manage human uses to maintain biodiversity and ecosystem processes to the maximum extent possible—and only then move on to the spatial and temporal allocation of different uses in the same sea space. Ecosystem-based MSP should, therefore, be based on a deep understanding of ecological processes, functions, interconnectivity, and service and value delivery. In this context, marine scientists can play a major role in providing information and guidance to marine planners. Similarly, ecosystem services identification, assessment, and valuation will be key for informing MSP that is environmentally sustainable [43].

Ways to integrate the ecosystem approach principles in the MSP process have been proposed, for example, by the experience in the Baltic Sea where the following issues have been identified to be considered when developing MSP [44].

- Best available knowledge and practice: the allocation and development of human uses shall be based on the latest state of knowledge of the ecosystems as such and the practice of safeguarding the components of the marine ecosystem in the best possible way.
- Precaution: a far-sighted, anticipatory and preventive planning shall promote sustainable use in marine areas and shall exclude risks and hazards of human activities on the marine ecosystem.
- Alternative development: reasonable alternatives shall be developed to find solutions to avoid or reduce negative environmental and other impacts, as well as impacts on the ecosystem goods and services.
- Identification of ecosystem services: To ensure a socio-economic evaluation of effects and potentials, the ecosystem services provided need to be identified.
- Mitigation: the measures are envisaged to prevent, reduce and offset any significant adverse effects on the environment of implementing the plan to the maximum extent possible.
- Relational understanding: various effects on the ecosystem caused by human activities and interactions between human activities and the ecosystem need to be considered, as well as those among various human activities.
- Participation and communication: all relevant authorities and stakeholders, as well as the wider public, shall be involved in the planning process at an early stage.
- Subsidiarity and coherence: maritime spatial planning with an ecosystem approach as an overarching principle shall be carried out at the most appropriate level and shall seek coherence between the different levels.
- Adaptation: the sustainable use of the ecosystem should help apply an iterative process including monitoring, reviewing and evaluation of both the process and the outcome.

Some application examples and guidance available – also for the AIR – that can help MSP authorities operationalize ecosystem approach can be found at the European MSP Platform website.[9]

The ADRIPLAN project[10] (executed in 2013-3015) identified and tested a methodology for practical implementation of MSP in the AIR, also taking a cross-border perspective into account. The methodology (Figure 3-2) is based on the ecosystem approach and builds up previous methodologies developed for this region, particularly the one developed by the SHAPE project. It is divided into several steps, including pre-planning, vision and objectives definition, analysis and interpretation (coexistence among uses, cumulative impacts, compatibility among uses, socio-economic aspects, etc.), design, monitoring and evaluation of the planning outputs and implementation. Horizontal means of implementation, such as stakeholder participation and monitoring of the planning process, take place in different stages once the methodology has been developed.

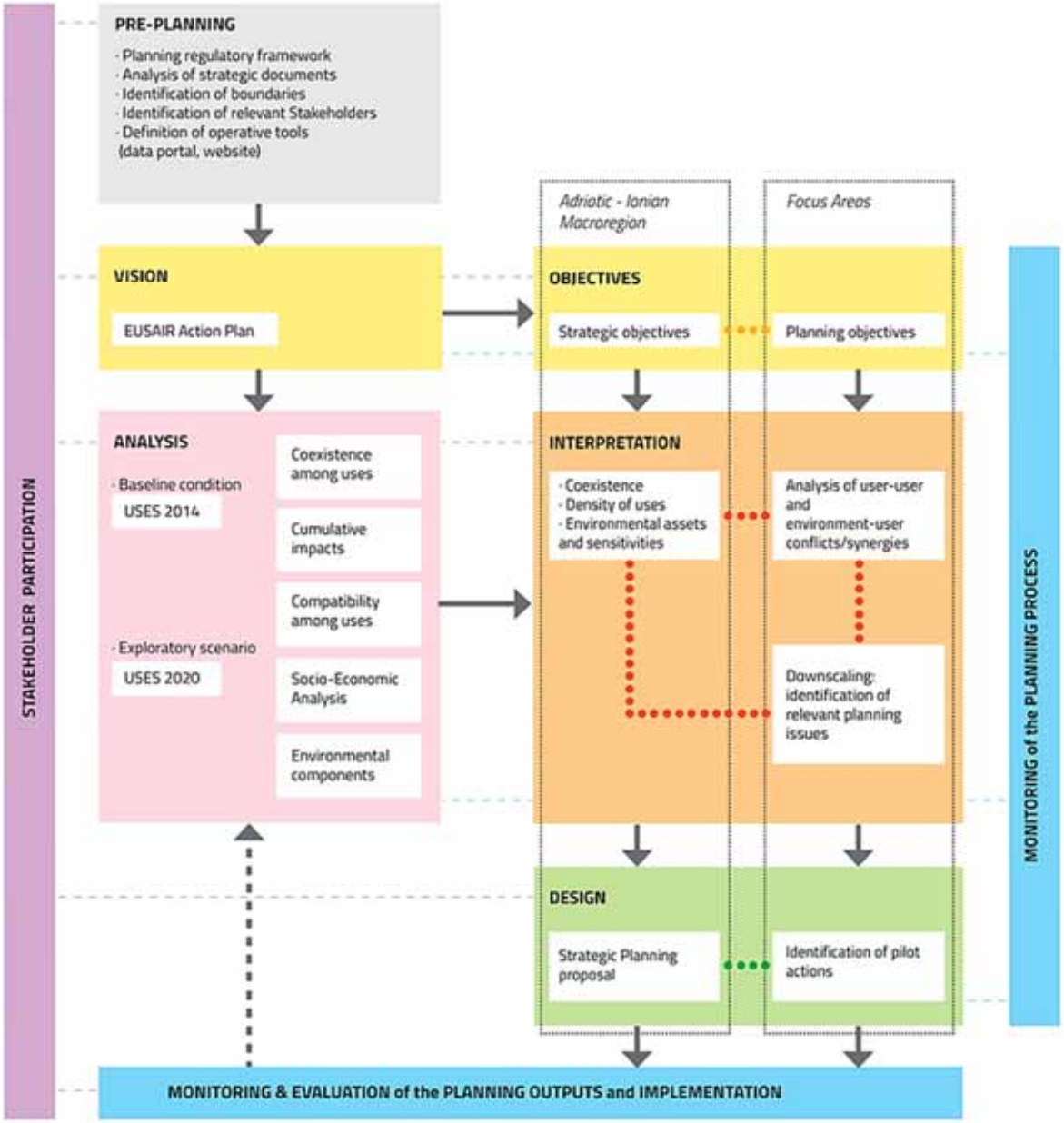


Figure 3-2. Project-based experience of ecosystem approach in MSP. Flowchart of the activities developed under ADRIPLAN methodology (source: [45]).

[9] www.msp-platform.eu/faq/ecosystem-based-approach

[10] adriplan.eu

Elements needed for an ecosystem-based approach to MSP in the Adriatic: the SUPREME project outcomes

From a practical point of view, the adoption of the Ecosystem Approach in MSP should consider the following conditions:

Adoption of a more area-based approach (instead of a sectoral one) when planning in the marine space: Adopting the ecosystem-based approach in MSP means that spatial planning in the marine space should no longer be practised on a sector or economic activity basis (which has been common practice until now). Instead, it should be practised within ecosystem boundaries (marine regions) that may lead to wiser management of all uses (marine or terrestrial) and the ecosystems.

Choosing the right limits (and scale) of the marine management units. The sea delimitation of the management units should not only consider the administrative limits or the national (geopolitical) borders of each coastal country. Instead, the definition of the management units should also take the ecosystem boundaries into account.

Ensuring GES of marine ecosystems and waters within the management units. This means that, at least, the 11 Ecological Objectives adopted under the Barcelona Convention Ecosystem Approach Roadmap implementation, need to be considered, primarily based on the assessment of IMAP Common Indicators at appropriate temporal and spatial scales, noting that they are mostly in line with the MSFD Descriptors.

Designation of MPAs in order to expand the existing network at sea

Source: [46]

The methodology was used in the project for the development of cross-border MSP exercises within the AIR, specifically in two Focus Areas (Northern Adriatic and Southern Adriatic/Northern Ionian). Furthermore, it aims to provide a guideline for the implementation of other MSP projects and initiatives in the AIR and on the Mediterranean or sub-Mediterranean scale.

Adopting the Ecosystem Approach in MSP, i.e. practising MSP within ecosystem boundaries, is usually not only a matter of a single country. Instead, in most cases, it is a matter of two or more States, highlighting the need for transboundary considerations and cross-border MSP initiatives, involving all countries sharing the same marine region. Through the ecosystem approach, the MSP process is adaptive and evolves through a series of social, cultural, economic and environmental sustainability assessments in order to devise an integrated plan that will be able to take into account all the aspects at stake [46].

The ecosystem approach is recognised as well conceptualised. In the Mediterranean, it has also been underpinned by durable processes, in particular by the Ecosystem Approach Roadmap adopted by the Barcelona Convention Parties in 2008. Nonetheless, the full application of ecosystem approach within MSP is still at an early stage in the Mediterranean, as well as in the whole of Europe.

Institutional complexity and challenges related to modifications of governance models pose barriers to implementing both approaches simultaneously. Specifically, the real-world application is hindered by the difficulty to alter multi-layer governance regimes, historically formed to manage sectoral activities individually [47].

One of the key barriers to the implementation of the ecosystem approach within MSP is the lack of inter-disciplinary science [48]. Additionally, marine spatial plans are usually implemented within short time frames, which does not help foster integration of the ecosystem approach into MSP [49].

Different European countries have already developed frameworks for the implementation of the ecosystem approach within their national policy legislations [50]. Some examples of possible solutions for a practical application of the ecosystem approach in MSP taken from the European experience are shared [51].

In the context of the Adriatic-Ionian region, the SUPREME project highlighted some elements of effective implementation of MSP based on the ecosystem approach. Specifically, these elements indicate how to possibly consider, assess and balance the pressure-state-impact inter-linkages caused by socio-economic activities affecting the marine environment [52]. Testing of MSP implementation and management, driven by the ecosystem approach, has been carried out within SUPREME for the Adriatic case study [53]. These instruments should be considered as important and strategic references to be taken into account to make the MSP implementation in the Adriatic sub-region effective.

The Montenegrin experience with the Boka Kotorska Bay is a good example of how the ecosystem approach and IMAP Common Indicators, as part of the implementation of the Barcelona Convention, can serve as a basis for the MSP process. A pilot study was developed within the Project "Defining the methodological framework for marine spatial planning in Boka Kotorska Bay (Montenegro)" [54], focusing on the Boka Kotorska Bay, which is one of the most

vulnerable zones of the Montenegrin coastal area. The pilot study designed and tested an IMAP-based methodology for marine vulnerability assessment, considering the IMAP Ecological Objectives and using related Common Indicators.

The potential use of this approach to fill the gaps in the MSP and ICZM processes was also tested. The IMAP-based vulnerability assessment included three main steps:

- Identification and mapping of data related to IMAP Common Indicators, including both those predominantly related to the state of the marine environment (biodiversity and landscape features, such as habitat distributional range, population abundance of selected species and the like) and those related to existing pressures (e.g. eutrophication, contamination, physical disturbance of the coastline). The identification and mapping of IMAP Common Indicators have been complemented with findings of the vulnerability assessment of the coastal area based on a relevant set of environmental indicators related to ICZM criteria.
- Attribution of values to the current state (i.e. value index) and pressures on the marine areas (i.e. impact index). By using different criteria (e.g. conservation status, rarity, endemism), the value index is applied to different components of the environment. The impact index reflects the intensity of the impact on the marine environment and is defined based on criteria related to exposure to and sensitivity of the marine environment to the pressures coming from existing human activities.
- Assessment of vulnerability, which depends on the current state of the marine environment (value index), the current intensity of pressures (impact index), characteristics of future activities and resilience of the marine environment to future activities (i.e. its capacity to absorb additional pressures). Based on expert opinion on the resilience of the marine environment to each specific future activity, a value was assigned to the vulnerability found on a scale of 1–10 for each spatial unit.

It should be noted that quantification of the value and impact indexes is based on an assessment of the parameters defined both under state and pressure IMAP Common Indicators, respectively.

Results of the vulnerability assessment pointed to the areas where proper management of coastal and maritime activities is needed, e.g. in terms of relocation of specific activities and/or the need to seek alternative solutions for marine uses (Figure 3-3). The results of the vulnerability assessment can also underpin the identification of technological improvement needs, or other measures needed to reduce the impacts of specific activities on the marine environment.

In Greece, the ecosystem approach and ecosystem-based management principles were the main ideas and elements taken into consideration in the elaboration of the management plan of the protected Marine Park of the Island of Zakynthos;[11] this plan constitutes a local hybrid MSP.

In Croatia, an expert background document for nature protection developed by the Ministry of Environment and Energy of the Republic of Croatia is mandatory[12] for the development of spatial plans for national and

Use of best available data

A shared ECOlogical observing system in the Adriatic Sea: the ECOSS project

ECOSS overall objective is the establishment of the ECOlogical observing system in the Adriatic Sea (ECOAdS), shared between Italy and Croatia, able to integrate ecological and oceanographic research and monitoring with Natura 2000 conservation strategies. Building on the facilities, infrastructures and long term ecological data existing in the Programme area and developing specific case studies, ECOSS will enhance the marine observational capacities for improving the conservation status and the expansion of the marine component of Natura 2000 network. The synergies and feedbacks among the main conservation management questions, ecological variables and key oceanographic processes will be assessed, basing on the connectivity among habitats and species in coastal and offshore waters. For the first time in the area, the holistic view of marine ecosystem health, at the base of the MSFD, will be merged with the traditional nature conservation approach, evidencing and developing the interconnections and synergies among the MSFD and H&BD.

ECOSS will develop, building on the existing ICT facilities, a robust data management infrastructure, following the principles of open science, facilitating access to the results and maximizing the re-use and the transferability of project outputs (source: CNR-ISMAR web site).

Source: ECOSS project; https://www.italy-croatia.eu/web/ecoss

[11] http://www.nmp-zak.org/en

[12] Nature Protection Act of the Republic of Croatia (Official Gazette 80/13, 15/18,14/19)

nature parks. The organization, identification of uses, planning and nature protection measures are defined by national and nature park spatial plans based on this expert background document. Zoning of protected areas is one of the fundamental tools in spatial and management planning. The definitions of zones range from those where almost no human impact is allowed to those where the natural features can be significantly affected according to planning solutions. Zoning does not imply the value of the protected area, but reflects the need to manage it to preserve overall biodiversity, geological and landscape diversity.

The spatial plan and the management plan are the two documents that serve as a tool setting out how zoning of protected areas will be implemented. Zoning in the management plan as a lower-order document must be consistent with that of the spatial plan. For this reason, it is recommended that the two documents are developed in coordination whenever possible:

- Zoning in the management plan – it reflects the needs of the public institution for managing the area. Management is defined according to the conservation objectives.
- Zoning in the spatial plan – the result of an analysis of existing, but also planned uses. It takes into account all aspects of the use (tourism, construction, transport, and infrastructure), and nature protection is imperative.

Expert background documents for nature protection for national and nature parks comprising the maritime area are available for Brijuni and Telašćica. The documents are expected to be prepared for the plans that are currently being developed (Kornati, Lastovo Islands and Mljet) based on preliminary analyses. Furthermore, some coastal counties have developed (Šibenik-Knin County) or are planning to develop (Split-Dalmatia and Primorje-Gorski Kotar County) coastal management plans with a number of analyses of environmental issues.

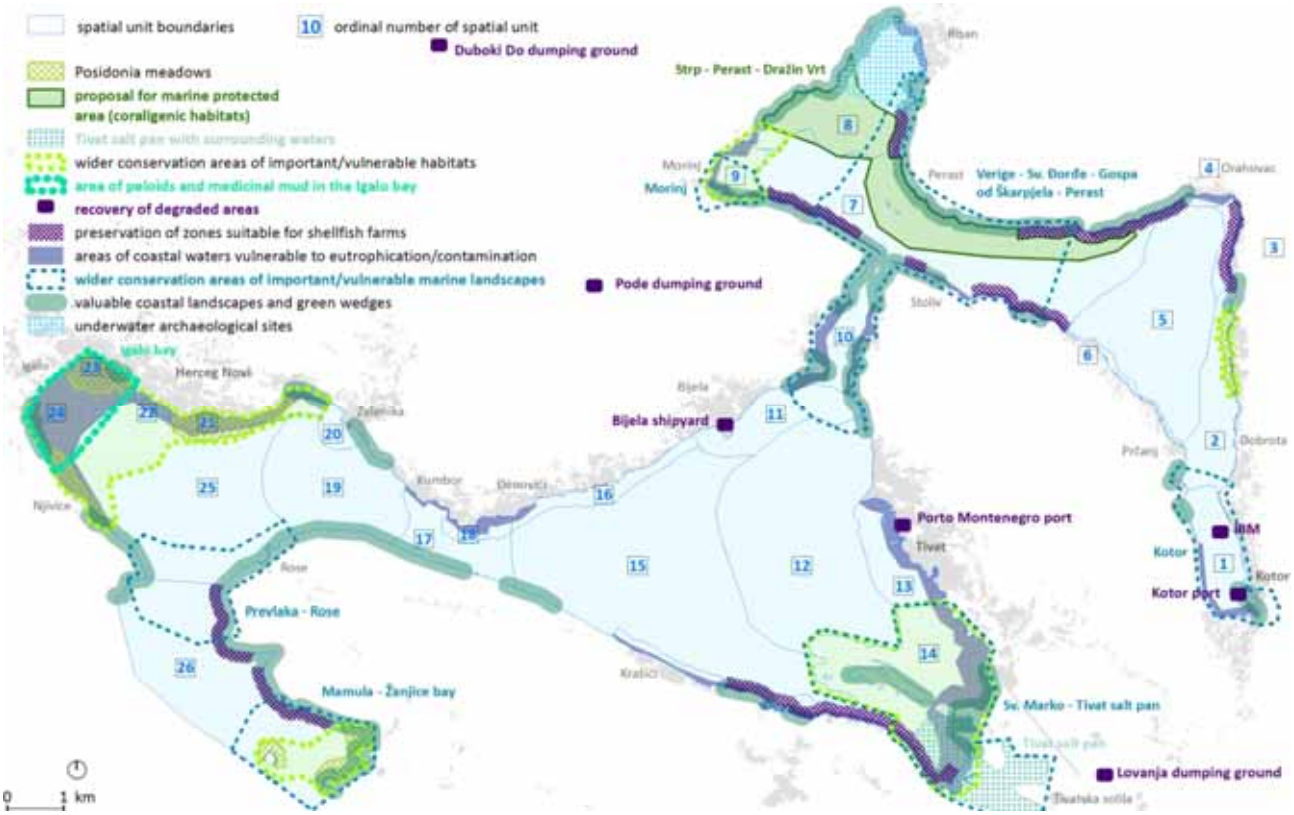


Figure 3-3. Recommendations for marine and coastal planning in the Boka Kotorska Bay (Montenegro) deriving from environmental vulnerability assessment based on IMAP Common Indicators (source: [54]).

The tools and approaches can support the implementation of the ecosystem approach in spatial planning. For example, the Study on the use and protection of the sea and seabed in the Zadar County area (developed in 2003 as a starting point in the process of ICZM in Zadar County) provided some valuable input for planning aquaculture zones in future amendments to the County spatial plan.

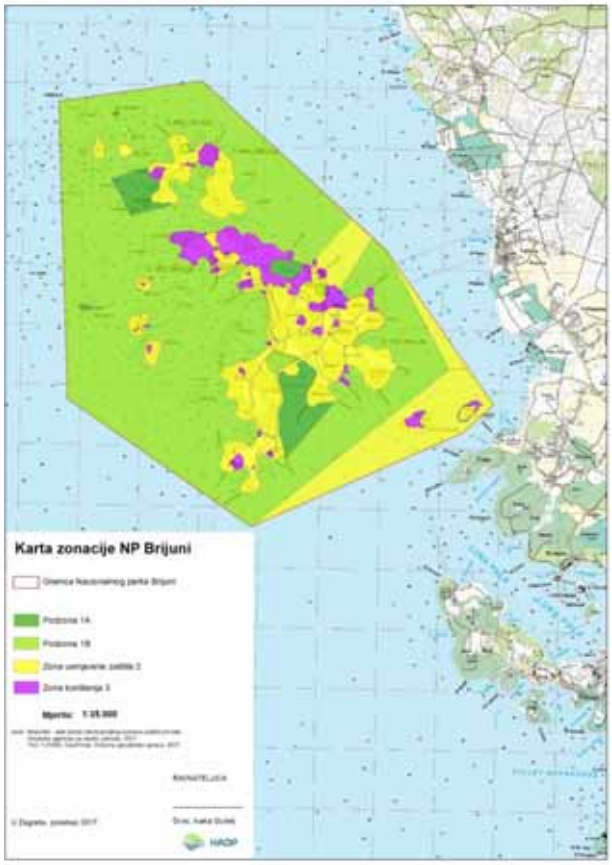


Figure 3-4. Example of marine protected area zoning: the Brijuni National park (HR)

3.1.2 Better alignment between MSP and the EU Marine Strategy Directive through the ecosystem approach

The most recent EU policy driver for the protection of the marine environment is the Marine Strategy Framework Directive (MSFD), which represents an ecosystem approach towards marine management and governance, aiming to achieve GES. Together with the Water Framework Directive (WFD), the MSFD represents a framework that serves as a link between other EU sectoral directives, providing integrated management from the catchment through the coast to open marine ecosystems. These two directives provide additional tools to underpin the implementation of the ecosystem approach. The 'framework' nature of the MSFD is reflected in eleven descriptors for determining GES, which cover the most important maritime sectors and their impacts on marine ecosystems [55].

As stated at the beginning of section 3.1, the ecosystem approach within the Barcelona Convention system is operationalized through the IMAP, with its ecological objectives and related indicators, aiming to achieve the GES. It is well known that the MSFD process and the ecosystem approach under UNEP-MAP share many important attributes, for example, concerning the respective visions aiming to achieve GES and Healthy Environment, which are independent in waters under national jurisdiction (Table 3-1). They both aim to achieve their respective goals by 2020. Besides, both MSFD and MAP make a conscious commitment to seeking mutual collaboration for the protection of the Mediterranean marine environment.

Even if MSFD does not apply to the entire Mediterranean, its philosophy, principles and practices can be used as a valuable asset across the region through the development of a common vision and coordinated processes by using MAP. In spite of vast differences across the MED in the capacity to implement specific measures or initiatives, the experience of the EU countries on MSFD and WFD can be an inspiration for non-EU countries as well.

According to the Directive, marine strategies shall apply an ecosystem approach by ensuring that the collective pressure of human activities is kept within levels compatible with the achievement of GES and that the capacity of marine ecosystems to respond to human-induced changes is not compromised while allowing the sustainable use of marine goods and services for present and future generations. Both programmes of measures and individual measures shall be based on such an ecosystem approach.

Table 3-1 Comparison between the EU-Marine Strategy Framework Directive and Mediterranean Action Plan-Ecosystem Approach. With the exception of Objective 8, they are almost identical.

EU-Marine Strategy Framework Directive	Action Plan-Ecosystem Approach
Vision	
GES	A Healthy Mediterranean with marine and coastal ecosystems that are productive and biologically diverse for the benefit of present and future generations
Strategic goals	
(i) to protect more effectively the marine environment across Europe;	(i) to protect, allow recovery and, where practicable, restore the structure and function of marine and coastal ecosystems thus also protecting biodiversity, to achieve and maintain good ecological status and allow for their sustainable use;
(ii) to achieve GES of the EU's marine waters by 2020 and to protect the resource base upon which marine-related economic and social activities depend;	(ii) to reduce pollution in the marine and coastal environment so as to minimize impacts on and risks to human and/or ecosystem health and/or uses of the sea and the coasts;
(iii) to constitute the vital environmental component of the Union's future maritime policy, designed to achieve the full economic potential of oceans and seas in harmony with the marine environment.	(iii) to prevent, reduce, and manage the vulnerability of the sea and the coasts to risk induced by human activities and natural events (UNEP-MAP 2008)
Descriptor / Objectives	**Ecological objectives**
1. Biological diversity is maintained. The quality and occurrence of habitats and the distribution conditions	1. Biological diversity is maintained or enhanced. The quality and occurrence of coastal and marine habitats and the distribution and abundance of coastal and marine species are in line with prevailing physiographic, hydrographic, geographic, and climatic conditions.
2. Nonindigenous species introduced by human activities are at levels that do not adversely alter the ecosystems	2. Nonindigenous species introduced by human activities are at levels that do not adversely alter the ecosystem.
3. Populations of all commercially exploited fish and shellfish are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock.	3. Populations of selected commercially exploited fish and shellfish are within biologically safe limits, exhibiting a population age and size distribution that is indicative of a healthy stock.
4. All elements of the marine food webs, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long-term abundance of the species and the retention of their full reproductive capacity.	4. Alterations to components of marine food webs caused by resource extraction or human-induced environmental changes do not have long-term adverse effects on food web dynamics and related viability.
5. Human-induced eutrophication is minimised, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algae blooms, and oxygen deficiency in bottom waters.	5. Human-induced eutrophication is prevented, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algal blooms, and oxygen deficiency in bottom waters.
6. Sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected.	6. Sea-floor integrity is maintained, especially in priority benthic habitats.
7. Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems.	7. Alteration of hydrographic conditions does not adversely affect coastal and marine ecosystems.
8. Concentrations of contaminants are at levels not giving rise to pollution effects.	8. The natural dynamics of coastal areas are maintained and coastal ecosystems and landscapes are preserved.
9. Contaminants in fish and other seafood for human consumption levels established by community legislation or other relevant standards.	9. Contaminants cause no significant impact on coastal and marine ecosystems and human health.
10. Properties and quantities of marine litter do not cause harm to the coastal and marine environment.	10. Marine and coastal litter does not adversely affect coastal and marine environments.
11. Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment.	11. Noise from human activities causes no significant impact on marine and coastal ecosystems.

Considering MSFD requirements under MSP seems unavoidable: as already reported above, the MSP Directive clearly states:

- [...] Maritime spatial planning should apply an ecosystem approach as referred to in Article 1(3) of Directive 2008/56/EC with the aim of ensuring that the collective pressure of all activities is kept within levels compatible with the achievement of GES and that the capacity of marine ecosystems to respond to human-induced changes is not compromised, while contributing to the sustainable use of marine goods and services by present and future generations (Preamble 14)
- 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 approach, and to promote the coexistence of relevant activities and uses (Art. 5-1).

On the other hand, even if the MSFD does not explicitly require MSP, it states that:

- Programmes of measures established pursuant to this Article shall include spatial protection measures, contributing to coherent and representative networks of MPAs, 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 MPAs as agreed by the Community or Member States concerned in the framework of international or regional agreements to which they are parties (Art. 13-4).
- Member States are required to develop national programmes taking consideration of 'spatial and temporal distribution controls', which are 'management measures that influence where and when an activity is allowed to occur' (Annex VI).

Links between the ecosystem approach principles (the Malawi principles), MSFD strategic elements and MSP is illustrated in the diagram in Figure 3-5. Overall, the ecosystem approach is relevant within MSFD at two levels:

1) The strategic level represented by the integration and application of the measures and objectives set out in the MSFD, which represents the Integrated Maritime Policy (IMP) Environmental Pillar and is, therefore, the interconnection and interrelationship between different sectoral regulations.
2) The functional-procedural level, consisting of the application of the SEA Directive working tools as a methodology that can clearly articulate the way the ecosystem approach needs to be integrated and used to define the marine spatial plans.

Although each of the Directives has its specific objectives, many authors (e.g. [57], [58]) have shown the importance of linking the efforts of these Directives (along with others, such as the WFD (2000/60/EC) or Habitats Directive (HD, 92/43/EEC)) to achieve their objectives in a more coherent way (Figure 3-6).

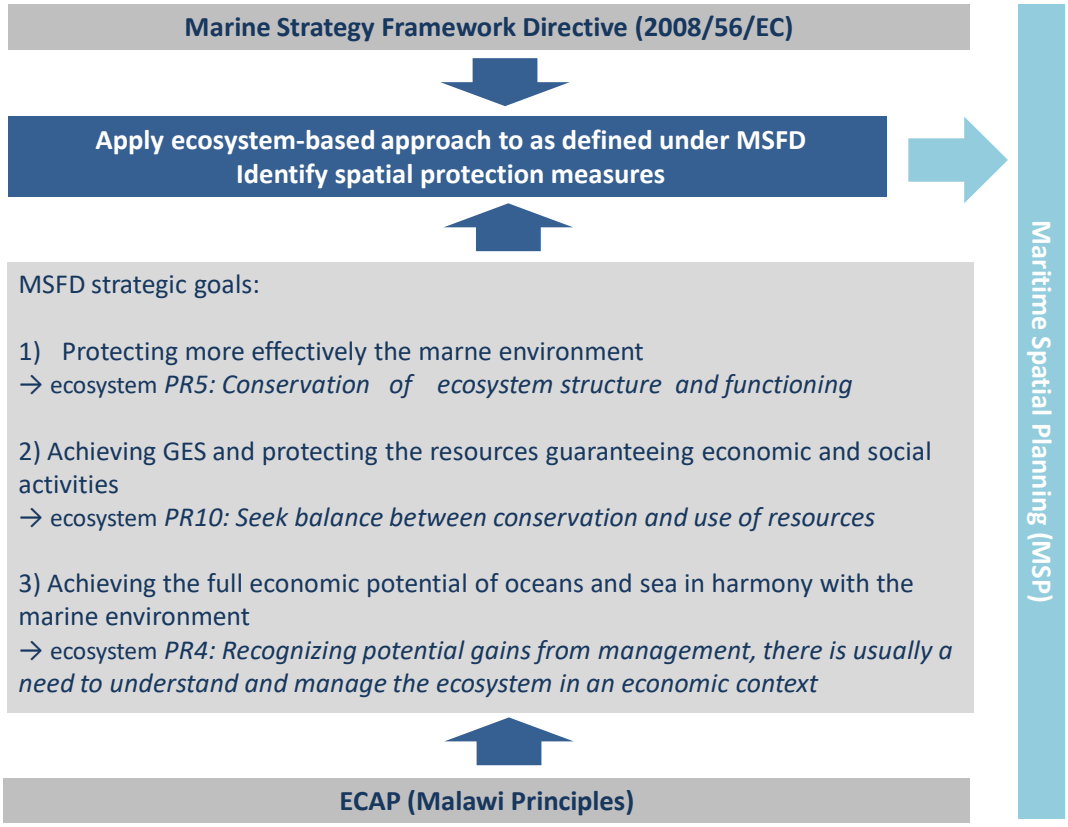


Figure 3-5. Links between MSFD, ecosystem principles and MSP (source: [56])

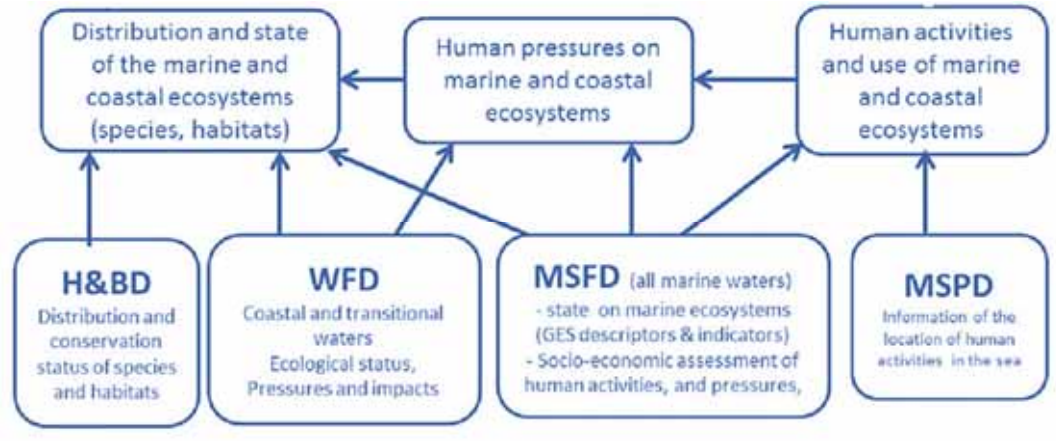


Figure 3-6. Overview of the links between the MSFD, WFD, the H&BD, and the MSPD illustrating how the assessments and data produced by these Directives can feed into each other (source: the EU MSP Platform).[13]

[13] https://www.msp-platform.eu/faq/ecosystem-based-approach

There are possibilities for linking MSFD/IMAP and MSP Directive aims through:[14]

- data exchange: making available data collected under MSP serve as information basis for pressure indicators under MSFD and IMAP; making available data collected under MSFD and IMAP serve as information basis for marine spatial plan assessment (i.e. information that show how well they are performing, if measures to reduce pressures should be put in place, etc.);
- taking into account land-sea interactions;
- an adequate design of monitoring programmes for measuring IMAP/MSFD indicators, assessing predominant pressures and impacts and environmental status of marine waters;
- an adequate evaluation of pressures and impacts produced by activities, including cumulative impact assessments;
- setting adequate targets for indicators;
- considering ecosystem boundaries instead of administrative ones;
- taking into account the assimilative capacity (carrying capacity of the system before affecting GES); and
- regularly undertaking assessments and observing marine ecosystems in a holistic way (including humans as part of the system) [59], [60], [61].

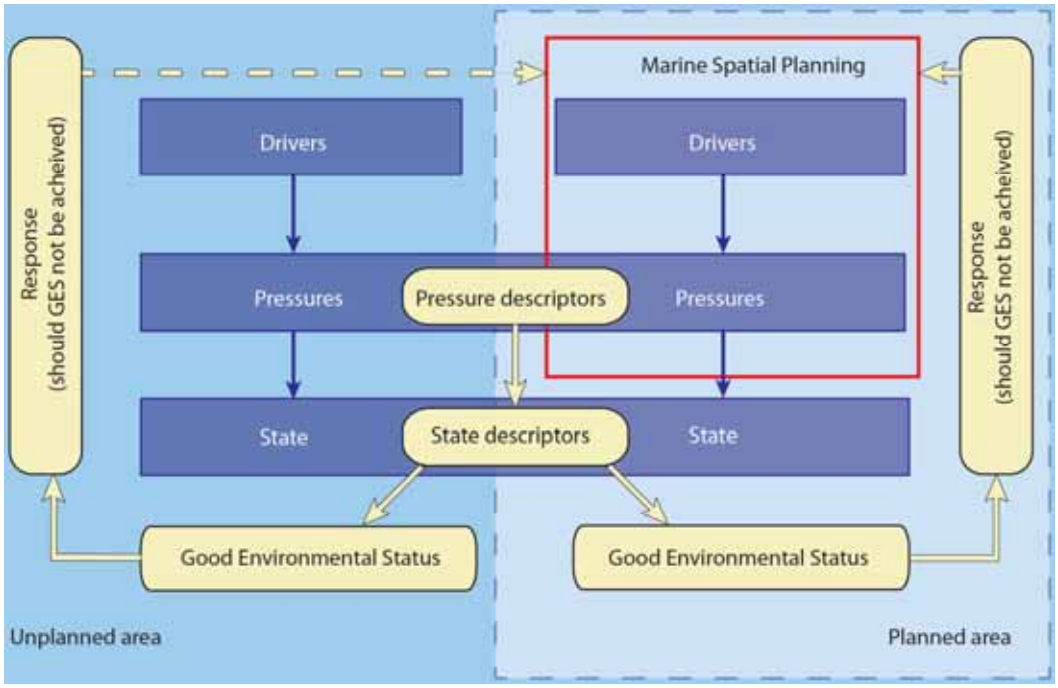


Figure 3-7. MSP and GES within the Driver Pressure State Welfare Response (DPSWR) framework (source: [61])

As the marine environment is not a closed system, pressures may derive from drivers outside a planned area and activities within a planned area may cause pressures beyond the planned area. In the former instance, external sources of pressures will need to be considered in making plans. For example, nutrient loads from land-based sources might place limits on aquaculture development because the combined loads cause eutrophication [61].

In rationalizing maritime activities for a given area and determining the pressures placed on the marine environment, MSP has the potential to become an important tool within an ecosystem approach to achieve GES. However, its focus so far has been primarily put on the specific area being planned. There is growing recognition that MSP environmental objective will only be met when MSP also addresses environmental effects beyond the planned area (e.g. BaltSeaPlan [62]). A given plan will need review and modification if achieving or maintaining GES in the

[14] Ibid

MSP and GES

In rationalizing maritime activities for a given area and determining the pressures being placed on the marine environment, MSP has the potential to become an important tool within an ecosystem approach to achieve GES.

→ *A plan will need review and modification if achieving or maintaining GES in the planned area is threatened. To support effective implementation, robust governance and institutional arrangements, supported by an EU directive, are needed.*

Plans within a nation's EEZ need to be spatially coherent, but they will also need to be coherent with neighbouring EEZs up to the level of the marine subregion or region.

→ *As GES is to be achieved at sub-regional or regional sea levels MSP needs to be coherent at multiple spatial scales, benefiting from existing regional cooperation frameworks, especially Regional Seas Conventions.*

From the perspective of temporal scales, MSP yields plans with a time horizon and periodic review. However, plan adaptation, and specifically curtailing or stopping activities that cause unexpectedly adverse environmental effects, may not be possible.

→ *Maritime activities that are less amenable to review, and with the potential to adversely affect place-specific descriptors, i.e., hydrographical changes, EO7/D7, energy and underwater noise, EO11/D11, and seafloor integrity, EO6D6, require explicit and careful examination during the preparation of the Environmental Impact Assessment.*

Cumulative effects may compromise achievement of GES (see Busch et al. 2013). In assessing and/or reconciling cumulative effects, MSP has the potential for contributing more to an ecosystem approach than just supporting achievement of GES.

→ *Marine spatial planning's environmental objective means that it needs to address cumulative effects and make trade-offs between pressures and environmental effects. Frameworks to assess effects, together with a stakeholder process, are needed for effective resolution of conflicts between maritime uses and the marine environment.*

Source: [61]

planned area is threatened. To support effective implementation, robust governance and institutional arrangements, support is also needed from the Regional Sea Conventions that are now in place, as well as from the EU.

Areas with multiple uses of and multiple pressures on the marine environment may require detailed spatial plans with a fine resolution in comparison with plans at an Exclusive Economic Zone (EEZ) or sub-regional sea levels. Plans within a nation's EEZ clearly need to be spatially coherent, but they will also need to be coherent with neighbouring EEZs up to the level of the marine subregion or region. As GES is to be achieved at sub-regional or regional sea levels (Marine Strategy Framework Directive, Article 3[5], Article 4; European Union 2008), MSP needs to be coherent on multiple spatial scales (see sections 1.1 and 1.1).

From the perspective of temporal scales, MSP formulates plans with a time horizon and periodic review. However, plan adaptation, and specifically curtailing or stopping activities that unexpectedly cause adverse environmental effects, may not be possible. Maritime activities that are less amenable to review, and with the potential to adversely affect place-specific descriptors, i.e. hydrographical changes (EO7/D7), energy and underwater noise (EO11/D11), and seafloor integrity (EO6/D6), require explicit and careful examination during the preparation of the Environmental Impact Assessment. In the case of EU Member States, this is required under the Directive on Strategic Environmental Assessment (Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001).

Cumulative effects may compromise the achievement of GES [63]. In assessing and/or reconciling cumulative effects, MSP has the potential for contributing more to an ecosystem approach, rather than just supporting the achievement of GES. The MSP environmental objective means that it needs to address cumulative effects and make trade-offs between pressures and environmental effects. The impact assessment frameworks, along with a stakeholder process, are needed for effective conflict resolution between maritime uses and the marine environment.

National MSP processes are currently progressing in the Adriatic and Ionian area, and operative links with MSFD have yet to be defined. Notwithstanding, some relevant experience remains available. The Croatian Strategy for the Management of the Marine Environment and Coastal Zone links together obligations arising from the ICZM Protocol to the Barcelona Convention and the MSFD Directive, and also links to the ongoing MSP process. The Strategy

itself is composed of a number of assessment documents[15] and action programmes. Monitoring and observation programme[16] was adopted in 2014, and Programme of measures for the protection and management of the marine environment and the coastal area of the Republic of Croatia, as the most comprehensive document addressing land-sea interactions, was adopted by the Government in 2017 (Official Gazette 97/17).

In the Italian context, at the institutional level, the MSFD Technical Committee does ensure the involvement of different authorities at various levels of governance in the implementation of the MSFD. Moreover, the MSFD Programme of Measures (PoM) identified existing measures that are currently being taken in the context of other policies, which would contribute to the achievement of GES, as well as new measures to fill the gaps identified. Within the ongoing MSP process, both the Inter-Ministerial Coordination Table and the MSP Technical Committee have the potential to provide more coordinated management of all marine and maritime policies and to integrate the GES into sector-based policies [64].

3.1.3 Ecosystem approach for the strategic environmental assessment of marine plans

Since marine spatial plans are likely to have significant effects on the environment, they are subject to Strategic Environmental Assessments (the SEA Directive (Directive 2001/42/EC)). SEAs are an important tool for integrating environmental considerations into the preparation and adoption of 'Plans' and 'Programmes'. They complement the preparation process of marine spatial plans, providing a mechanism for the strategic consideration of environmental effects, assessment of plan alternatives and potential development of mitigation measures. They also contribute to the implementation of the ecosystem approach, as they provide an important framework for the evaluation of effects on species and habitats of conservation importance.

The SEA is part of the national MSP process. However, the SEA Protocol of the Espoo Convention obliges Parties to assess the environmental impact of certain projects with possible transboundary impact at an early planning stage. In addition, "Guidelines for environmental assessment in a transboundary context on the procedures for notification, exchange of information and consultation among the Mediterranean States" have been prepared in the framework of UNEP/MAP. Bearing in mind that different international agreements and national regulations already apply across the BC area, those Guidelines aim to create a common framework of reference and recommend possible courses of action to strengthen the implementation of environmental assessments in a transboundary context and enhance cooperation for the implementation of ICZM, achievement of GES and sustainable development in the Mediterranean. The SEA is therefore closely connected to transnational consultation processes across the Mediterranean.

The SEA process requires consideration of the effects of "alternatives to the plan", which is presented in the environmental report. Interpretation of 'alternatives' varies across different contexts; in some processes, the alternative is defined as 'no plan', and the only viable options are, therefore, the proposed plan, or considering the implications of not implementing the plan. However, it is also possible to use the SEA requirement to assess plan alternatives to consider different scenarios for an MSP, varying the scale of development, location, etc. to explore the relative ecological effects. Realistic alternatives may be difficult to set out since the components of the MSP are often driven by specific policy indications (such as a requirement for a certain level of offshore renewable energy), but there may be potential to consider other options within these boundaries, such as development configuration, relative composition of different renewable energy technologies, etc. (EU MSP Platform).[17]

SEA provides a way of incorporating consideration of ecological effects into the MSP process. SEA and MSP should be implemented simultaneously to ensure that SEA is informed by the most up-to-date plan. The

[15] The following documents are available on-line: (i) Initial Assessment of the environmental status of the marine waters; (ii) Social and Economic Analysis; (iii) Good Environmental Status and Environmental Targets; (iv) Initial assessment of marine environment and coastal areas

[16] http://www.mzoip.hr/doc/sustav_pracenja_i_promatranja_za_stalnu_procjenu_stanja_jadranskog_mora.pdf.

[17] https://www.msp-platform.eu/faq/strategic-environmental-assessment-sea

understanding gained through assessment and consultation through the SEA can be used to refine the design of the MSP. However, the extent to which the processes are integrated will vary according to the implementation in each country. In some countries, the SEA process may be limited and only influence the MSP process at a certain stage, for example, when the first draft of the MSP is being created. For an overview of MSP per country and the degree to which SEA has been conducted, please see the country overview tables (EU MSP Platform).[18]

Both processes are mutually informing, and predetermined connection points between SEA and MSP (e.g. through the scoping phases, consultation, etc.) can support the effective transfer of information. Coordination of consultation processes can also ensure rapid incorporation of more diverse stakeholder voices and demonstrate coherence. Although the SEA process is rather limited in scope and resources, it may be necessary to align some of the required stakeholder engagement for SEA and MSP, which would address the challenges of overwhelming stakeholders with requests for input to different processes.

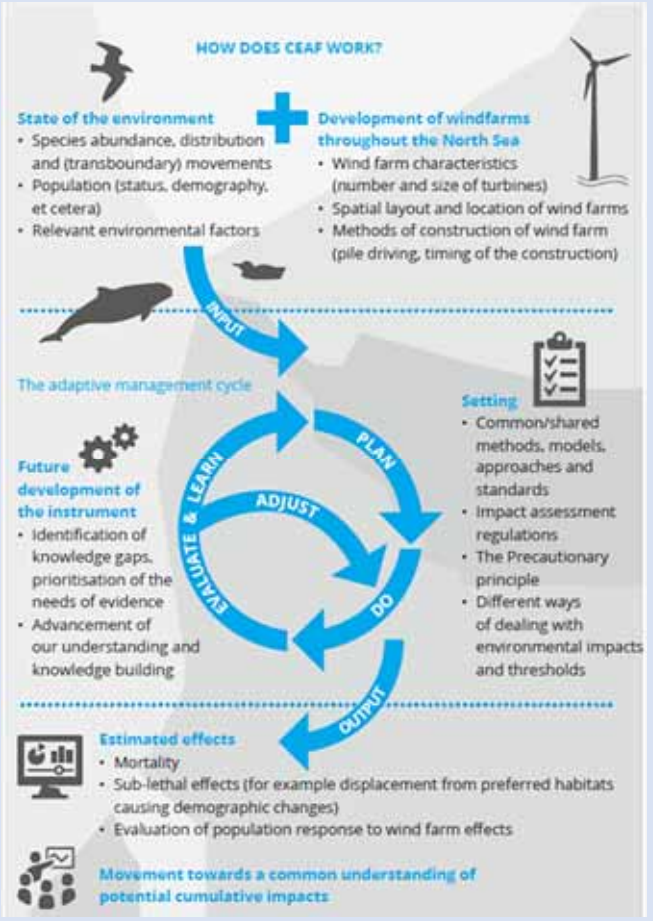
That being said, some separation between SEA and MSP is also appropriate, and there are advantages and disadvantages, for example, to both processes led by the same authority. This can be mitigated to some extent through the use of external contractors (e.g. as required by law in Latvia) that may provide a level of independence to the assessment and associated consultation processes (EU MSP Platform).[19] Overall, there is a lack of documented SEA practices that would clearly describe the methodology applied, particularly concerning MSP. However, some information on the approach taken by the countries in the AIR is available.

SEA on North Sea energy: the SEANSE project

The project is being carried out by Maritime Spatial Planning authorities and appropriate institutes in the countries bordering the North Sea: the Netherlands (Ministry of Infrastructure and Water Management/ Rijkswaterstaat), Germany (Maritime and Hydrographic Agency/BSH), France (French Hydrographic Office/ SHOM), Denmark (Danish Maritime Agency/DMA), Scotland (Marine Scotland) and the Conference of Peripheral Maritime Regions (CPMR). This project focuses on:

- Developing a coherent approach to SEAs, with a focus on renewable energy and testing it in practice through case studies;
- Creating a coherent understanding of how and when to use this part of the SEA through knowledge transfer and information exchange;
- Demonstrating the benefits of the implementation of a coherent SEA approach for the preparation of national MSPs;
- Facilitating the efficient implementation of the "Political Declaration on energy cooperation between the North Seas Countries".

Source: northseaportal.eu



[18] Ibid

[19] https://www.msp-platform.eu/faq/strategic-environmental-assessment-sea

For example, the Italian MSP Guidelines (approved by the Decree of the Presidency of the Council of Ministers – DPCM, 1st December 2017) specify that, due to the nature of their contents, the marine plans will be subject to the SEA and EIA procedures. The SEA process will start simultaneously with the marine spatial plan elaboration, including consultation with the competent actors, including cross-border and transboundary actors, also for SEA purposes; elaboration of the specific documentation required by the SEA procedures; assessment for SEA purposes and elaboration of related conclusions. Therefore, the SEA evaluation shall inform the whole process of elaboration of the plan from the early stages and proceed in parallel until the plan is finally adopted. Moreover, the guidelines envisage the application of the SEA as a methodology that would help elaborate concrete methods of action that would allow the ecosystem approach to be integrated and used for the definition of the marine spatial plans.

In Greece, the legal provisions supporting SEA are already in place. They have not been used so far in the context of MSP, given that proper/comprehensive marine spatial plans have not been developed yet. However, SEA procedures have been applied to the Specific Spatial Framework for Aquaculture and to the Specific Spatial Framework for Renewable Energy, both of which define criteria and special divisions for the offshore marine area. These can be considered sort of sectoral MSP.

In Croatia, SEA is mandatory for strategies, plans and programs at all levels (national, regional and local) in case they provide a framework for interventions with potential environmental impact. From this perspective, SEA also applies to spatial plans covering marine area. The SEA procedure starts from the very beginning of plan development. The Ministry of Environment and Energy, which is also responsible for MSFD implementation, is involved in the process, deciding on the need for SEA.

The EU SEA Directive 2001/42 was fully transposed into the Albanian legislation through the Law No. 91/2013 of 28.2.2013 on "Strategic Environmental Assessment" and related byelaws (Decision of the Council of Ministers (DCM) No. 219 of 11.03.2015 "on rules and procedures for consultation with stakeholders and public, as well as public hearing during the process of SEA" and Decision of the Council of Ministers (DCM) No. 220 of 07.07.2015 "on rules, responsibilities and detailed procedures for SEA in a transboundary context"). The main institution responsible for the implementation of the SEA is the Ministry of Tourism and Environment. At the moment, Albania is in the initial phase of MSP, so MSP-related SEA has not been developed; nevertheless, as for the coastal area spatial planning, a SEA, compliant with the directive requirements, has been carried out.

Slovenia ratified the SEA Protocol of the Espoo Convention on February 2, 2010.[20] It is implemented under the Strategic Environmental Impact Assessment Division at the Ministry of the Environment and Spatial Planning as an administrative procedure, as part of the preparation of spatial planning documents and other plans and programmes in the fields of water management, forest management, agriculture, energy, industry, transport, waste and wastewater management, drinking water supply, telecommunications and tourism, based on the law is passed by state authorities or municipalities. All relevant ministries and organizations work with the Ministry of the Environment and Spatial Planning.[21]

Bosnia and Herzegovina ratified the Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention) ("Službeni glasnik Bosne i Hercegovine", MU broj 08/09). Also, SEA has been embedded in the environmental laws and in practice in the country, for example, in the Water Management Plan of the Adriatic Catchment area, including Neum bay as one of the water bodies (www.jadran.ba).

3.1.4 Data for operationalizing the ecosystem approach under MSP in a transboundary context

Transboundary data exchange is a crucial aspect of ensuring that the ecosystem approach is applied under MSP. Transboundary MSP data needs are different from national MSP data needs: the scope and level of detail needed are much simpler, usually dealing with issues such as the cases where bathymetry, shipping lines or energy corridors cross political boundaries. However, ensuring the coherence and harmonisation of data across boundaries still remain challenging due to different data protocols and formats.

[20] http://pisrs.si/Pis.web/pregledPredpisa?id=ZAKO5599#

[21] https://www.gov.si/teme/celovita-presoja-vplivov-na-okolje/

Typically, this is where it starts to get complicated, owing to a number of underlying issues: language barriers between countries, the need for a high-level political agreement to share relevant data across boundaries and the need for good cooperation between local and regional interest groups. Cooperation between MSP authorities is therefore essential.

Under the SUPREME project, the MSP Knowledge Catalogue (MSPKC) was developed to collect and share metadata for MSP-relevant datasets, portals and tools [65][22]. Data relevant for MSP in the Adriatic-Ionian Region have been identified and analysed. The following actions have been identified in order to strengthen data availability for MSP in a transboundary context:

- Promote joint data collection programmes, at the wider spatial domain possible.
- Define guidelines for standardised joint data monitoring, integrated as much as possible into the monitoring programmes of environmental characteristics, pressures and impacts.
- Basin, sub-basin and regional-based portals should promote the aggregation and the standardization of data in their spatial domain, facilitating the creation of harmonised datasets (monitoring, for example, what has been done under the PORTODIMARE Interreg ADRION project).
- Define a set of spatial layers that are absolutely essential as a basis for marine spatial plans at national/transboundary levels.
- Define a minimum common data structure for each essential spatial layer in order to harmonise data created by different producers and for different geographic areas and facilitate their combination for transboundary analysis and planning.
- Support the availability of spatial datasets through standard web services in case they have not yet been organised in interoperability infrastructure services.
- Support and raise awareness of the issues related to data policies and accessibility, so that data managers can improve and make clearer pathway on how data can be accessed and reused, preferably by using standard open licenses (e.g. Creative Commons Attribution CC-BY).

3.1.5 Tools for operationalizing the ecosystem approach under MSP

Considering the abundant project-based experience, a wide range of tools and practices related to the application of the ecosystem approach to MSP is available in the study area, and is briefly described below. The need and ways to improve the usability of existing tools and to develop new ones to the benefit of MSP are also discussed below.

Examples of tools and methods

GES-integrated assessments based on the DPSIR approach

Under UNEP/MAP, methods for GES-integrated assessment based on the driver-pressure-state-impact-response (DPSIR) approach have been developed [66]. Such methods are aimed at supporting the integrated assessment under IMAP of the predominant pressures and their impacts on the marine and coastal environment to assess the state of the marine environment (i.e. DPSIR-based assessments); and consequently, build policy responses (e.g. measures and priority actions) to address the drivers (e.g. economic sectors and activities) that lead to the degradation of marine ecosystems and ecosystem services.

The GRID/Table approach consists in cross-mapping all the anthropogenic activities that significantly contribute to pressures with the Common Indicators used for monitoring and assessment purposes (Figure 3-8).

Mapping of pressures/impacts relationships can also be done using a risk-based approach. Scoreboard method is similar to the GRID/Table approach; however, it uses numeric scores (i.e. assigning a numeric value to categories) rather than colours alone, to get calculation-derived quantitative information. The GRID/Table approach and the quantitative risk-based methodological scoreboard approach that rely on the calculation of numeric scores (i.e. criteria that should be based on EOs assessments, along with the spatial distribution of pressures-impacts and risks across the marine environment) for the IMAP integrated assessments could be seen as tools that support the implementation of the DPSIR approach.

[22] The software used for the Catalogue is provided by CKAN (Comprehensive Knowledge Archive Network) (Open Knowledge International 2018).

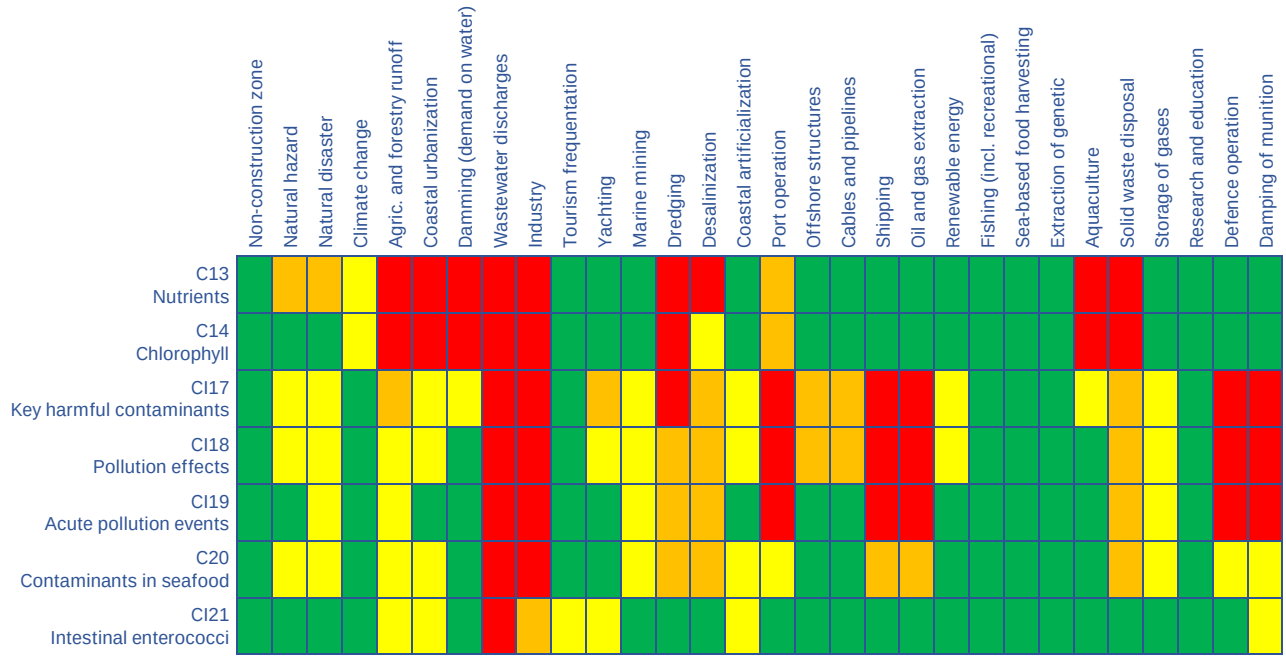


Figure 3-8. Natural and anthropogenic pressures (selection based on the main activities in terms of pressures as provided by ICZM Protocol and other Barcelona Convention Protocols) affecting the marine ecosystems and the related IMAP Common Indicators for EO5 and EO9 (source: [66]).

Maritime Use Conflicts (MUC) Analysis

The Tools4MSP [67] consists of a set of web and open-source tools[23] developed to support the implementation of Maritime Spatial Planning (MSP), with a specific focus on the analysis of conflicts between marine uses and the analysis of cumulative impacts (CI) of human activities on marine environments. MUC is one of these tools. The Cumulative Effect Assessment (CEA) tool, described in the next section, is another tool prepared by Tool4MSP.

The Maritime Use Conflicts Analysis tool was developed during the ADRIPLAN project. The tool is based on a methodology developed for the FP7 COEXIST Project and aims to (1) support MSP process through reallocation of maritime uses, (2) conduct a collaborative conflict score analysis; (3) conduct the analysis over different periods through the integration of new conflict scores and geospatial datasets on sea uses, (4) conduct a sea use scenario analysis and (5) perform overlay analysis. The MUC Analysis tool was initially developed during the ADRIPLAN Project, while the updated version was developed within the Italian Flagship Project RITMARE (the national marine research project).

Cumulative Effects Assessment (CEA)

The Cumulative Effects Assessment tool aims to support the MSP process under an ecosystem approach by assessing potential cumulative impacts of maritime activities on the marine environment. The CEA assessment tool was developed during the ADRIPLAN project. It is the core tool of the Tools4MSP, an open-source Geo-Python library. The tool was tested for the Adriatic-Ionian sub-basin but can be used for any research area around the globe. The CEA tool was initially developed during the ADRIPLAN Project, while the updated version was developed within the Italian Flagship Project RITMARE.

[23] data.adriplan.eu/tools4msp.

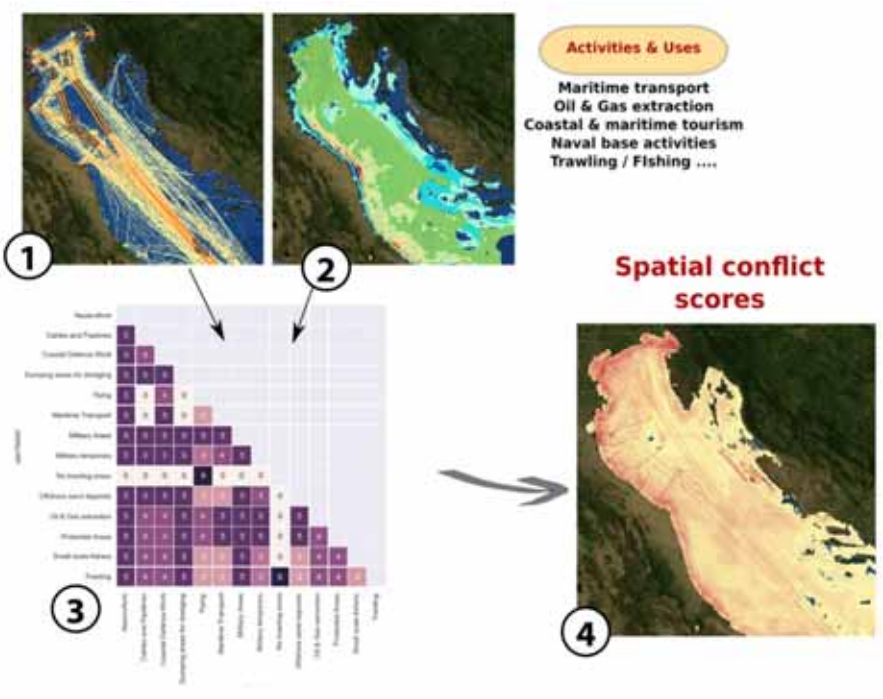


Figure 3-9. Stepwise methodological approach COEXIST sea uses conflict analysis (source: Tools4MSP, data.adriplan.eu/tools4msp/coexistinfo).

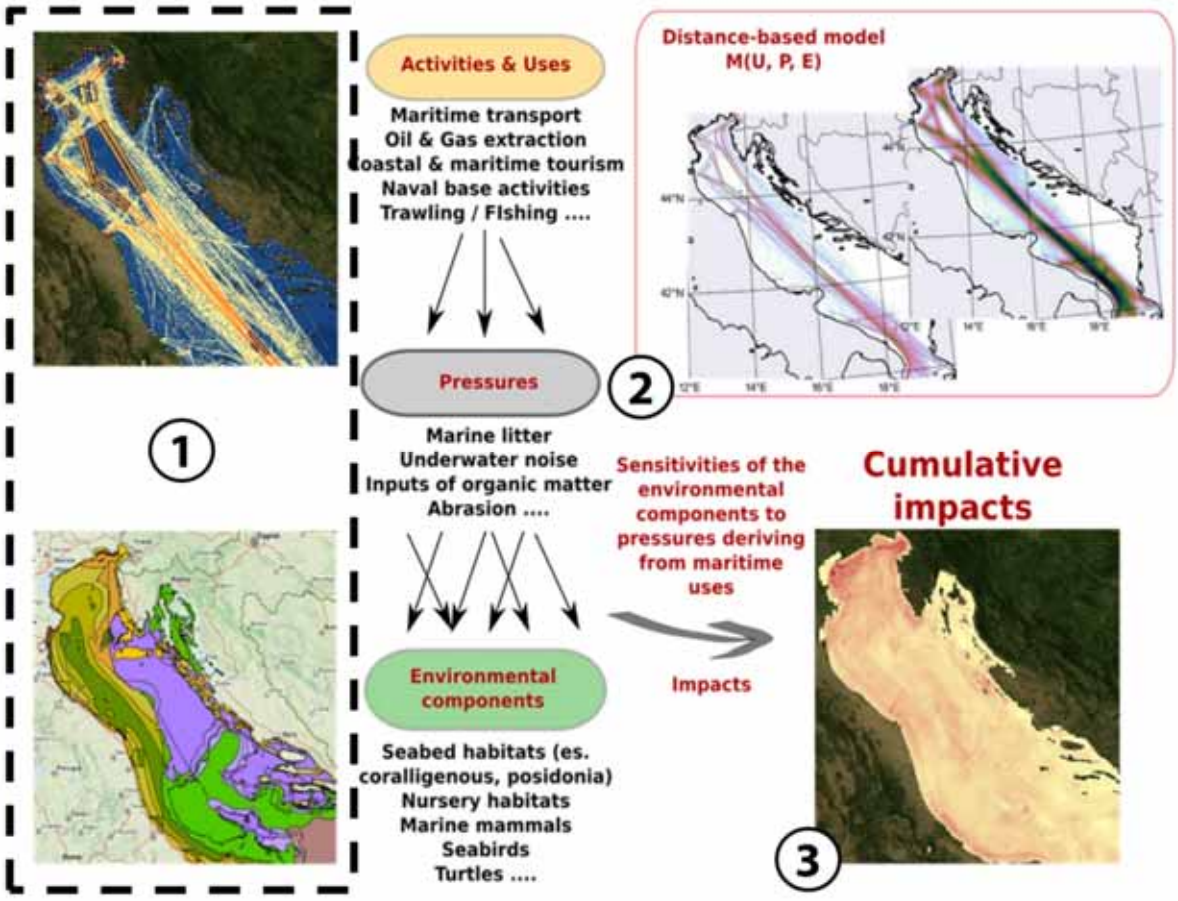


Figure 3-10. Stepwise methodological approach for the Cumulative Impact Assessment (source: Tools4MSP, data.adriplan.eu/tools4msp/ciinfo).

Marine Ecosystem Services Threat Assessment (MES-Threat)

The MES-Threat tool is based on an expert-based MES services supply index (from 0 – none/negligible to 2 – high) for EUNIS habitats developed by [68] and adopted for the Adriatic Sea [69]. The web tool combines the expert-based MES supply index with the CEA modelling capabilities, generating a threat index describing the risk of reduction of ecosystem services capacity, loss or impairment of use due to cumulative impacts of anthropogenic activities [69], [70].

Aquaspace Tool to support the design of Allocated Zones for Aquaculture (AZAs)

The AquaSpace tool was developed within the EU Horizon 2020 project AquaSpace[24] in order to achieve effective implementation of MSP for aquaculture by adopting an Ecosystem Approach to Aquaculture (EAA). A specific component of this tool, the "Bluefarm 2" aims to support the science-based design of Allocated Zones for Aquaculture (AZAs) [71]. The tool is based on a Spatial Multi-Criteria Evaluation (SMCE) methodology, which allows one to combine different spatially explicit information layers, covering both constraints on the further development of shellfish culture and suitability criteria (e.g. productivity, environmental impacts and socio-economic factors). The latter are subsequently aggregated in a spatially explicit suitability index, using an appropriate weighting algorithm. Constraints include conflict of uses, i.e. presence of ports, MPAs, navigation routes etc. The results of the application of "Bluefarm 2" can therefore be easily visualised in 2D maps. The tool was used for mapping the Adriatic Sea, in the Region Emilia-Romagna (Italy) sea area [72].

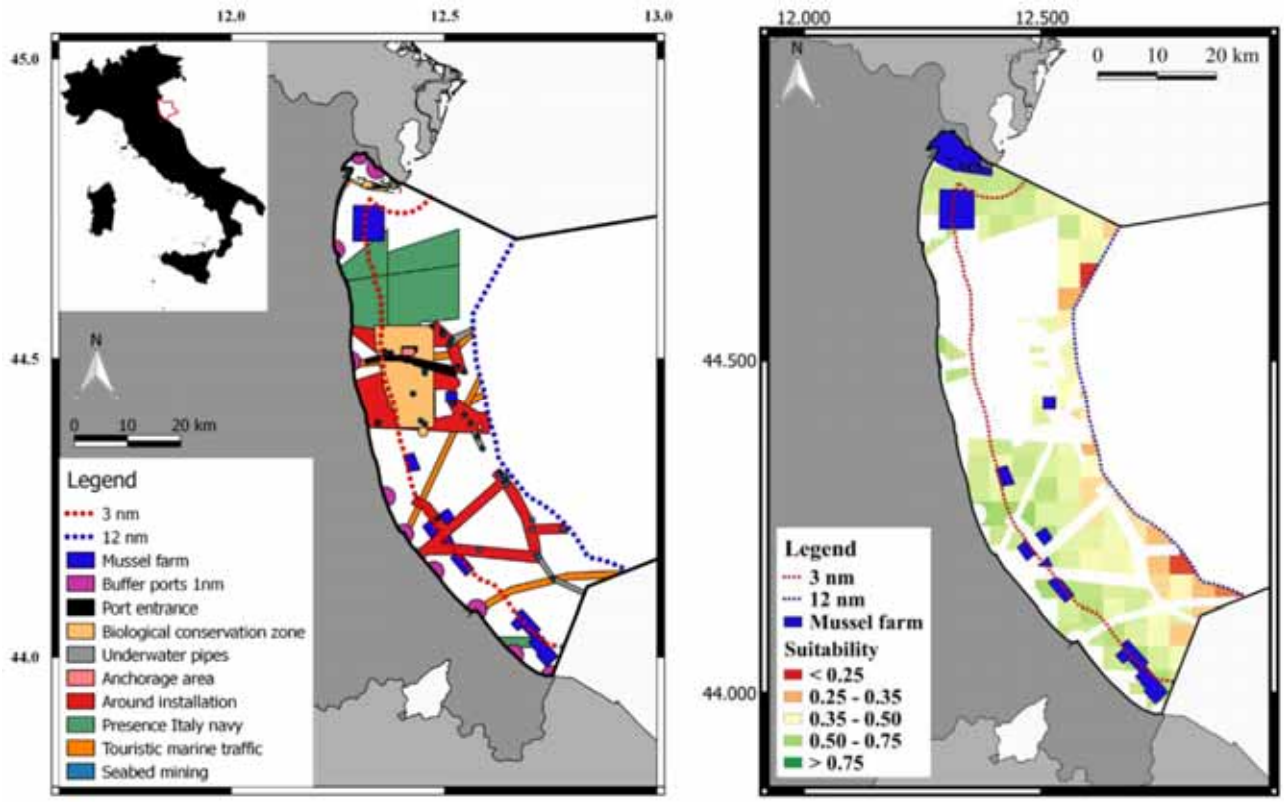


Figure 3-11. Results of the "Bluefarm 2" application in the Emilia-Romagna Region (Italy) area:
1) spatial constraints to the expansion of mussel farming due to use conflicts (left),
2) suitability map for mussel farming: blue areas are already leased to mussel farmers
(source: [72]).

[24] www.aquaspace-h2020.eu.

Tool for spatial fishery planning and effort displacement

DISPLACE[25] is a tool contributing to MSP for evaluating the effects on stocks and fisheries (impact assessment on stocks and fisheries as part of marine management) and ultimately incorporating other sea uses, such as energy production, transport, recreational use, etc., such as offshore windmill farms, large marine constructions, NATURA 2000 areas, commercial shipping routes, pipelines, cables, etc. The practice aims at implementing simulation models and tools for making an integrated evaluation of the impacts of different management options in fisheries under various environmental and climate conditions (regimes), e.g. spatial planning:

- Biological impact on several stocks according to sustainable exploitation (multi-stock level);
- Economic impact on specific fisheries according to economic sustainability (profitability) and fleet reactions such as capacity changes and effort reallocation (multi-fleet-level);
- Energy efficiency (and CO2 emission) concerning the spatial allocation of fleet-specific fisheries effort;
- Impacts to the ecosystem and spatial-temporal patterns of fishing pressure on benthic habitats and communities.

The DISPLACE tools were applied to the northern Adriatic in the context of the ECOSEA and ECOAST projects (Geographical Subarea – GSA 17; see Figure 3-12). Vast overfishing of demersal resources in this area, with conflicts among different fishing activities, calls for proper management of the fish stock exploitation to achieve the targets set by the EU Common Fisheries Policy [73]. This application contributed to the assessment of the effects of various spatial management scenarios for the fishery, in terms of mitigation of conflicts among different fishing activities (e.g. trawling vs. small–scale fishery) and evaluating whether these changes could make exploitation of fish resources more sustainable. The results can lead to a science-based input to facilitate policy improvement and better fish stocks governance and fisheries management in the northern Adriatic Sea. After observing the effects of different regulatory measures in the aim of preserving stocks, establishing the sole sanctuary area was recognized as potentially the most efficient solution.

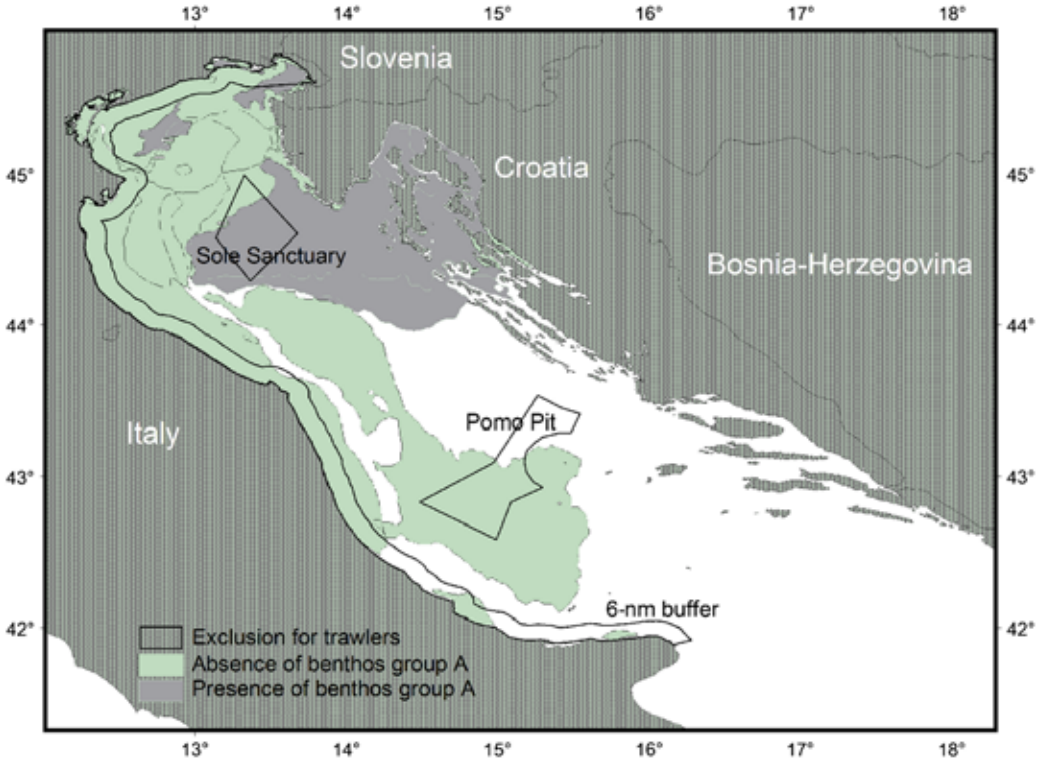


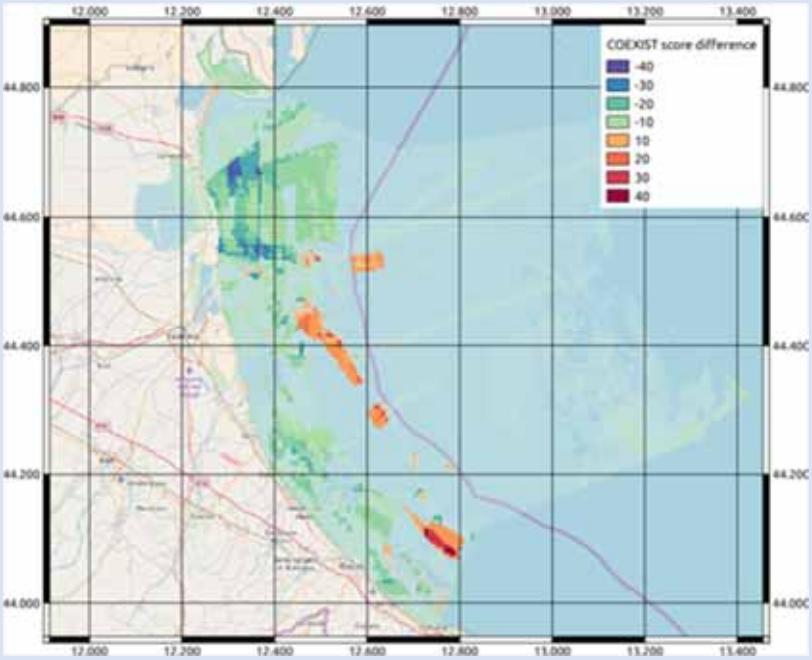
Figure 3-12. ECOSEA/ECOAST study area. The black solid line polygons give some of the tested exclusion for trawlers, that is: 6-nm buffer, sole sanctuary polygon and the Pomo Pit ban (source: [73]).

[25] http://displace-project.org/blog/

Proposals for ICZM-MSP for the marine area of Emilia Romagna Region – Italy

The proposals for ICZM-MSP for the Emilia Romagna Region were formulated within the Italian National Project RITMARE. They are focused on marine and maritime research topics, according to the priorities of the EUSAIR Action Plan and in line with the implementation of the MSP Directive. The study area is the marine area in front of the coast of Emilia Romagna Region, in the north-western Adriatic Sea. The study activity was developed in two phases: (i) creation of a knowledge reference framework and its analysis to support maritime spatial planning and (ii) Identification and analysis of possible management objectives and measures to implement them. A set of 9 measures was proposed concerning 6 major uses of the marine space.

An integrated "managed development" scenario which considers all the measures implemented at the same time was finally considered. This final scenario was re-analysed using tools for use conflict analysis and for cumulative impact analysis, already developed within previous projects and also previously used to characterize the study area (phase 1). This led to an assessment of possible overall reduction in use conflicts and in cumulative impacts deriving from the application of the proposed measures. The study concluded with the identification of next investigation needs, considering that suggested proposals should be considered as preliminary or as a valuable basis for further studies and discussions.



Use Conflict for the study area: difference between the integrated "managed development" scenario and the current state of uses.

Source: EU MSP Platform; https://www.msp-platform.eu/practices/proposals-iczm-msp-marine-area-emilia-romagna-region-italy

Improve usability of tools and need for new MSP support tools

Recent research examined the usability of Decision Support Tools (DST) in MSP [74]. Quite a large number of DSTs (34) were identified in 28 different MSP initiatives from across the globe. The research concluded that the main gaps of DSTs are linked to their limited functionality, instability, high costs and some less-than-ideal considerations of economic and social decision problems. Besides, decision support tools are not always user-friendly. The study revealed that most DSTs were used in the first stages of the MSP cycle.

The lack of a single tool for the whole MSP as a multi-actor and multi-stages process was also identified by the SUPREME project [75]. Even if the previous examples show that the different available tools can support the MSP planners in different phases of the whole planning process, currently there are no suitable tools that can be used by a single user because of the different levels of complexity present in the various tools. Furthermore, owing to technological and semantic limitations, it is not possible to integrate and concatenate multiple tools in order to support and harmonise workflow analysis, since these tools had been developed at different times and often for specific projects-related objectives.

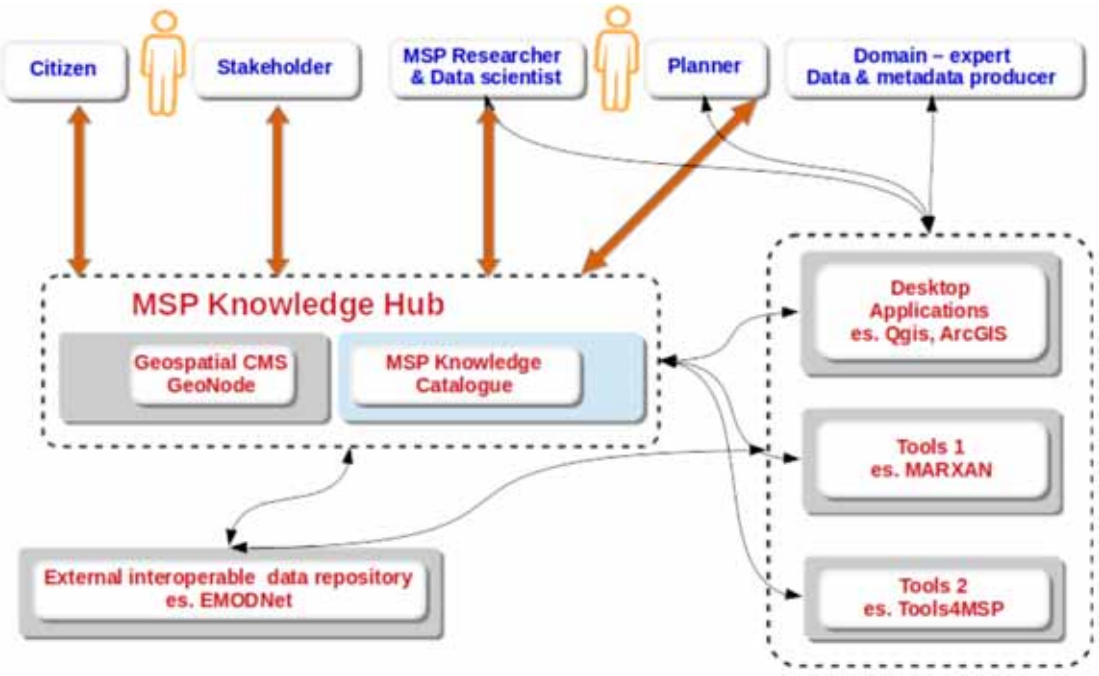


Figure 3-13. Proposal of interoperable tools and portals integration to support MSP process (source: [75])

Usability of tools could be improved by multiplying the occasions for MSP Practitioner training and providing customized training experience, according to the different roles and needs. Development of a science-policy interface of MSP in the Adriatic-Ionian area could also help strengthen the dialogue between scientists and policymakers within and across countries.

In order to better accommodate the MSP process, DSTs should consider both the spatial and temporal dynamics of the marine environment. They should also be made easy to use and widely available. In addition, future tools should be integrated and multi-functional, focusing on more than one purpose, preferably including future projections, socio-economic analyses and stakeholder engagement, as these are key aspects of an MSP process. Future DSTs should be multi-functional and integrative in order to assist the needs of MSP, including future projections, scenario analysis, plan review, monitoring, cost-benefit analysis and online participation functions [74].

Within the SUPREME project, a proposal for the MSP Knowledge Hub has been developed to provide access to data, tools and knowledge to all types of users [75]. The hub should also facilitate integration and concatenation of multiple tools sharing the datasets through standard and interoperable services.

3.2 Multi-scalar approach to MSP

Chapter overview

- MSP is a process which is, or should be, conducted at multiple scales, encompassing both vertical and horizontal dimensions. The adoption of a multi-scalar approach to MSP is therefore recommended, in line with the contents of the CF for MSP in the Mediterranean Sea.
- When dealing with MSP in the Adriatic-Ionian region, there are four interplaying levels: (i) the regional level, providing a common framework (e.g. vision, strategic goals, common priorities) for the entire Mediterranean sea; (ii) the sub-regional level, addressing the MSP specificities of the AI region; (iii) the national level, having the responsibility for the full implementation of the MSP at the country scale; and in some cases (iv) the sub-national level, aiming to develop more detailed plans for specific areas.
- Inter-scale interactions occur in two directions:
  1) Overarching visions, strategic objectives and guidelines set at the regional (Mediterranean) and sub-regional (Adriatic-Ionian) scales can provide a common base for the coherent implementation of MSP at the national level.
  2) Along with the bottom-up process, the national level can help transfer the country's understanding and priorities to the upper scales, to identify challenges and opportunities that need to be addressed through transboundary cooperation.
- Multi-scalar stakeholder engagement is a relevant component of a multi-scalar approach to MSP. The purpose is to ensure that there are enough opportunities for a balanced involvement of stakeholders at all levels. A poor mutual understanding of different values and motivations may lead to a mismatch of processes implemented at different levels and lack of trust among stakeholders.
- The promotion of a pan-Adriatic-Ionian dialogue (and multi-level governance) on MSP is a relevant component of the multi-scalar stakeholder engagement.

MSP is a process which is, or should be, conducted at multiple scales, encompassing both vertical and horizontal dimensions. Continuity of marine ecosystems, as well as the international dimension of some maritime activities, requires a coherent approach to planning and management across administrative boundaries [76]. A plan developed at any given scale and resolution needs to take into account connections between upper and lower planning levels, regardless of whether or not it is formally part of a multi-scalar approach. Ecological and socio-economic interactions across borders (within a country and between different countries) can strongly influence planning options. This notion is also reflected in the commonly accepted statement highlighting that the scale and geographic scope for the analysis are different, and generally wider, than those for the planning phase. Actually, planning limitation often matches administrative boundaries, while the geographic scope of the analytical phase normally extends beyond them [77].

A multi-scalar approach to MSP is also recommended by the CF for MSP in the Mediterranean Sea [1]. Three or four levels can be distinguished when dealing with MSP in the Adriatic-Ionian Region (Figure 3-14). These scales are not mutually exclusive but are meant to be part of a unique multi-scalar approach to MSP.

The wider scale is the regional one, addressing the entire Mediterranean Sea through cooperation among countries to approach the strategic level of MSP, including (i) definition of a common vision and related strategic objectives, (ii) identification of priority MSP areas and issues to be addressed at regional scale, (iii) identification of initiatives (e.g. projects or other cooperation initiatives) aimed at addressing MSP aspects in the identified areas and for the identified issues. A key player at this scale is clearly UNEP/MAP; more details on the cooperation activities in the framework of the Barcelona Convention are given in section 1.1.

Figure 3-14. Multi-scalar approach to MSP for the Adriatic-Ionian Region.

Notwithstanding the relevance of a pan-Mediterranean approach to MSP, it is also important to acknowledge that this sea basin is characterised by sub-regional specificities. From this perspective, the Adriatic-Ionian appears to be the sub-regional scale of the proposed multi-scalar approach, which it is expected to detail and tailor – to the specific characteristics of this area – the strategic elements defined at the regional level: vision, strategic objectives, priorities (both in terms of areas and issues, as detailed in chapter 1 and section 1.1) and concrete cooperation initiatives. There should be an interplay between the sub-regional scale and the upper level, not only to ensure coherence at the regional level, but also because some of the Adriatic-Ionian transboundary processes may heavily depend on Mediterranean dynamics (e.g. as in the case of shipping connection and operation). At the same time, within the sub-regional level, it may be necessary to further distinguish between the Adriatic and the Ionian marine sub-regions.

The third level of the MSP multi-scalar approach is the national scale, which is the one that has the responsibility to fully implement the MSP process within the national jurisdiction, and which is therefore called to make concrete steps to develop the marine spatial plan or plans. Being part of a multi-scalar approach, the national MSP processes are expected to be coherently implemented according to common principles and the common framework provided by the Mediterranean and sub-regional scales.

Based on the characteristics of the marine space under national jurisdiction, national MSP authorities may decide to prepare a unique plan or distinct plans for different marine areas, thus adding the sub-national and/or local level to the multi-scalar approach. Moreover, the scale(s) at which marine spatial plans are designed may be influenced by planning culture and traditions, as well as governance and administrative issues, including distribution of competences and responsibilities on sea governance and related boundaries within the country [78]. Different plans part of the same national marine space may or not overlap spatially. The adopted approach can also involve a planning hierarchy: a primary level of a large-scale plan (typically a national overarching plan for the entire marine space) has a secondary level of more detailed plans for smaller areas within it. This is also referred to as a nested approach to MSP [78].

As far as the multi-scalar approach is concerned, the Adriatic-Ionian countries provide a variety of diverse situations:

- In Italy, the national guidelines for MSP (Decree of the Presidency of the Council of Ministers, 1st December 2017) identify three marine areas for the development of marine spatial plans. These marine areas are coherent with the identification of marine sub-regions under the MSFD: (i) the Western Mediterranean Sea, (ii) the Adriatic Sea, (iii) the Ionian Sea and the Central Mediterranean Sea. The national guidelines also envisage the possibility to develop small, nested plans for hotspot areas.[26] In this respect, it is worth noting that several plans have already been made available for the Italian ports.[27]
- One unique marine plan is expected for Slovenia, also considering the limited extension of its marine waters. The Plan will be designed in the format of an Action Programme of the Spatial Development Strategy (SDS) 2050, currently under revision, which serves as a hierarchically superordinate strategic document for both land and sea. The plan will also contain implementation measures and guidelines for subordinate documents at the sub-national and local levels.[28]
- Spatial plans in Croatia are mandatory and not a single spatial intervention can be approved and carried out unless provided by the plan. Following the requirements of the Physical Planning Act, preparation of the State Plan for Spatial Development for the entire terrestrial and marine area (up to the external limit of territorial waters) of the Republic of Croatia has been initiated. Two new marine spatial plans at state level will be developed: the Spatial Plan of the Ecological and Fisheries Protection Zone and the Spatial Plan of the Continental Shelf. As for the existing spatial plans, all coastal county spatial plans (mainly developed in the period between 2000 and 2003 with consequent updating) include provisions for their marine areas

[26] See also "Maritime Spatial Planning. Country Information – Italy" (updated on 25.09.2018). https://www.msp-platform.eu/countries/italy.

[27] For example: (i) Port of Trieste (https://www.porto.trieste.it/eng/port/port-masterplan); (ii) Ports of Bari, Brindisi, Barletta, Manfredonia, Monopoli (https://www.adspmam.it/comunicazione/documento-di-pianificazione-strategica-del-sistema-portuale); (iii) Port of Ancona: https://porto.ancona.it/en/ports/port-of-ancona/port-of-ancona/266-three-years-operational-plan

[28] See also "Maritime Spatial Planning. Country Information – Slovenia" (updated on 19.09.2018). https://www.msp-platform.eu/countries/slovenia.

(up to the outer limit of the territorial sea) referring to different sea uses. Moreover, each coastal city and municipality specifically developed its spatial plan, including the marine area falling within its responsibility (mostly focusing on 300 m of the maritime area from the coastline). At state level, four spatial plans for national and nature parks comprising sea area have been developed (national parks Brijuni, Kornati and Mljet and Nature Park Telašćica), while spatial plans for nature parks Velebit and the isles of the Lastovo archipelago are planned to be developed. Croatia figures prominently amongst articulated cases of overlapping plans developed at different scales.[29]

- Greece will develop its National Maritime Spatial Strategy in 2020. This will define strategic directions based on the country-specific characteristic conditions and is a prerequisite for the development of marine spatial plan(s). Moreover, MSP issues are addressed in special frameworks for spatial planning covering specific sectors. Sectoral plans have in particular been elaborated for aquaculture, industry and renewable energy. These plans include spatial planning guidelines for the land-based, coastal and marine segments of each sector. Additionally, the recently revised Regional Spatial Frameworks include MSP elements concerning maritime transport and connectivity between ports, development of aquaculture, protection of marine resources and management of the coastal area. In the light of a multi-scalar approach, it is relevant to mention that the sub-national plans of the 12 (out of a total of 13) Greek coastal regions pay special attention to coastal uses, while some of these plans also provide a strategic spatial outline of sea activities spatial needs.[30] For the preparation of a sub-national marine plan in the Ionian Sea, Greek competent authorities can build on the information, evaluations and proposals included in the study "Paving the Road to MSP", carried out in the context of Priority Action Programme/Regional Activity Centre (PAP/RAC) activities [116].
- In Bosnia and Herzegovina, a marine spatial plan has been expected in the process of preparing and adopting the BiH Federation Spatial Plan, but it is still pending. As for the Municipality of Neum, there were some proposals of spatial plans, but they were never formally adopted. Through the forthcoming CAMP, there is a chance to formulate and formally adopt the MSP too.
- The obligation for MSP in Montenegro is set down as part of the Spatial Planning and Construction Act (64/17, 44/18, 11/19). The act envisages preparation of the overall Spatial Plan of Montenegro that encompasses the entire marine territory of Montenegro. Besides, more detailed General Regulation Plan will be prepared for different Montenegrin regions, including coastal region. MSP shall be included in that plan as well.

Reflecting the above variety, links between national and sub-national plans developed under the same multi-scalar process can be different in nature. They can include a national overarching strategy, also providing links with the land component of the coastal areas (as in the case of Slovenia), national guidelines ensuring a common framework for vertical and horizontal integration (as in the case of Italy) and/or completely or partially integrated plans (as in the case of Croatia). Moreover, different plans of the same multi-scalar approach can fall under the responsibility of the same or different authorities.

Inter-scale interactions might occur in two directions: top-down and bottom-up. Overarching visions, strategic objectives and guidelines set at the regional (Mediterranean) and sub-regional (Adriatic-Ionian) scales can provide a common base for the coherent implementation of MSP at the national level. Similarly, framing documents developed at the national level are meant to improve the coherence of sub-national plans, in case they are designed. The bottom-up process is integrative, but by no means can it be seen as an alternative to the top-down approach. Detailed marine spatial plans at local and/or sub-regional scale can be useful to address specific hot-spot areas and build on a solid information baseline that might be transferred to the upper scale of the MSP multi-scalar process, e.g. contribution in forming a nationwide understanding of MSP-related problems and opportunities. Working on the more detailed scale can also be useful to transfer and interpret national interests at the local or sub-national level and, at the same time, to scale-up ambitions of local communities [78]. Similarly, along the bottom-up process, the national level can transfer country understanding and priorities at the upper scale, to identify challenges and opportunities that need to be approached at the transboundary level (Adriatic-Ionian or Mediterranean).

[29] See also "Maritime Spatial Planning. Country Information – Croatia" (updated on 30.08.2018). https://www.msp-platform.eu/countries/croatia.

[30] See "Maritime Spatial Planning. Country Information – Greece" (updated on 30.04.2019), https://www.msp-platform.eu/countries/greece.

The adoption of a multi-scalar approach down to the sub-national or even local levels also enables to comply with the principle of **spatial subsidiarity**, according to which spatial challenges should be dealt with at the lowest most appropriate spatial level. However, this must be facilitated by appropriate structures and processes at national and international levels, ensuring a coherent framework [1], [79] and [80].

Notwithstanding the variety of situations and the directions of interactions (bottom-up vs top-down), the implementation of a multi-scalar approach needs to address important challenges. In general, the implementation of a multi-scalar approach within a country tends to increase the complexity of the MSP process, which has to take different planning scales into account and therefore provide the required coordination effort [1], [76], the level of complexity increases not only when different administrative levels are involved, but also different countries, as in the case of the multi-scalar approach here described.

Different planning processes implemented under a multi-scalar approach should be coordinated and related plan aligned in terms of methods, objectives, contents and provisions. Both the **horizontal integration** – among neighbouring and/or overlapping plans designed at the same level – and the **vertical integration** – among nested plans – are relevant [76], [1]. Vertical integration across planning levels typically involves different administrations and organisations ranging from local and national ones to those operating at the regional or sub-regional level, aiming to foster transnational cooperation. Horizontal integration pertains all scales and calls for cooperation among actors (authorities, sectors, etc.) acting at the same level. To improve the coherence of plans, the **timing** of the different phases in different MSP processes need to be aligned as much as possible, as it is never the case that different plans within a country or across countries are developed at the same time.

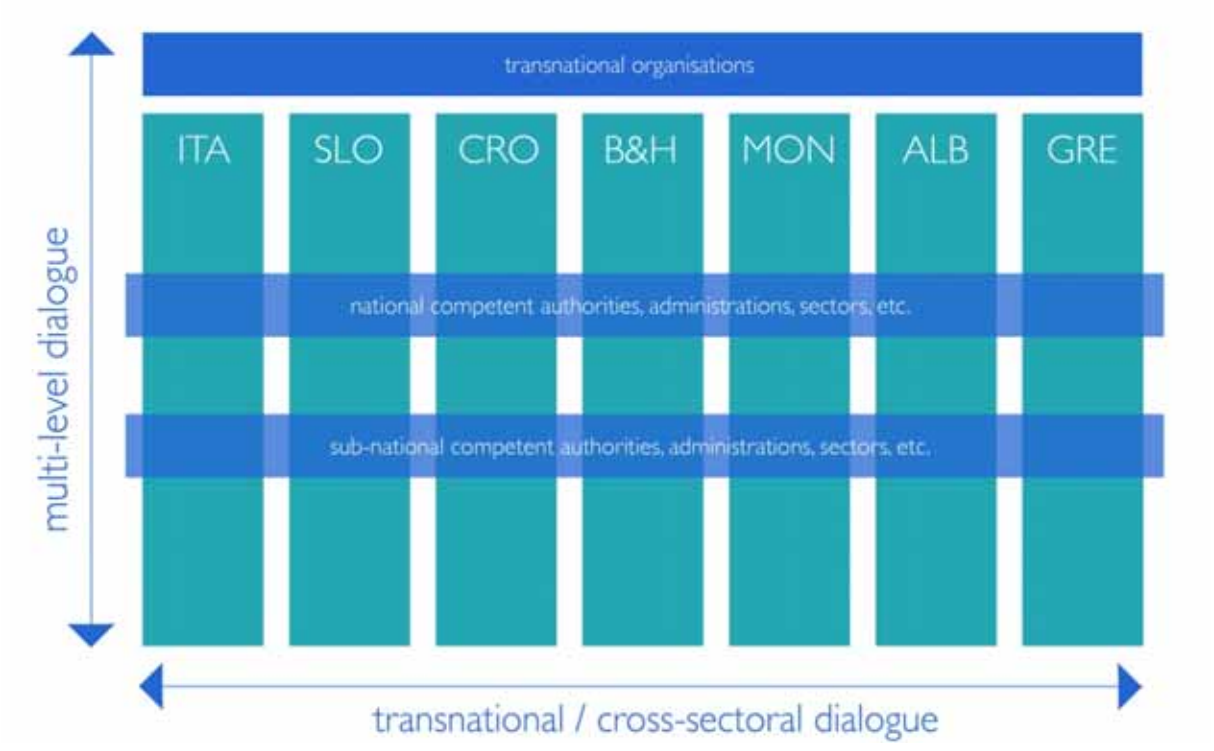


Figure 3-15. Horizontal and vertical integration in the Adriatic-Ionian multi-scalar approach to MSP (source: adapted and modified from [79]).

Multi-scalar stakeholder engagement is a relevant component of the multi-scalar approach to MSP. Planners and stakeholders involved in MSP at different scales within a country might have different values, motivations, ambitions and interests, which in turn translate into different objectives. It might be the case that some national motivations are hardly understood and accepted by local communities, while they can struggle in bringing their interests to the attention on the national level [78]. The interplay among scales of the same multi-scalar MSP process must, therefore, take these aspects into consideration as well, providing opportunities for the balanced and efficient involvement of all the stakeholders, regardless of their levels. A poor mutual understanding of different values and motivations may lead to a mismatch between processes implemented at different levels and lack of trust among stakeholders. A multi-scalar approach to MSP calls for specific tools to engage with stakeholders at different levels. Engaging stakeholders at the national level generally requires a more formal approach, while stakeholders at the local level normally accept more direct and informal methods.

In addition to multi-level stakeholder engagement within a country, the promotion of a **pan Adriatic-Ionian dialogue** (and **multi-level governance**) on MSP is a relevant component of the multi-scalar stakeholder engagement. This dialogue needs to rely on the existing cooperation bodies, clearly referring to the Adriatic-Ionian region to EUSAIR, its Forum of stakeholders and UN Environment/MAP in particular, linking to the wider scale of the entire Mediterranean Sea. Some suggestions on how to build/strengthen this transboundary dialogue can be taken from the PartiSEApate project [81]:

- Building a pan Adriatic-Ionian MSP dialogue takes time. The long tradition of cooperation on MSP in the region provides a fertile substrate for continuing this process.
- The dialogue shall not only involve MSP authorities, but also all involved sectors and stakeholder typologies in general. However, in order to speak with one voice, each sector needs time to discuss the matter among themselves before talking with other sectors and other stakeholders.
- The dialogue shall be purpose-oriented, in the sense that tangible output should be identified for different phases of the dialogue process.
- More mature forms of cooperation will build up gradually, moving from initial mutual information to common strategic planning and implementation.
- Considering the previous two points, it makes sense to initially focus on tasks that are both priority interests and more easily manageable.
- The nature and the focus of the dialogue may change over time, as Adriatic and Ionian countries progress on MSP.
- The dialogue must be coordinated by competent experts (MSP, maritime sectors, diverse political and institutional frameworks, etc.).

3.3 Cross-border and transboundary cooperation

Chapter overview

- In the framework of the BC system and, for the EU Member States, in accordance with the EU MSP Directive, countries are expected to increasingly cooperate and consult with one another during the MSP process. The existing cooperation mechanisms (BC and EUSAIR in particular) play a vital role in supporting transboundary (and cross-border to some extent) MSP.
- The multi-scalar approach to MSP calls for horizontal and vertical integration of different plans. The first aims to ensure coherence among neighbouring and/or overlapping plans designed at the same level, while the second deals with the nested plans designed at different levels. Cooperation can play an important role in promoting actions and initiatives aiming to improve spatial and temporal coherence among plans.
- Cooperation activities perceived as more relevant for MSP by country experts involved in the study are data and information sharing; development of common visions, strategies and objectives; development of cross-border or transboundary pilot plans; elaboration of methodologies and guidelines for common approaches to MSP and specific MSP issues.
- Extensive and wide project-based experience of cooperation on MSP has been developed in the AIR, which enabled developing a rich collection of different practices and tools. There is a need to better mainstream and capitalize on useful and reliable project results and durable deliverables by building them into statutory MSP processes.
- Furthermore, it is necessary to keep improving the ambition of cross-border and transboundary cooperation that MSP matters require in the AIR, to move towards the co-management of common problems. In this regard, the establishment of an integrated and multi-scalar governance scheme, which benefits from the existing cooperation mechanisms, is essential.

In the framework of the Barcelona Convention system and, for the EU Member States, in accordance with the EU MSPD, countries are expected to increasingly cooperate and consult with one another during the MSP process. The methods and means of establishing and carrying out cooperation and consultation are left to countries to decide [82]. A distinction has to be made between cooperation and consultation:[31]

- Cooperation on MSP is understood as a more open and horizontal process than consultation. It can even take place in the context of international organisations and/or stemming from conventions or agreements. It often focuses on strategic decisions, methodologies, information and knowledge exchange, common tools development, common understanding, etc.
- Consultation refers to the formal process between adjacent countries or corresponding authorities, which arises in the course of the elaboration of marine spatial plans, aimed at assessing transboundary impacts of the plan or transboundary coherence of the planning provisions. This usually takes place in bilateral or trilateral interactions (cross-border interactions) [83].

Both processes can reinforce each other by building trust, extending knowledge, improving information sharing and securing personal contacts between maritime spatial planners from different countries.

As defined in Chapter 1, a distinction between cross-border and transboundary cooperation needs to be made, with cross-border cooperation defined as the collaboration between two or more entities sharing common borders and transboundary cooperation referring to countries that share a common region/sub-region [1]. These forms of cooperation can contribute to improving coherence among marine spatial plans (e.g. through the elaboration of a common vision and definition of common guidelines) and can ensure that MSP processes are timely coordinated. Both types of cooperation are necessary to initiate and further promote activities aiming at the resolution of common MSP-related problems and the management of sensitive marine areas falling across or even beyond borders.

Cooperation mechanisms playing a vital role in supporting transboundary (and cross-border to some extent) maritime spatial planning are already in place in the Adriatic-Ionian Region. Regional sea conventions can serve as an efficient platform to encourage a regional sea MSP approach, and provide comprehensive regional marine perspectives in transboundary cooperation (see for example [84]). In line with the MAP Mid-Term Strategy 2016–2021 (UNEP(DEPI)/MED IG.22/28), at their 18th Ordinary Meeting (December 2013, Istanbul, Turkey), the Contracting Parties to the Barcelona Convention recommended to strengthen MAP activities on MSP as part of ICZM, in order to contribute to the GES of the Mediterranean Sea, investigate connections between land and sea areas in more detail and propose coherent and sustainable land and sea-use planning. The importance of a common approach to MSP in the Mediterranean is also mentioned in the Mediterranean Strategy for Sustainable Development (MSSD) 2016–2025 [85] and, in particular, under MSSD Objective 1, strategic direction 1.2: "Establish and enforce regulatory mechanisms, including Maritime Spatial Planning, to prevent and control unsustainable open ocean resource exploitation".

Based on these elements and following two years of work coordinated by MAP Priority Actions Programme Regional Activity Centre (PAP/RAC), the 20th Ordinary Meeting of the Contracting Parties to the Barcelona Convention, held in December 2017 in Tirana (Albania), adopted the "Conceptual Framework for Marine Spatial Planning" in the Mediterranean Sea [2]. This is recognised as a guiding document to facilitate the introduction of MSP under the Barcelona Convention and, in particular, link it to ICZM, as well as to provide a common context for Contracting Parties to implement MSP in the Mediterranean Region. It can therefore be seen as a document setting the overarching framework for cooperation on MSP in the region, through the identification of common principles and the definition of a simplified step-by-step MSP process. Moreover, the conceptual framework is the first step in embedding MSP in the ICZM process defined by the Barcelona Convention, which can provide a wider, common and legally based framework for MSP implementation in the entire Mediterranean [2].

On the Adriatic-Ionian scale, EUSAIR figures as the most relevant cooperation mechanism. MSP represents a relevant issue for the Strategy when considering development and coordination of activities and actions at sea, particularly in the context of:

[31] https://www.msp-platform.eu/faq/cross-border-cooperation.

- Pillar 1 Blue Growth, since proper joint governance of the maritime space provides an important framework for a sustainable and transparent use of maritime and marine resources.
- Pillar 3 Environmental Quality, within which ICZM and MSP are recognized as tools needed to ensure sustainable use of resources, in a scenario of increased human use of the marine and coastal space, and related intensified pressures on coastal and marine ecosystems.

Indeed, MSP figures as a cross-cutting issue among all Pillars within EUSAIR, and it is also relevant for the proper planning of coastal and maritime activities, specifically addressed by the other two pillars: transport, including shipping, and energy network for Pillar 2, and tourism for Pillar 4.

Another potential instrument for cooperation on MSP environmental aspects could be the Trilateral Commission for the Protection of the Adriatic. Its main goal is to protect the Adriatic Sea and coastal areas against pollution. The Adriatic-Ionian cooperation on MSP could also be mainstreamed through this cooperation mechanism.

Besides the above-mentioned regional and sub-regional players, other cross-sector cooperation mechanisms can be mentioned for their relevance for MSP or, generally, for the governance of the marine space, including the Union for the Mediterranean, the CPMR Inter-Mediterranean Commission, the Adriatic and Ionian Initiative, the Adriatic Ionian Euroregion, etc.

3.3.1 Guidance on cooperation on MSP

The European and international experiences serve as a basis for some of the guiding documents supporting the implementation of cross-border and/or transboundary processes in MSP. An overview of the most relevant ones is provided in this section.

As pointed out in section 3.1.1, the ADRIPLAN project identified and tested the methodology for a practical MSP implementation in the Adriatic and Ionian Region, also considering a cross-border perspective. More recently, the two parallel SUPREME and SIMWESTMED projects developed recommendations on procedural steps to follow in order to develop cross-border and transboundary MSP [46], [86]. From a methodological perspective, both documents emphasize that cross-border and transboundary MSP is not much different from MSP practised within national waters. However, it has to take into account some further steps and adapt some other measures in order to align governance procedures and harmonize planning contexts and approaches (Figure 3-16).

The integrative steps are mostly taken in the pre-planning phase and are related to:

- Establishment of an informal transboundary working group, also relying on already existing mechanism of cooperation (step 1);
- Proposal for the cross-border or transboundary area(s) to be planned (step 2);
- Definition of common planning and management goals (step 3);
- Data alignment and sharing, part of the data management (step 7)
- Analysis and assessment of human activities of a highly transboundary nature (step 9).

Stakeholder engagement is considered relevant for all phases and steps illustrated in Figure 3-14, also considering the need to ensure proper involvement of stakeholders representing all levels of the governance systems (multi-scalar stakeholder engagement; see section 1.1).

Experiences gained from other European Seas and at the international level can be mentioned in the perspective of a possibility to capitalize on that experience in the Adriatic Ionian region. The HELCOM-VASAB Working Group on MSP [87] agreed on the principles for transboundary pan-Baltic cooperation on MSP in general terms, identifying the following recommendations:

- Continuing cooperation under the auspices of the VASAB CSPD/BSR (Committee on Spatial Planning and Development of the Baltic Sea Region), HELCOM HOD (Heads of Delegation) and the HELCOM-VASAB MSP Working Group;
- Creating expert groups and facilitating their work on relevant MSP topics and issues and disseminating the results;
- Engaging and cooperating with other pan-Baltic organisations continuously;
- Promoting informal pan-Baltic cooperation between MSP practitioners.

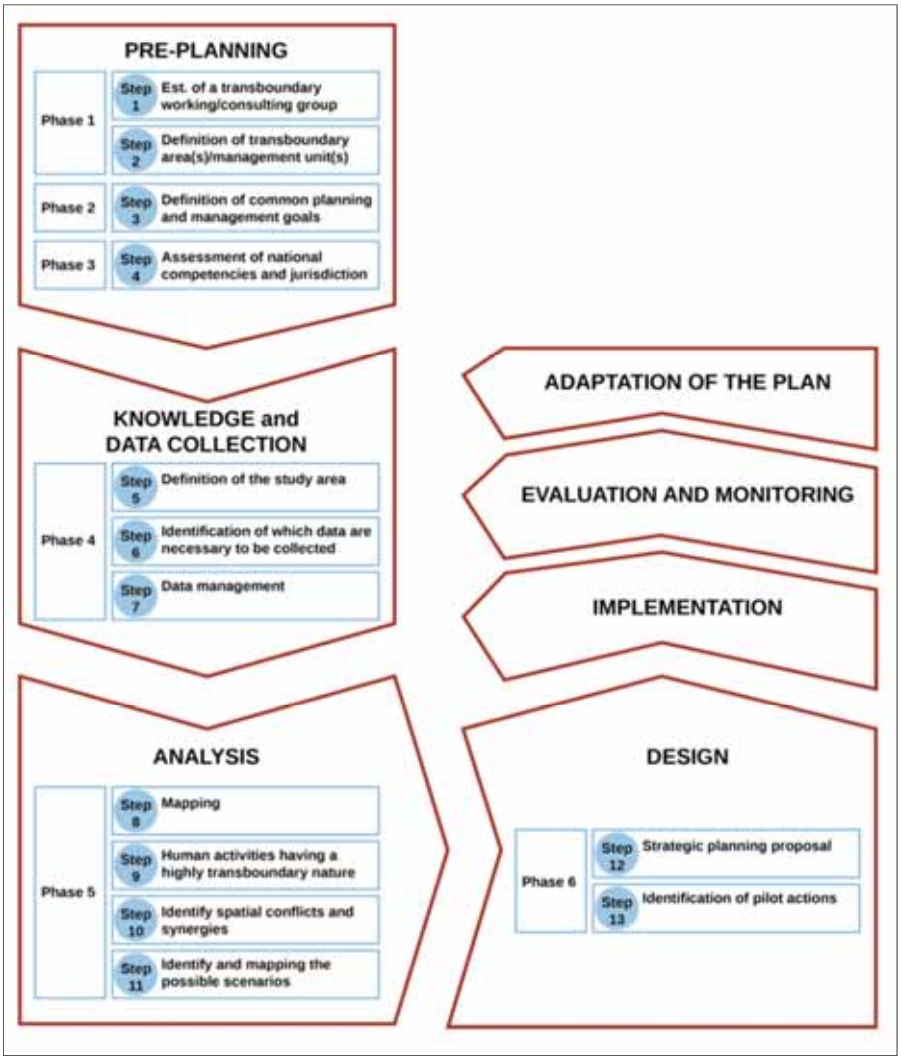


Figure 3-16. Scheme of the methodological approach for cross-border and transboundary MSP (source: [86]).

The HELCOM-VASAB guidelines also give recommendations to support cooperation and consultation concerning a specific national MPS process, i.e. how to better involve neighbouring countries:

- Broadening the scope of transboundary dialogue beyond the Espoo convention;
- Establishing a formal process of transboundary information exchange and consultation early in the MSP process;
- Organising stakeholder involvement in the transboundary consultation process via the authorities in the neighbouring country;
- Developing a transnational consultation strategy (minimum requirements);
- Strengthening informal transboundary cooperation processes.

The guidelines are non-binding, but it is recommended that they are applied voluntarily to set joint standards for MSP cooperation in the Baltic Sea region. Among other references, they are built on the MSP Governance Framework Report developed by the PartiSEApate project [83], which identifies the requirements for building up and strengthening sea-basin cooperation on MSP.

The TPEA (Transboundary Planning in the European Atlantic) Project developed an evaluation framework for assessing the quality and effectiveness of MSP in transboundary contexts [88]. Specifically, a checklist is presented containing a series of proposed evaluation criteria and indicators, putting special emphasis on transboundary considerations. The checklist covers the following aspects of MSP: (i) legal and administrative framework, (ii) institutional capacity and cooperation, (iii) transboundary MSP area, (iv) formulation of strategic objectives, (v) area characteristics, (vi) uses and activities and cross-border relevance of coastal and maritime issues, (vii)

governance framework, (viii) area of common interest, (ix) specific objectives, (x) planning alternatives (options and scenarios), (xi) planning documents, (xii) data availability and quality, (xiii) stakeholder engagement, (xiv) communication. For each issue, the checklist identifies various indicators. Aspects of the proposed evaluation scheme that are more critical for the success of transboundary cooperation are legal, administrative and institutional ones [89].

The EC study "Cross-border cooperation in Maritime Spatial Planning" reviewed worldwide MSP initiatives and conducted an in-depth analysis of four case studies. Based on this analysis, the study delivered some of the lessons learned and good practices supporting cross-border cooperation [90]. Proposed good practices can be summarised as follows:

- Invest in a deep understanding of the existing governance systems. It is necessary to build on the strengths and respond to the weaknesses of the existing governance systems. A clear understanding of barriers and enablers to cross-border collaboration will be the basis for priority setting, the definition of objectives and identification of roles and responsibilities.
- Invest time and resources during the MSP processes to build trust and instil a sense of common purpose among all parties involved.
- Adopt an issue-driven approach to MSP. Clear objectives on matters of concern help build constituencies and reinforce political commitment, assisting in the delivery of effective MSP.
- Adopt a long-term perspective. A long-term historical perspective on trends in the state of the marine ecosystem and the goods and services it generates is essential to understanding current conditions. These conditions evolve over decades and require a long-term perspective, also in the future. Another important implication of the long-term nature of effective MSP is the need for sustainable funding.
- Manage expectations for stakeholder involvement. The extent to which stakeholders participate and shape MSP is strongly influenced by the traditions and practices of the existing governance system. These need to be considered to ensure effective and fit-for-purpose engagement.
- Design a monitoring and evaluation system that analyses performance, encourages learning and progress towards goals in the long term.

Finally, it is worth mentioning the GEF LME: LEARN marine toolkit on Marine Spatial Planning [1], which provides MSP practitioners with practical guidance and examples of tools and methods that are necessary for designing and carrying out the MSP process in a transboundary LME (Large Marine Ecosystem) context.

The toolkit is organised according to the general components of an MSP process and highlights specific aspects which must be taken into account during a transboundary MSP process. The online accessible toolkit is structured in seven chapters:

- Introduction to transboundary MSP
- Designing the transboundary MSP process
- Stakeholder engagement in transboundary MSP
- Analysing the conditions
- Analysing future conditions and developing joint visions
- Solutions, planning and implementation
- Monitoring and evaluation of transboundary MSP.

3.3.2 Cooperation to improve the coherence of plans

The adoption of a multi-scalar approach to MSP calls for horizontal and vertical integration of different plans. The first aims to ensure coherence among neighbouring and/or overlapping plans designed at the same level, while the second deals with nested plans designed at different levels (see section 1.1). Cross-border and transboundary cooperation can play a vital role in promoting actions and initiatives aiming to improve spatial and temporal coherence among plans. Improved cooperation is also essential to approach common MSP-related problems that extend beyond national borders or occur elsewhere, but have effects within the sea space of a given country (see chapter 1).

Country experts involved in the study were asked to score cooperation activities in relation to the relevance they might have in improving coherence among national plans and effective tackling the relevant issues at the sea basin scale. Results of the survey are reported in Figure 3-17. All the eight identified typologies of actions are considered relevant, as the average scores, which in any case are values greater than 3 (range 3.1 – 4.6, in the scale 1 – 5), are not so different. Among those, the ones perceived as relatively more important are (average score greater than 4):

- Sharing of coherent data and information (average score = 4.6);
- Development of common visions, strategies and/or strategic objectives (average score = 4.3);

- Development of cross-border or transboundary pilot plans for highly sensitive and high-value areas (average score = 4.3);
- Elaboration of methodologies and/or guidelines for common approaches to MSP and specific MSP issues (average score = 4.3).

Responses to the survey pointed out that developing common visions and strategies is desirable. However, different countries have their own national priorities and agendas, which often results in long processes and/or in very broad visions and strategies. Discussions on more concrete issues (e.g. projects, guidelines, methodologies, data sharing, etc.) can be more fruitful and trigger cooperation initiatives.

National experts identified other possible cooperation activities of interest and/or provided specific suggestions for detailed action related to the typologies of Figure 3-17, including (i) networking among the same type of stakeholders and related activities and projects (e.g. ports, MPAs, fisheries, underwater cultural heritage, etc.); (ii) better capitalising on results and deliverables of cooperation projects; (iii) development of a methodology for the sensitivity and vulnerability analysis of the marine environment in the Adriatic-Ionian region.

Independently from the specific cooperation action considered, some of the survey responses highlighted the importance of involving all EUSAIR countries in transboundary cooperation for an efficient alignment and improved coherence of the MSP process. Real engagement and commitment of countries are considered necessary pre-conditions for efficient cooperation.

This is very much related to the issue of integrated governance. The overall challenge is to take advantage of the existing cooperation mechanisms (referring in particular to those mentioned in section 1.1; primarily UNEP-MAP and EUSAIR) to promote an integrated and multi-scalar governance scheme, therefore also including the regional (Mediterranean) and sub-regional (Adriatic-Ionian region) levels, together with national and sub-national ones.

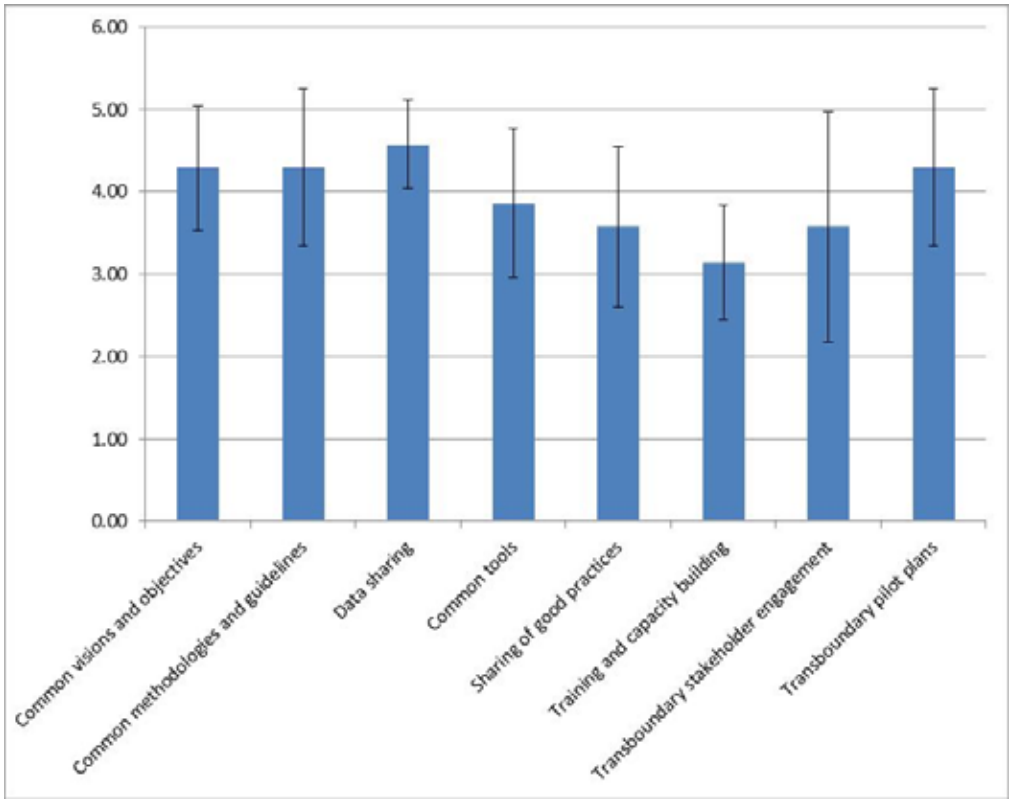


Figure 3-17. Relevance of different cooperation activities for the improvement of coherence among national plans and in tackling the issues at sea basin scale (the score ranges between 1 and 5; 1 = of little relevance and 5 = of high relevance).

Operation mechanisms focused on MSP can be of different nature, including, for example, mandate to a specific institution/commission, working groups, networks, forum, etc. The HELCOM-VASAB MSP Working Group[32] constitutes a well-known example of an overarching regional cooperation mechanism, specifically focused on MSP. It was jointly launched by HELCOM and the Vision and Strategies around the Baltic Sea (VASAB) Committee on Spatial Planning and Development of the Baltic Sea Region (CSPD/BSR) in October 2010. The Working Group was established to ensure cooperation among the Baltic Sea Region countries for coherent regional MSP processes in the Baltic Sea. It promotes and hosts periodic dialogues on recent and future developments in the field of MSP in the Baltic Sea Region. The Working Group also includes a Data Expert Sub-Group that supports data, information and evidence exchange for MSP processes concerning cross-border/transboundary planning issues.

Extensive and wide project-based experience of cooperation on MSP has been developed in the Adriatic-Ionian Region (Figure 1-1), which enabled developing a rich collection of different practices and tools (already discussed in different parts of this report) including:

- Elements for a common vision, e.g. those developed by the SHAPE, ADRIPLAN and SUPREME projects.
- Methodologies, handbook and guidelines on MSP in general, e.g. the PlanCoast Handbook on integrated maritime spatial planning [91], the ADRIPLAN methodology [45]. and the Methodological handbook on MSP in the Adriatic Sea developed by the SHAPE project [37].
- Targeted methodologies directed at specific aspects of the MSP process, as those recently developed mostly within the SUPREME project concerning (i) a conceptual methodology for transboundary MSP aspects [46], (ii) guidelines for LSI analysis within ICZM and MSP [92], and (iii) evaluation of the MSP process [93], as well as its feasibility at the sub-regional scale [116].
- Data sharing platforms and initiatives, such as the SHAPE Adriatic Atlas to support ICZM and MSP,33 the Tools4MSP Geoplatform,34 and the common platform (geoportal) for data and information related to coastal and marine areas of the Adriatic-Ionian Region that PORTODIMARE project35 is currently developing.
- Tools, as the set of web and open source tools36 part of Tools4MSP [67] (Maritime Use Conflicts Analysis, Cumulative Effects Assessment and Marine Ecosystem Service Threat), the AQUASPACE Tool to support the design of Allocated Zones for Aquaculture (AZAs), developed within the H2020 AQUASPACE project, and the DISPLACE fish and fishery model applied in the Northern Adriatic Sea within the ECOAST project.37
- Pilot plans with some transboundary or cross-boundary components, such as the MSP exercise in the Northern Adriatic developed by the ADRIPLAN project, in which Italy and Slovenia were involved.[38]

Those are some of the examples of the rich and diversified collection of experiences developed through cooperation projects in the Adriatic-Ionian Region. Notwithstanding the richness of experience, there is an evident need to better mainstream and capitalize on useful and reliable project results and durable deliverables by building them into statutory national MSP processes. Indeed, this challenge does not only affect coastal and marine planning and management, but it is common to a variety of science-based policy processes (such as climate change adaptation; see [94]). The actual uptake of project outputs in formal MSP processes, as well as their broader diffusion to target groups outside of the project partnership, can be improved, among others, by optimising the transferability of results, planning the follow-up process as an integral part of the project life cycle, developing the outcome plan for the transfer and actual use of results, and mobilising respective governance structures and necessary resources. This implies a clear definition of ownership, commitment and responsibilities for further use of results beyond the project lifespan; should any of these components be lacking, and it coincides with the end of funding, it may lead to the major barrier to capitalising on project results [94].

Notwithstanding the above-mentioned limitations, it shall be acknowledged that through cross-border or

[32] http://www.helcom.fi/helcom-at-work/groups/helcom-vasab-maritime-spatial-planning-working-group

[33] https://atlas.shape-ipaproject.eu/shape/

[34] http://data.adriplan.eu

[35] https://portodimare.adrioninterreg.eu/

[36] http://data.adriplan.eu

[37] https://www.msp-platform.eu/practices/spatial-planning-fisheries-northern-adriatic-sea

[38] https://www.msp-platform.eu/practices/msp-exercise-northern-adriatic

transboundary MSP projects and initiatives, MSP authorities, practitioners and stakeholders are becoming more familiar with the issues and processes of their neighbouring countries, as well as building stronger ties and networks. These ongoing cooperative processes can be supportive of the formal cross-border consultation among neighbouring countries, envisaged by the EU MSP Directive [82].

There is also the need to keep improving the ambition of cross-border and transboundary cooperation on MSP, moving from knowledge co-creation and practice-sharing experiences to more institutionalised processes, providing the formal basis for the co-management of common problems at the scale of the Adriatic-Ionian Region (see chapter 1) and the (pilot) planning/management of shared areas. In this respect, as mentioned before, it is essential to establish an integrated and multi-scalar governance scheme, which would benefit from the existing cooperation mechanisms.

3.4 Adaptive approach to MSP

Chapter overview

- The adaptive approach is an essential characteristic of MSP, which is a continuing iterative process that has to adapt over time, for various reasons.
- An adaptive approach is needed to take into account both natural and economic sector dynamics. These are relevant in the short term, on the seasonal scale (e.g. seasonal variation of fish nursery areas, riverine freshwater discharge, tourist presence on the coast, etc.) as well as in the long term (e.g. coastline dynamics, economic sector trends).
- An adaptive approach is also needed to take care of climate change effects and related uncertainty. This implies climate proofing of an marine spatial plan and more vulnerable maritime activities in particular. Moreover, marine spatial plans might need to address specific adaptation demands, e.g. identification of areas for the extraction of submarine sand to be used in coastal protection (beach nourishment and dune reconstruction); fishing restrictions to improve the adaptation in the fisheries sector; MPAs networking to improve their resilience.
- Monitoring and evaluation are an essential component of an adaptive approach to MSP. Indicators are generally used to describe monitoring results.
- In Europe, several countries have had MSP in place for about a decade, and are currently in the second or third planning round (e.g. Belgium, Netherlands, Germany). In the AIR, there are examples of national legislations foreseeing the revision of the marine plans.

The adaptive approach in system managing is an interactive and systematic process directed at continual improvement of policies, plans and management practices by learning from the outcomes of previous steps and cycles. Such an approach is an essential characteristic of MSP as well, which is a continuing iterative process that has to adapt over time. This component of MSP is cross-cutting, in the sense that it is relevant in the context of the other components indicated in this document.

Adaptive decision-making involves the use of management itself to pursue management objectives and learn about management consequences at the same time. Even if it offers new opportunities to inform decision-making and improve the management of natural resources, the record of success for adaptive management remains limited. More often than not, research and management are treated as separate activities, implemented in the absence of any framework for their integration [100].

Features typically associated with adaptive management include the following:

- The natural resource system being managed is dynamic, with changes over time that occur in response to environmental conditions and management actions, which themselves vary over time.
- Environmental variation is only partly predictable, and may sometimes go unrecognized.
- Periodic management interventions influence resource system behaviour, either directly or indirectly.

Adaptive decision-making can usefully be portrayed as an ongoing process of planning and learning, with the adaptive learning cycle portrayed as a cycle of planning, implementation, tracking, and feedback (Figure 3-18). Since there might be a risk the

adaptation process is influenced by stakeholder interests, measures should be put in place to prevent deviations from the overall goals and strategic objectives defined in the original plan.

A specific implementation of adaptive sea management is the dynamic sea management. The sea itself and the majority of sea uses (e.g. shipping, fishing) are highly dynamic, but the majority of marine management approaches (e.g. MPAs, MSP, total allowable catches and quota setting) remain relatively static. To meet the challenge of managing this highly dynamic system, management must become as dynamic in space and time as both the marine environment and the marine resource users. The dynamic ocean management is defined as "*management that changes rapidly in space and time in response to the shifting nature of the ocean and its users based on the integration of new biological, oceanographic, social and/or economic data in near real-time*" [101].

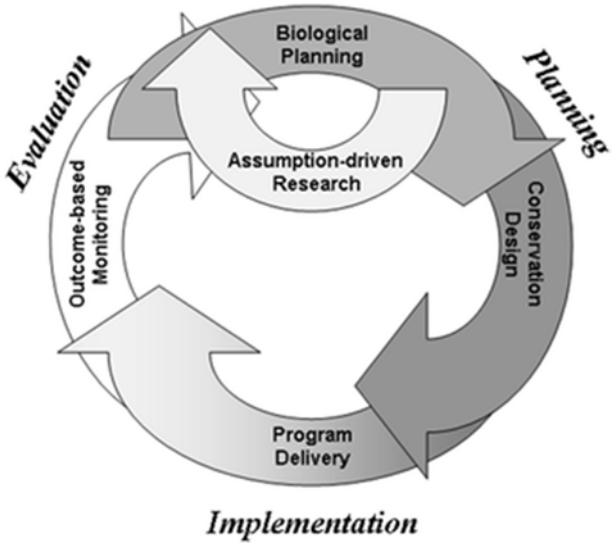


Figure 3-18. The adaptive cycle in terms of planning, implementation, and evaluation and learning. Planning includes design, assessment and selection of management decisions. Implementation includes management actions on the ground. The evaluation includes social and ecological monitoring as well as analysis and learning (source: [100]).

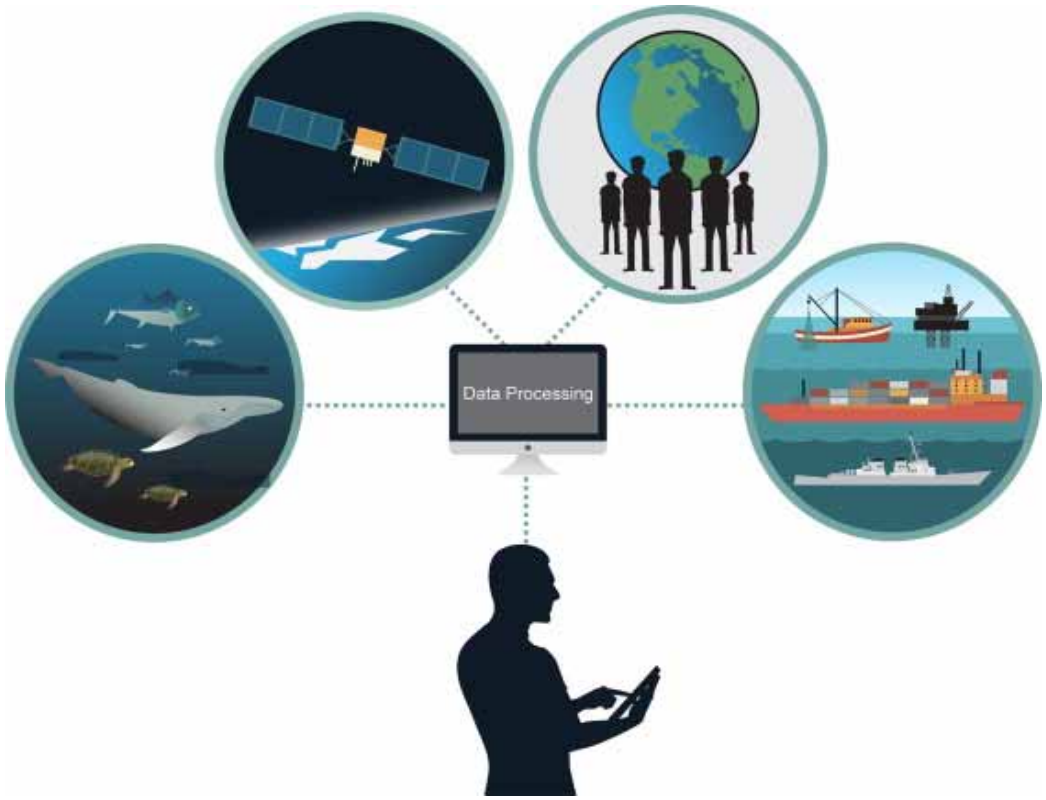


Figure 3-19. Schematic of dynamic ocean management. Multiple data types can be integrated into dynamic management including biological, remotely-sensed, socio-economic and user distribution data. Data is processed and then distributed to users (e.g., managers, resource users), often taking advantage of mobile data-sharing technologies such as smartphones and tablets (source: [101]).

3.4.1 Adaptation to variable environments: sector trends in MSP

Adopting an adaptive approach is needed from the beginning of the planning phase in order to take into account both natural and economic sector dynamics. These are relevant in the short term, on the seasonal scale (e.g. seasonal variation of fish nursery areas, riverine freshwater discharge, tourist presence on the coast, cruise and nautical tourism traffic, aquaculture production cycle, etc.) as well as in the long term (e.g. coastline dynamics, economic sector trends). All these dynamics need to be considered in concert because their covariation is particularly relevant, given that natural processes and human activities are closely interlinked.

The trends of economic sectors are relevant for MSP in relation to the changes in their spatial demands. A recent study on Blue Growth [102] described the trends of main maritime sectors at the EU level. This study's sector fiches explain particularly how to best consider the development of each sector during MSP processes and how to reach the related Blue Growth potentials in a sustainable manner. The fiches are the result of the review of existing work on the future sea uses and the evolution of different maritime sectors. The nine fiches cover offshore wind energy, tidal and wave energy, coastal and maritime tourism, marine aggregates and marine mining, shipping and ports, oil and gas, cables and pipelines, fishing and marine aquaculture. The fiches deal mainly with the spatial dimension of the expected developments in the sectors. They also look into the interactions between sectors, and offer a set of recommendations on how both planners and sectors may inform each other to create optimal MSP solutions.

The MEDTRENDS project analysed Blue Growth sector trends in the Mediterranean and also provided a specific assessment for the Adriatic [103]. According to the sector analysis, with the exception of professional fisheries and military activities, all traditional sectors of the Adriatic maritime economy, such as tourism, shipping, aquaculture and offshore oil and gas industry are expected to grow considerably over the next 15 years. Comparatively new or emerging sectors (such as the renewable energy sector) are also expected to grow, although there is a degree uncertainty over their developments and potential impacts on marine ecosystems. The main trends that have emerged from the analysis are summarized in the following table, including the key indicators used for the assessment.

The analysis of the economic sectors showed that, in the majority of cases, they will develop and eventually occupy large areas, both offshore (oil and gas, fisheries, renewable energy and maritime transport) and at the coastal level (for instance, aquaculture and recreational fisheries). Therefore, despite the current proposals of new MPAs in the open sea [104], [105], and the identification of EBSAs and GFCM trawling restrictions,[39] it still seems unlikely that significant new protection measures will be adopted by 2020, as they would very likely come into conflict with the developing economic sectors.

Hotspots with high interaction between Blue Growth and sites of conservation interest in the Adriatic Sea were identified, based on the following criteria: at least two sectors exerting major pressures, overlapping with existing conservation areas or priority areas for conservation or EBSAs. Results are shown in Figure 3-20.

Some updates and additional data about the trends of maritime sectors in the Adriatic-Ionian area can be found in a recent report from the SUPREME project [106]. The report analysed the following sectors: fish and shellfish harvesting (both professional and recreational); oil and gas extraction, including the necessary infrastructure; aquaculture, including the necessary infrastructure; shipping; shipbuilding; renewable energy generation (wind, wave and tidal power), including the necessary infrastructure; maritime tourism, including cruise tourism and sailing and nautical activities.

[39] GFCM have adopted recommendations requiring members to prohibit the use of towed dredges and trawl net fisheries at depths greater than 1,000 metres.

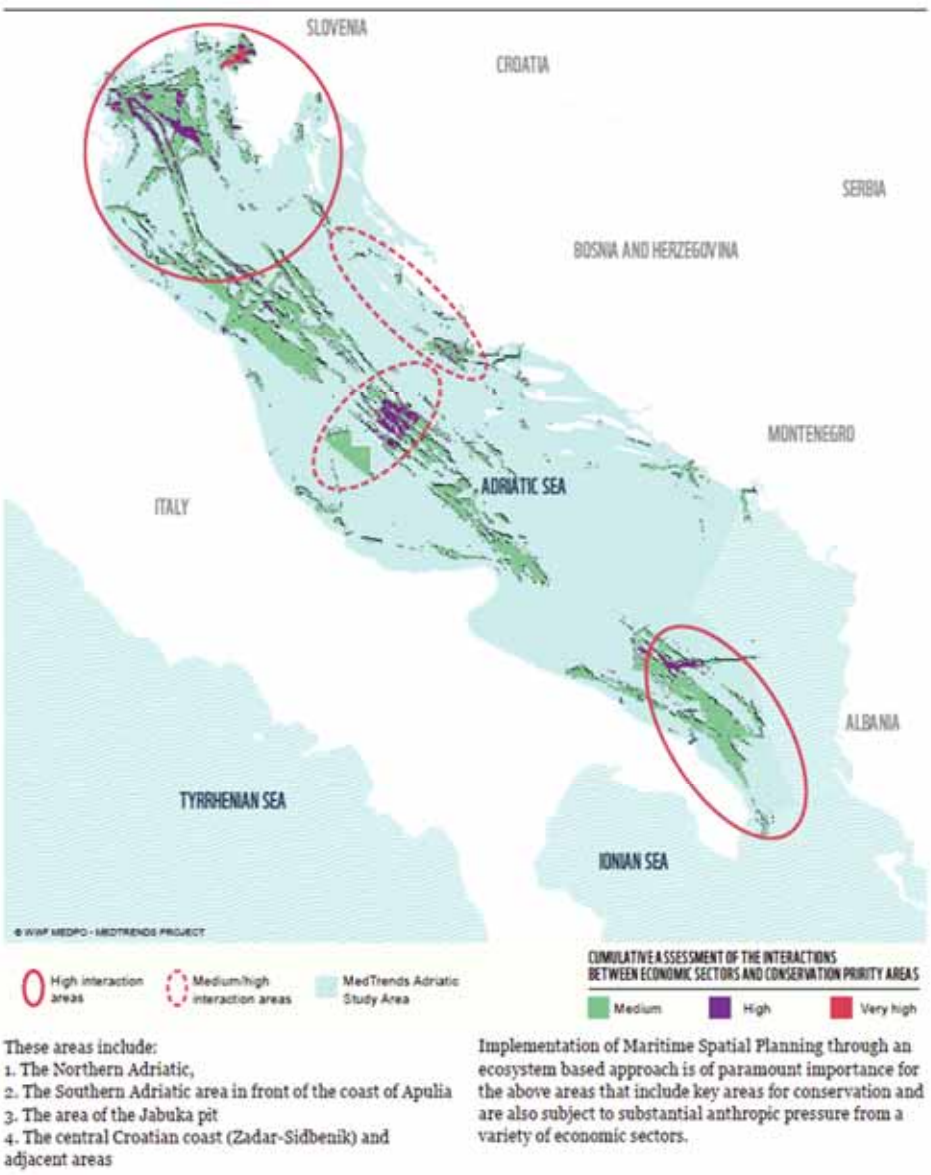


Figure 3-20. Area of interaction between Blue Growth and areas of conservation interest in the Adriatic Sea (source: [103]).

3.4.2 Adaptation to variable environments: climate change and MSP

On top of all challenges that MSP already faces, climate change will present an additional overarching and evolving challenge. Climate-related drivers of change, such as ocean warming, acidification and sea level rise, will alter present ocean conditions, thereby leading to a redistribution of marine ecosystem goods and services. As a result, ocean uses that rely on those services will undergo change, experiencing local decrease or increase and relocation, with potential for new use-use conflicts and increased cumulative environmental impacts [107]. While some uses of the ocean, such as renewable energy and seabed mining, are less susceptible to the effects of climate change, others, such as fisheries and aquaculture, are globally more vulnerable. Planning for a changing ocean will require increasingly flexible and adaptive ocean planning approaches, as well as the proper recognition of climate change as a real (and growing) challenge. Still, the incorporation of climate change into MSP will allow for better preparedness, improved response capacity and, ultimately, the reduced vulnerability of marine socio-ecological systems [107].

The best way for ocean planning efforts to respond to potential future alterations is to become increasingly flexible and adaptive. Regional and national policies for ocean planning, as well as individual processes (both in terms of legislation and of actual ocean plans) need to be able to effectively incorporate change to

thrive in a dynamic and uncertain future. Operational approaches to foster such flexibility – such as dynamic ocean management or dynamic ocean zoning – must be explicitly identified, and implemented. Subsequently, regular revision mechanisms must be established. There is an underlying premise for all of this to be possible: climate change must be recognized as a challenge in both policies and processes of ocean planning. Only then can the climate dimension be properly encompassed, and a long-term, sustainable vision for the use of the ocean be ensured [108].

From a climate change adaptation perspective, there may be demands that need to be considered in MSP, e.g. coastal erosion adaptation measures (beach nourishment and dune reconstruction) may increase demand for research and excavation of submarine sand deposits; climate change adaptation of the fishery sector might require fishing restrictions including no-take zones; MPAs resilience can be improved through networking. Climate proofing of offshore installations is also essential to properly deal with a long-term perspective.

In the Mediterranean, UNEP/MAP has prepared the Regional Climate Change Adaptation Framework for the Mediterranean Marine and Coastal Areas, endorsed by the 19th Meeting of the Contracting Parties of the Barcelona Convention [109]. The main objective of the framework is to set a regional strategic approach to increase the resilience of the Mediterranean marine and coastal natural and socio-economic systems against the impacts of climate change, assisting policymakers and stakeholders at all levels across the Mediterranean in the development and implementation of coherent and effective policies and measures by identifying strategic objectives, strategic directions and priorities that:

- Promote the enabling environment for mainstreaming adaptation in national and local planning;
- Promote and exchange best practices and low-regret measures;
- Promote leveraging of necessary funding; and
- Exchange and access best available data, knowledge, assessments and tools on adaptation.

Very few examples of coastal and marine plans considering provisions for climate change adaptation are available in the AIR. Among these, the pilot coastal plan for Šibenik-Knin County (Croatia) recommends several adaptation measures for the county coastal area; some of which are also relevant for marine and maritime aspects, e.g.:

- Infrastructure: protection against coastal flooding, adaptation of the existing coastal infrastructure to the expected sea level rise, climate proofing of future infrastructure
- Spatial planning: implementation of Article 8 of the ICZM Protocol to the Barcelona Convention establishing setback zones along the coast, managed realignment to reduce vulnerability to climate change impacts, MSP for more sustainable and resilient sea use.
- Governance and management: ICZM coordination body at the regional level, creating favourable conditions for participation, awareness raising and capacity building.

The Territorial Action Plans for Coastal Protection and Management were developed under the COASTANCE project.[40] Plan formulation activities for coastal protection and management and adaptation to climate change effects, such as erosion and submersion risks, were undertaken. The focus was on low sandy or pebbly coastal zones and their inland, the most exposed to sea level rise, erosion and submersion risks. The need to identify sand deposits at sea to be exploited for beach nourishment is one of the important MPS-related topics in some of the countries of the AIR.

3.4.3 Adaptive approach to MSP in practice: methods and indicators for plan monitoring

Monitoring and evaluation are two of the most important phases of MSP. Indeed, as stated in the IOC-UNESCO guide on evaluating marine spatial plans [110] "*without knowing what it is that existing marine spatial plans are achieving (or not achieving), how will it be possible to improve them the second time around?*". These two phases are the vehicles that allow responsible entities to learn about the effects of planning and management actions, and to further adjust and adapt them accordingly. In particular, monitoring and evaluating MSP "performance", that is, assessing the effects of management actions, are

[40] https://www.keep.eu/keep/project-ext/3921/COASTANCE

especially important as they allow responsible entities to establish if observed changes in the managed system are due to MSP actions or some other factors [111], [42].

During the phase of marine plan implementation, there are certain processes/items to monitor, given the next plan preparation [110]:

- Trend or state-of-the-system (or state-of-the-environment) monitoring: State-of-the-system monitoring focuses on assessing, for example, the status of biodiversity in the marine area, the quality of marine waters, or the overall health of a particular marine ecosystem;
- Compliance monitoring: collection and evaluation of data, including self-monitoring reports, and verification to show whether human activities comply with the limits and conditions specified in permits; compliance monitoring is sometimes called "surveillance monitoring";
- Performance monitoring: it is the activity for assessing programme accomplishments, particularly progress towards pre-established goals, objectives and outcomes. While data from other monitoring programmes may be repurposed for performance monitoring, they must be able to show the impact of the marine spatial plan.

Indicators are generally used to describe monitoring results. Several studies provide detailed guidance on the development and use of MSP indicators (see [102] for a review). One of the most widely used guides was developed by Charles Ehler [110]. It describes several steps of monitoring and evaluating the performance of marine spatial plans, including the identification of indicators, establishing baselines, defining targets, and monitoring indicators.

Another detailed guide is the Handbook for Measuring the Progress and Outcomes of Integrated Coastal and Ocean Management (ICOM) [112]. It offers a step-by-step guide on developing, selecting and applying governance, ecological and socio-economic 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 [113] provides a good overview of the MPA indicators selection process. The importance of choosing specific indicators for the control variables to monitor changes in ecosystem models is also discussed in the study 'Planetary boundaries for a blue planet' [114].

In addition to the studies mentioned above, there are also some projects that provide tools that may support the development of MSP indicators. For example, the BONUS BaltCoast project[41] designed a tool to measure the sustainable development in coastal areas and 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 grouped into four categories: Environmental Quality, Economics, Social Well-Being, Governance (Process indicators).

The Transboundary Planning in the European Atlantic (TPEA)[42] project provides a checklist for assessing transboundary MSP processes.[43] 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 the evaluation and monitoring of transboundary collaboration in MSP.

Examples of MSP-related indicators, Blue Growth and maritime sectors can be found in the "Handbook for developing MSP indicators", which is also included in a Blue Growth Study [102]. The report provides insight into how MSP authorities can monitor whether MSP processes are on the right track, in relation to promoting sustainable Blue Growth Figure 3-21.

Examples and checklists that MSP authorities may use are also included in the Handbook. A short and operational version provides a ready-to-use checklist and guiding questions for practitioners with hands-on-experience in MSP.[44] A long version is aimed at MSP stakeholders interested in the overall theoretical framework of indicators. It provides a detailed description of the role of indicators in the MSP cycle, an overview of the indicator development process, as well as a detailed process description for developing these indicators.[45]

[41] www.baltcoast.net

[42] https://www.msp-platform.eu/practices/tpea-evaluation-report

[43] Summary available on https://www.msp-platform.eu/practices/tpea-evaluation-report

[44] https://www.msp-platform.eu/sites/default/files/indicatorhandbook_msp4bg_short.pdf

[45] https://www.msp-platform.eu/sites/default/files/indicatorhandbook_msp4bg_long.pdf

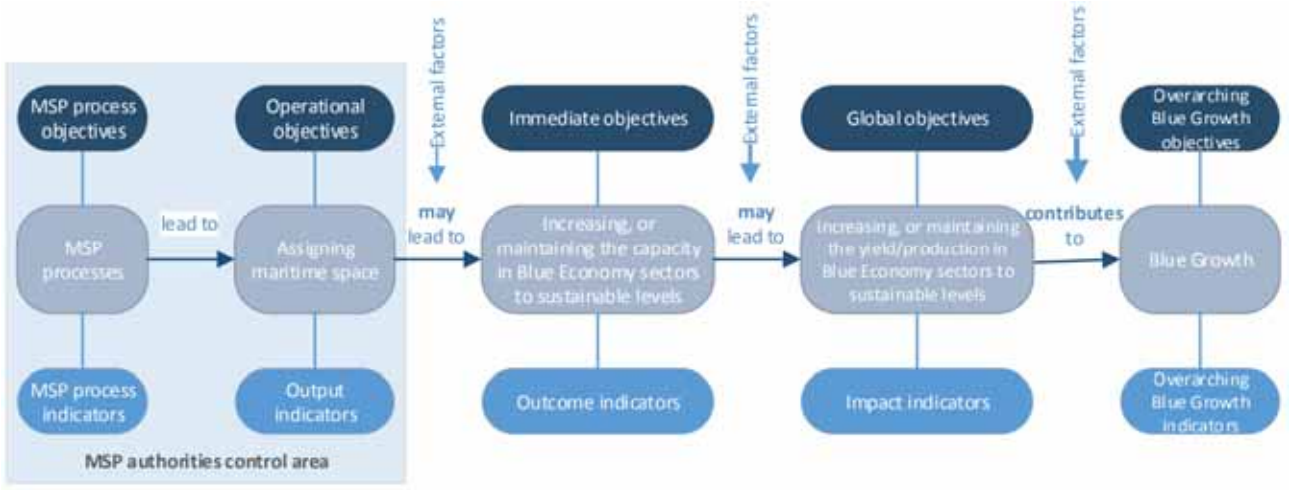


Figure 3-21. Objectives and indicator chains in the MSP context (source: [102]).

3.4.4 Plan revision

In Europe, several countries have had MSP in place for about a decade and are currently in the second or third planning round. A review of the situation was prepared by Frazão Santos et al. [42]. Norway is one of the countries where three marine spatial plans cover the entire EEZ of over 2 million km^2: (i) the Barents Sea-Lofoten Area plan (approved and implemented in 2006 and first updated in 2011), (ii) the Norwegian Sea plan (approved in 2009 and implemented), and (iii) the North Sea and Skagerrak plan (approved in 2013 and implemented) [115]. Norway's marine spatial plans are very comprehensive and establish guidelines for management actions across economic sectors (including fisheries) together with actions for the conservation and sustainable use of its marine areas [115].

In Belgium, MSP has also been in place for over a decade; Belgium was one of the first nations to have an operational MSP system in place. Its initial master (zoning) plan was completed and implemented in 2003 to manage its intensively used EEZ of only 3500km^2, and in 2014 Belgium approved a new, legally binding marine spatial plan [115]. Belgium MSP addresses the management of human uses within nature protection zones and MPAs, together with offshore wind development.[46]

The Netherlands is also an MSP "pioneer." With one of the most intensively used ocean spaces in the world (EEZ of c.65,000 km^2), it completed its first marine spatial plan in 2005, which was further revised and adapted in both 2009 and 2015.[47] The Netherlands MSP process started not only due to a need for integrated spatial planning because of new uses requiring ocean space, primarily offshore wind farms and protected areas, but also due to potential growth in existing uses [115].

In Germany, MSP has been developed at two levels: the EEZ level, since 2009, when two regulatory and enforceable marine spatial plans were approved for both the Baltic Sea and the North Sea parts of the German EEZ (c. 57,000 km^2), and the state (länder) level where authority to manage the territorial sea resides. Three legally binding marine spatial plans are in place for the three länders: the Mecklenburg-Vorpommern plan (approved in 2005 and revised in 2016), the Lower Saxony spatial planning programme (approved in 2008 and amended in 2012), and the Schleswig-Holstein plan (approved in 2010 and currently under revision). MSP in Germany is primarily focused on planning for offshore wind farms and shipping.[48]

In the AIR, there are examples where the national legislation foresees the revision of the marine plans.

[46] EU MSP Platform; Belgium country page: https://www.msp-platform.eu/countries/belgium

[47] EU MSP Platform; Netherlands country page: https://www.msp-platform.eu/countries/netherlands

[48] EU MSP Platform; Germany country page: https://www.msp-platform.eu/countries/germany.

For example, in Greece, the national legislation foresees a review, revision and adaptation procedure for all spatial plans.

According to the Italian Guidelines on MSP, the Plan has a ten-year duration, and a mid-term revision can be prepared if deemed necessary on the basis of the plan implementation monitoring or in case of particular events.

In Croatia, the plans are periodically revised according to the needs of the sectors and governing structures expressed in their developing documents (i.e. sectoral strategies, regional and local development strategies, programmes and plans) and/or updating with the legislative changes. Furthermore, territorial status reports are tools for checking planning solutions by monitoring spatial trends over a four-year period. The revision is carried out through the process of developing spatial plans in which the interests of all stakeholders are harmonized according to the guidelines of the national document (Spatial Development Strategy of the Republic of Croatia), and the principles of spatial planning as an interdisciplinary profession. The procedure is part of the system defined by the Physical Planning Act, with a clear commitment to integrative and ecologically-based approach. Developing "new generation" plans, i.e. applying GIS for spatial plans development, is the opportunity to review the existing marine spatial plans.

3.5 Land-Sea Interactions

Chapter overview

- Understanding and addressing LSI is crucial to ensure sustainable management and development of coastal areas and coherent planning of land and sea-based activities. The relevance of LSI processes in the AIR is high and sea planning is closely related to the coastal and territorial planning (and management).
- The LSI analysis is not a standalone activity, but will be considered an integral part of the MSP-ICZM process, as foreseen by the EU MSP Directive and the Protocol on ICZM in the Mediterranean.
- LSI do not only involve the areas and countries directly facing the marine space, but also inner countries that have important connections to the sea through complex socio-economic interactions and might affect the marine environment through large river basin systems.
- The AIR shares common LSI challenges, including following the most relevant ones: coastal erosion, climate change impacts and disaster risk reduction, proper planning and management of connections between land and sea-borne transportation, coastal urbanisation, coastal tourism boom, land-based impacts to marine environment, such as eutrophication and pollutant contamination along hotspot areas, degradation of land-sea transition systems, limited connection between coastal-marine and rural development.
- Methods and tools to identify and assess LSI have flourished recently; under the SUPREME-SIMWESTMED projects, PAP/RAC developed a step-by-step methodological guideline to account for LSI in MSP, which was tested in different Mediterranean case studies.

LSI interactions may be assessed and managed through ICZM initiatives that are well-placed to support integrated/holistic planning and management of the coastal areas. This is particularly relevant for the Protocol on ICZM in the Mediterranean, given its geographical scope, including both the land and marine components of the coastal area (art. 1). The importance of LSI within the ICZM process is reaffirmed by some of the Protocol's objectives and principles, as:

- "*Ensure preservation of the integrity of the coastal ecosystems, landscape and geomorphology*" (art. 5; objective d). Given the definition of coastal zone provided by the Protocol, this integrity can be preserved only if the land and marine parts of the coastal area are considered in concert, with the consequent necessary analysis of LSI.
- "*Prevent and/or reduce the effects of natural hazards and in particular of climate change, which can be induced by natural or human activities*" (art. 5, objective f). The role of LSI is evident also in this case, as most of the coastal hazards (e.g. erosion, coastal flooding, and saltwater intrusion into freshwater systems) are LSI themselves.
- "*The biological wealth and the natural dynamics and functioning of the intertidal area and the complementary and interdependent nature of the marine part and land part forming a single entity shall be taken particularly into account*" (art. 6, principle a).
- "*All elements relating to hydrological, geomorphological, climatic, ecological, socio-economic and cultural systems shall be taken into account in an integrated manner….*" (art. 6, principle

b), which also refers to land-sea interactions due to natural processes and human uses and activities.

- "*The ecosystem approach to coastal planning and management shall be applied so as to ensure the sustainable development of coastal zones*" (art. 6, principle c), again pointing to the integrity of the coastal system as a whole, and therefore to the interactions linking the land and the sea.

The importance of taking LSI into consideration is also explicitly marked by the EU MSP Directive. Without providing a definition, the Directive makes several references to the concept of LSI in:

- Art. 1, referring to the subject of the Directive;
- Art. 4, which refers to the development and implementation of maritime spatial planning. Paragraph 2 provides that, during the entire MSP process, the Member States shall take account of land-sea interactions; Paragraph 5 states that, when drawing up the maritime spatial planning, Member States shall take into account the peculiarities of the marine regions, the related activities and present and future uses and their effects on the environment, as well as natural resources, and land-sea interactions.
- Art. 6, Paragraph 2 (a), according to which one of the minimum requirements for the maritime spatial planning is that Member States take into account land-sea interactions;
- Art. 7, Paragraph 1 ("Land-sea interactions"), which describes the nature of the LSI and the relationship with the other formal or informal processes, such as integrated coastal zone management.

LSI is also referred to in recitals 9, 16 and 18 of the MSP Directive.

Understanding and addressing land-sea interactions (LSI) is crucial to ensure sustainable management and development of coastal areas and coherent planning of land and sea-based activities. Being a densely populated, semi-closed sea, the relevance of LSI processes in the Adriatic Sea is high and sea planning is very much related to the coastal and territorial planning (and management). LSI analysis can also provide relevant elements to ensure coordination between territorial and sea planning, to achieve integrated management of land and sea.

General Framework for LSI developed by EC DG-MARE describes LSI as "a complex phenomenon that involves both natural processes across the land-sea interface, as well as the impact of socio-economic human activities that take place in the coastal zone" [95].

3.5.1 Tools and approaches for LSI analysis

An important consideration is that land-sea interactions not only involve those areas and countries directly facing the marine space, but also inner countries that have important connections to the sea through complex socio-economic interactions and might affect the marine environment through large river basin systems. This concept was specifically analysed by the ESaTDOR – European Seas and Territorial Development, Opportunities and Risks study, developed within the framework of the ESPON[49] 2013 Programme [96]. The study focused on LSI within Europe's six regional seas; LSI was assessed considering three main features:

- Economic significance, based on employment in maritime sectors, used to describe the intensity of landward influences;
- Flows, representing the movement of goods, services, information and people across sea areas;
- Environmental pressures, representing the human impacts on the marine environment, through both sea and land-based activities, such as shipping or agriculture respectively.

Approaches for LSI analysis were further explored in a recent study conducted by ESPON [97] and a method was proposed to help operationalize the LSI exploration, particularly considering key maritime activities and impacts on land. The following elements were considered in the analysis:

- LSI Scoping: this stage might involve an initial discussion with relevant stakeholders about the nature of LSI and what could the coastal area/core area mean in order to identify critical issues for further examination.
- Governance Analysis: this stage could entail a review of land and sea spatial planning arrangements, and the relationships between them, including a competent authority identification that would deal with LSI agendas at national, regional and local levels. Such an analysis will help identify areas where action may be beneficial, as well as the competent authority responsible for taking action.
- Value Chain Analysis: based upon established value chain approaches used by the World Trade Organisation and others, the MSP LSI project has

[49] The European Spatial Planning Observation Network (ESPON) is an applied research programme aimed at supporting the formulation of territorial development policies in Europe. It is co-funded by the European Regional Development Fund.

developed a spatialized approach to value chain analysis for considering LSI associated with maritime sectors. This helps explore the spatial footprint of selected sectors and the spatial connectivity between different value chain segments, as well as consider the relative 'stickability' of economic and other benefits within coastal communities. From this, a spatial assessment of LSIs associated with selected sectors can be distilled, and areas where action may be beneficial can be identified.

- Mapping: mapping activities can assist in defining the boundaries of a core land and sea area and data visualisation to support analysis and discussion. Experimentation with different scales of mapping and alternative infographic approaches may be useful.
- Recommendations for good management: in this final element, findings from different aspects of research can be brought together to draw out key messages and develop recommendations for good management of LSI in territorial planning.

Value chain analysis is conducted undertaking the following steps:

- The general sector value chain for use in territorial planning is developed to highlight different segments of activity, envisage their spatial impact, and how they connect together.
- Key sector characteristics are identified, and associated statistics assembled to learn about how it operates, its relative significance (in terms of employment, for example) and trends in its local context. Subsequently, key framework conditions that influence the way the sector has performed, and is likely to perform, are explored. This includes sector-specific policies and strategies (not necessarily oriented towards spatial planning), factors that may influence the economics of the sector, including competition from other areas, labour availability etc., and environmental conditions.
- Key actors are mapped using different segments in the value chain to define relevant sector NACE codes[50] and background information related to the sector. Key actors mapping can be delivered as a qualitative exercise (as detailed company level data sets may be difficult to assemble) or a desk-based exercise and/or part of a stakeholder workshop. Using different segments in the value chain to define NACE codes for the relevant sector can be a useful starting point.
- An overall assessment of LSI sectors can be made, overall findings can be summarized and recommendations for territorial planning responses can be developed.

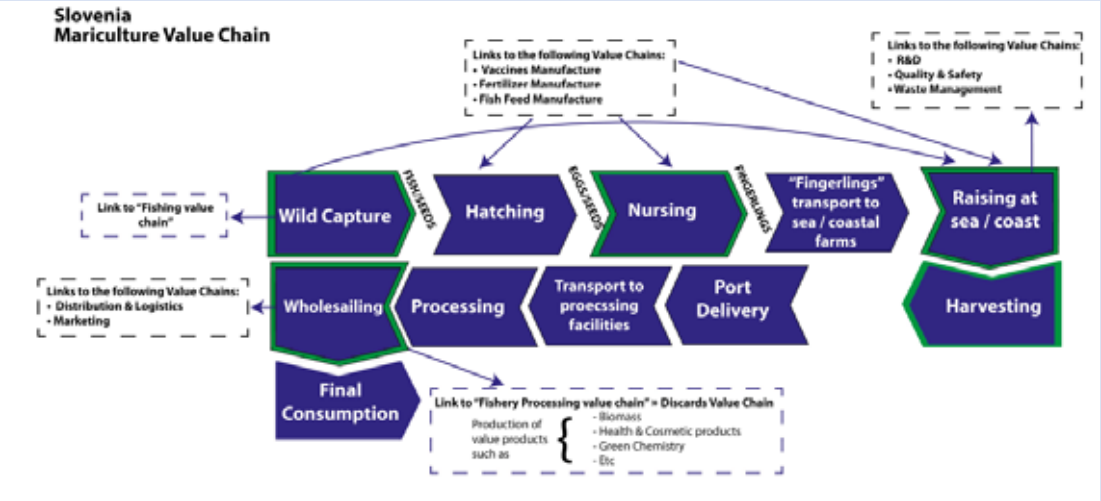
Possible land-sea interactions of some typical maritime sectors are described in the brochure prepared by Shipman et al. [98] for the Directorate General for the Environment of the European Commission. These guidelines consider the following sectors: aquaculture, desalination, fisheries, marine cables & pipelines, minerals & mining, ports & shipping, tourism & coastal recreation, offshore wind energy. Main LSI relevant for each sector are identified, key data, potential analytical and mitigation management tools are suggested, along with stakeholder categories to be involved and possible management options.

Figure 3-22. Assessment of LSI throughout MSP process. A = Identification of LSI according to categories; B = source of information that can assist in the consideration of the LSI; C = existing policies and guidance that are relevant for the consideration of the LSI; D = assessment tools that can be used to analyse the LSI; E = potential mitigation measures that might be applied to minimize negative impacts and maximize positive ones; F = stakeholders that should be engaged in discussion around the LSI; G = options for addressing the LSI though plan making (source: [98]).

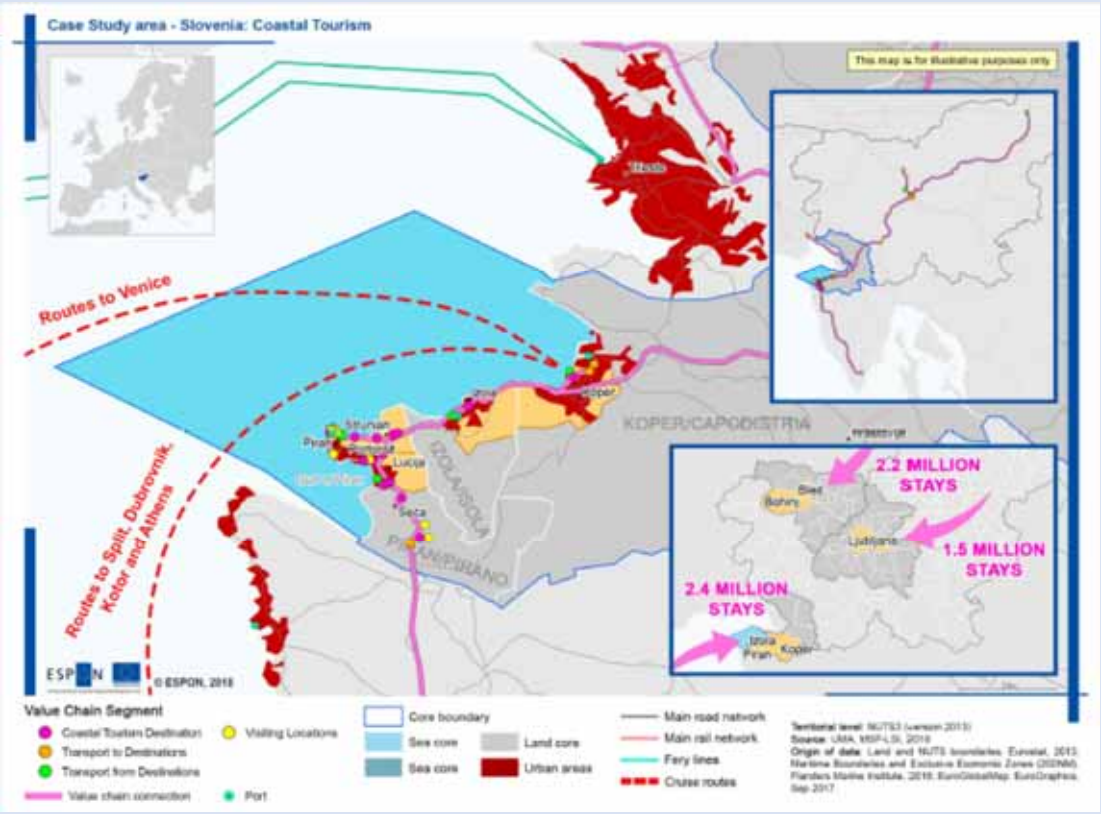
[50] NACE (Nomenclature Statistique des Activités Economiques) is the European industry standard classification system for classifying business activities.

Application of ESPON LSI analysis methodology to Slovenian coastal waters

The case study focuses on the coastal strip of Slovenian territorial waters, and in particular, the Piran Bay area. The selected focal sectors are coastal tourism (which has many varied dimensions in the case study area) and mariculture (marine aquaculture, fish and shellfish farms). Some preliminary results are available (at the time of preparation of the present report) and are reported herein in order to exemplify the methodology application. Mariculture value chain is shown below. Each segment of the value chain corresponds to specific activities and their land-sea dynamics. Five segments are highlighted in a green outline box, suggesting that the value chain segments 'Wild Capture', 'Nursing', 'Raising at sea/coast', 'Harvesting' and 'Wholesaling' are particularly relevant to the Slovenian case study.



Map of actors for the tourism sector allows to see how coastal tourism value chain is concentrated around the cities of Portorož and Piran, but also further away from Piran Bay at the cities of Koper and Izola. This coastal tourism value chain is spread almost all along the Slovenian coastline, covering the Coastal-Karst (Obalno-kraška) region and other more central inland regions.



Key actors of coastal tourism in the Slovenian case study area

Source: [97]

The CAMP Italy project [99] proposed a methodology for mapping and analysis of ecosystem services identified in a specific marine-coastal area, and for the identification of impacts that affect them, linking the different types of natural capital and assigning to them a value of potential impact. This approach allows defining a matrix of significance that connects human activities and their impacts on ecosystem services and, at the same time, their mutual interactions in term of socio-economic and environmental sustainability. The analysis, carried out by applying this methodology, allows to identify appropriate management procedures that can guarantee the resilience of ecosystem services and analyse the influence of the CAMP project actions on them at the same time.

The following tools were developed and tested:

- a matrix for the analysis of the land-sea and sea-land interactions, which defines a standardized approach to the identification of LSI, applicable to an individual activity (or Project activity in general) that analyses specific elements, such as concerned geographic scale, key ecosystem services, activities – human pressures and natural phenomena, and the main policy and planning tools. The matrix also requires a Gap Analysis of the Activity, in order to identify improvement proposals for the proper consideration of LSI in the context of a similar action;
- the analysis tool for ecosystem service mapping, related LSI, and for the evaluation of the impacts and effects of planning of coastal zone management actions. The proposed approach allowed for the definition of a matrix of significance, which correlates the human activities and their impacts on ecosystem services with their mutual interactions, in terms of socio-economic and environmental sustainability. The matrix allows, therefore, to identify the most suitable management approach that can ensure the resilience of ecosystem services and analyse the impact that the action had on them at the same time.

The SUPREME project has helped identify elements for a common approach to LSI analysis within MSP and ICZM [92]:

- Two typologies of LSI interactions should be considered: interactions due to natural processes and interactions among land-based and sea-based human activities;
- Two directions of LSI interactions should be considered: from land to sea and from sea to land;
- Temporal dynamics of interactions (on different scales) should be considered;
- The geographical scope of LSI analysis should be case-specific and related to the specific MSP context in which the LSI analysis is included;
- Link to a sea-basin scale approach should be taken, as a number of LSI issues have a transboundary dimension;
- Specific LSI hotspot areas (e.g. major port infrastructures, river input, coastal nursery habitat, etc.) should be considered with a more detailed analysis;
- LSI analysis should be based on the best available information, and transparently highlight current gaps.

A step-by-step methodological guideline to account for LSI in MSP was also defined. The methodological guideline foresees the compilation of a catalogue of interactions, populated with semi-quantitative and quantitative information. The use of GIS as a mapping tool can support the analysis, particularly its advanced phases. The guidelines propose a step-wise, tiered approach[51] and identify 14 Steps (Figure 3-23), streamlined with the MSP process. Stakeholder engagement is a key component of the proposed methodological guidelines. The proposed steps shall be taken along within the corresponding steps of the plan preparation, in order to avoid duplication of effort and optimize timing.

The methodological guidelines have been applied and tested in seven cases in the framework of SUPREME and SIMWESTMED projects.

[51] The tiered approach applies: (i) to contexts where planning is in a preliminary phase, (ii) to contexts where planning is more advanced. In more advanced contexts, the methodological guidelines could be applied starting with PART B or using PART A to reorganized available knowledge according to the needs of the in-depth analysis. The tiered approach gives flexibility to the proposed methodology. Given this approach, some steps in PART B represent a deepening of the analysis carried out by following corresponding steps in PART A.

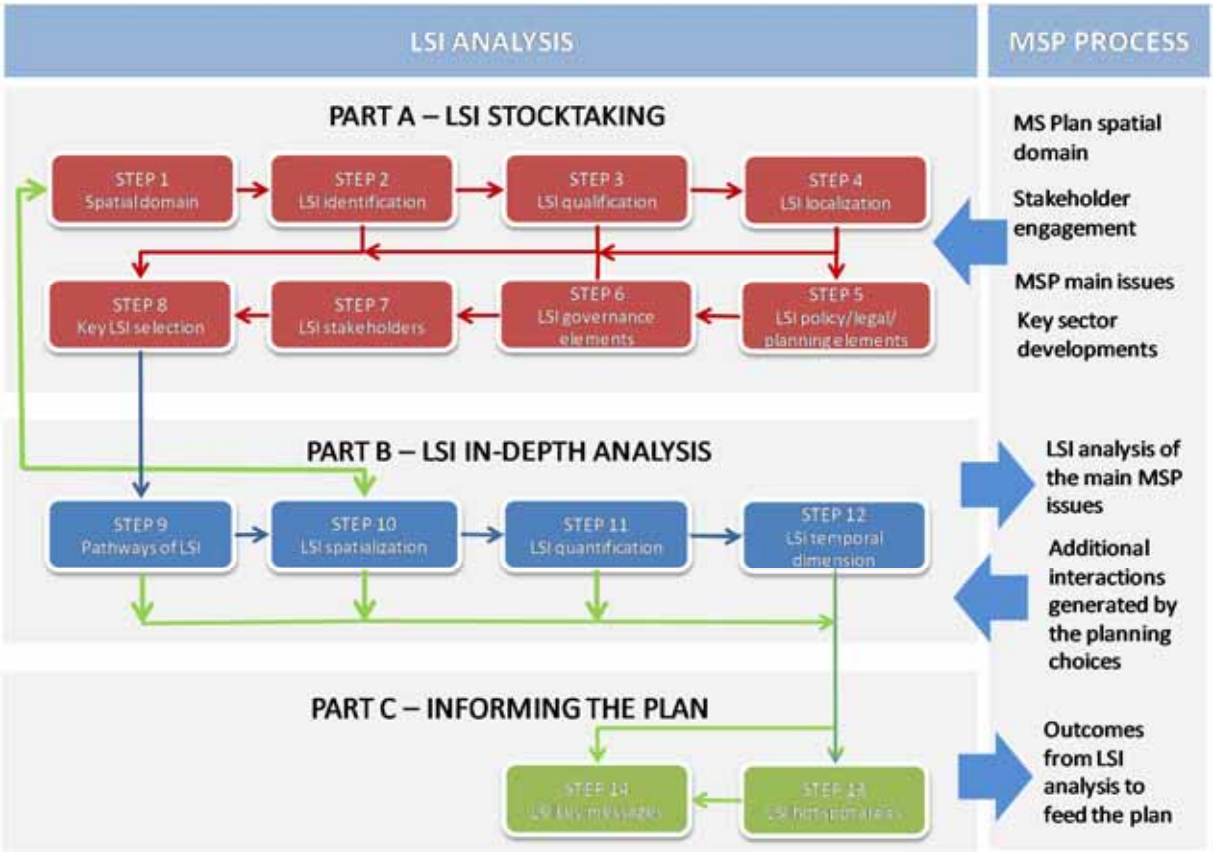


Figure 3-23. Step-by-step approach to LSI analysis, streamlined within the MSP process (source: [92]).

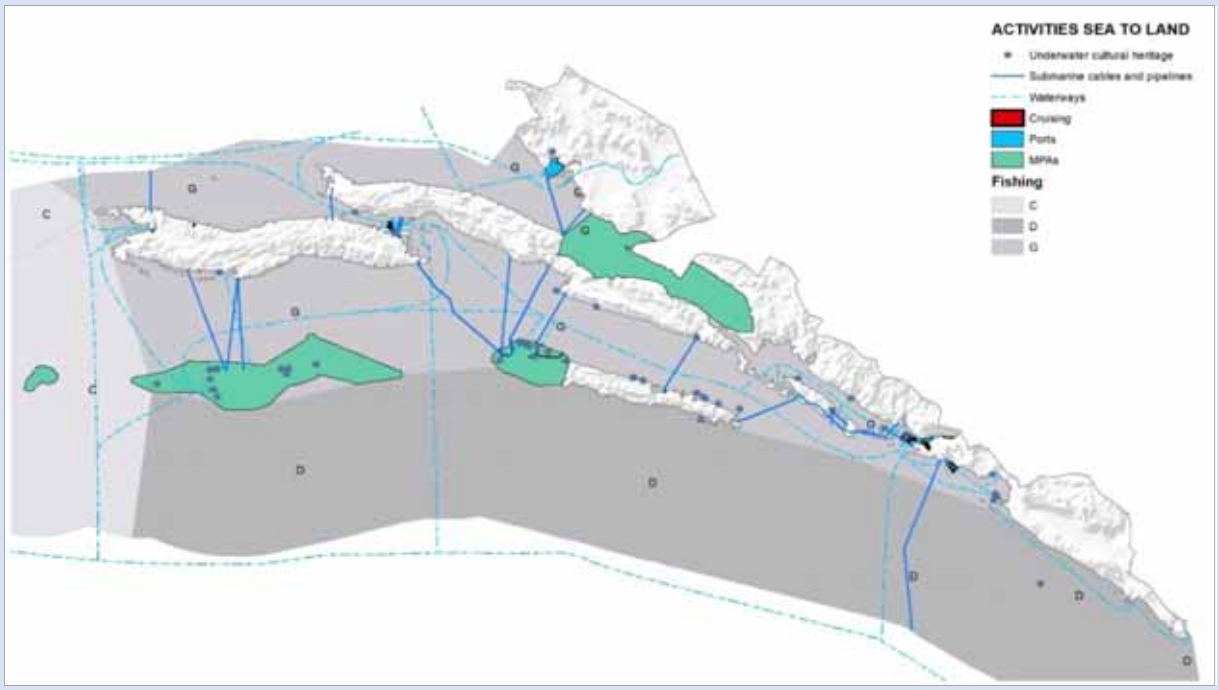
Figure 3-24. Test cases of LSI methodological guidelines implemented in the framework of the SUPREME and SIMWESTMED projects.

LSI in the Dubrovnik-Neretva County (Croatia)

Within the SUPREME project, some of the steps of Part A of the methodological guideline were tested. A wide number of LSIs related to natural processes were identified.

Interactions related to three marine processes (storm, saline intrusion and seiches) were recognised as highly relevant in terms of their impacts on the land component of the coast. Storm not only causes soil erosion, interruption of commercial operation or disruption of energy and water supply, but they also contribute to the accumulation of floating garbage in the coastal area. Strong southern winds wash off illegal dumping grounds located on the southeastern coast of Adriatic and, due to natural sea circulation cover beaches, ports and bays with huge amounts of floating garbage. Impacted areas are the old port of Dubrovnik, Prapratno bay and other beaches oriented to the southeast. Saline intrusion is one of the increasingly growing concerns in the County area. It is the result of the combination of various processes, including exploitation of natural sand deposits in the river mouths, decrease of river water flow in particularly during summer months, hydropower regime, and climate change – caused sea level rise. This interaction has a great impact on the society and economy (coastal tourism and agriculture) by damaging agricultural land and affecting drinking water sources. Seiches are standing waves generated in an enclosed or partially enclosed body of water. Also known as meteotsunami, seiches in the Adriatic occur every few decades causing damage to the coastal infrastructure as well as to professional and recreational fishing and aquaculture equipment. They can affect the shallow bays of Dubrovnik-Neretva County (city of Vela Luka and Mali Ston bay area).

Most of the analysed sea to land interactions related to human activities resulted in having negative impacts. However, for the two sectors of MPAs and underwater cultural heritage (UCH) substantial positive effects were identified. Together with cruising, UCH was recognised by the analysis as the most relevant sector in terms of LSI. Cruising is probably the most controversial activity in the Dubrovnik-Neretva County. Although it has positive effects on overall well-being, it produces serious impacts on natural habitats, environmental quality and other non-touristic economic activities (e.g. by affecting air and water quality, increasing noise pollution, increasing greenhouse gases levels, contributing to the introduction of allochthonous species, increasing volume of solid and liquid waste to manage, competing for space, and increasing the risk of damaging Posidonia habitats by anchoring). Proper preservation of underwater heritage can be combined with sustainable touristic activities, expanding the traditional land-based offer.



Sea to land interactions related to human activities in Dubrovnik-Neretva County

Source: SUPREME project

3.5.2 Identification of key LSI in the Adriatic

The following most relevant and common challenges with regard to LSI in the Adriatic Ionian area have been identified in the SUPREME project [119]:

- coastal erosion;
- climate change impacts and disaster risk reduction;
- proper planning and management of connections between land and sea-borne transportation;
- coastal urbanisation and littoralization;
- booming of coastal tourism;
- land-based impacts to marine environment as eutrophication and pollutant contamination along hotspot areas;

- degradation/transformation of land-sea transition system as coastal lagoons and deltas;
- difficulties in establishing a proper protection of vulnerable and high values coastal-marine systems;
- limited connection between coastal-marine and rural development; etc.

The following examples illustrate some of the relevant LSI in the area [119].

Coastal erosion represents a relevant LSI for Italy. A large part of the coastal zone is subjected to a strong recession due to erosion events: between 1960 and 2012, 23% of the coast (1,534 km) experienced erosion, with an overall recession of 92 km^2; 19% of the coast (1,306 km) experienced an increase in its surface area, with an overall gain of 57 km^2. Despite taking action to stabilize and protect the coastline, this phenomenon is still affecting the coast, especially along the sandy littoral as in all Adriatic regions, and the areas where marine flooding events can develop as in Calabria region. Submarine cables and pipelines also represent a relevant LSI for Italy: most important pipelines in the AIR area are located offshore (central Italy) and connect offshore gas production platforms with coastal power plants. The main project for the region is the TAP (Trans Adriatic Pipeline), based on the agreement signed in 2013 by and between Italy, Greece and Albania [119].

Risks to coastal areas (coastal erosion, marine flooding, and saline intrusion) represent important, natural LSI for Slovenia. In the Slovenian coastal area, three areas (Izola, Koper and Piran) were defined as Areas of Significant Impacts of Floods according to the Floods Directive (Directive 2007/60/EC). On two of these areas (Izola and Piran), marine flooding is the main risk source, while in the area of Koper flood risk is a result of both marine and river flooding. Natural coastal erosion processes on the Slovenian coast have been significantly altered, since only 23% of the coastline remains in natural state. An important part of the natural coastline represents the flysch cliffs at Piran, Strunjan and Debeli rtič [119].

Geotechnical instability is a characteristic of Croatia due to the karstic nature of the coast and the underwater. There are significant areas under flysch where landslides are a common risk. Flysch in Adriatic part of Croatia is widespread in Istria, Kvarner region, on some larger islands, such as Rab, Hvar, etc., Ravni Kotari, Makarska littoral and to the south of Dubrovnik, in Konavle littoral. These phenomena determine negative LSI due to the risk of earthquakes, tsunamis, new risks of potential landslides, changes in relief and, consequently, in habitats [119].

The strong growth of tourism and particularly the increased number of cruise ships represent a relevant LSI for Croatia determined by human activities. Related with the previous one, expansion of port infrastructure, construction of breakwaters, construction of road transport infrastructure, for connecting islands (bridges), and infrastructure construction in general represent together another relevant LSI for Croatia.

Erosion is a concern for the Ionian coasts, albeit to a lesser degree than the average of Greece. Floods, either of marine origin or due to extreme weather phenomena in combination with infrastructure deficiencies, aggravate further the condition of coasts and their erosion. A project called AdaptinGR has been ongoing since end of 2018 under LIFE, aiming at monitoring – including drone monitoring – 50 beaches in the Ionian for 6 years, as regards erosion, possible sea level rise and climate change impacts.

The Adriatic-Ionian area is most characterised by traffic linked to the movement of passengers and trucks and trailers in RoPax[52] ferries. Several central European and landlocked countries depend heavily on the Northern Adriatic ports for their trades. Five Northern Adriatic ports (Koper, Ravenna, Rijeka, Venice, and Trieste) have gathered considerable importance within the logistical platform of the North Adriatic Port Association (NAPA). The major environmental impact of the transport sector in the Adriatic may be the potential accidents and the consequent oil spills. In addition, competition for space may arise with other sectors like aquaculture and fisheries.

[52] The acronym RoPax (roll-on/roll-off passenger) describes a vessel built for freight vehicle transport along with passenger accommodation.

4 Areas with high LSI intensity: the national level

Some examples of LSI from different countries in the AIR were discussed in the previous chapter. The topic is of relevance for the entire region and deserves attention in the analysis phase of the preparation of the coastal and marine plans, as well as in the implementation phase.

Thanks to the contribution from national experts, it has been possible to identify examples of important areas for LSI in the AIR. Some of these areas are cross-border; in such a case, the LSI identification and analysis should be necessarily conducted in a cross-border cooperation context. These areas are described in the next chapter (1), entirely focusing on opportunities for enhanced cross-border and transboundary cooperation.

Other areas with high LSI intensity are relevant at the national level and are described in this chapter. They have also been selected because their LSI might have important implications for the Adriatic-Ionian Region as well, for example, in terms of ports providing necessary land-based hubs for shipping connection, or in relation to the role of major rivers in transferring pollutants to the sea and affecting the quality of the marine environment. Therefore, even if the analysis of LSI in these areas is primarily expected to provide elements for the national-level coastal and marine plans, it might also become relevant for the AI region, or some of its areas. At the national level, the following areas with high LSI intensity have been identified (Figure 4-1):

1) Slovenian coast (having also a cross-border component, see chapter 1)
2) Kvarner Bay – Croatia
3) Kornati National Park – Croatia
4) Municipality of Neum – Bosnia and Herzegovina (having also a cross-border component, see chapter 1)
5) Port of Kotor – Montenegro
6) Bijela – Montenegro
7) Drin Bay – Albania
8) Vlora Bay – Albania
9) The insular complex of the Diapontia islands, Corfu and Paxi/Antipaxi islands – Greece
10) The insular complex of Lefkada, Cephalonia, Ithaka, Zakynthos, Strofadia and opposite Greek coast – Greece
11) Trieste coast – Italy (having also a cross-border component, see chapter 1)
12) Delta of Po river – Italy
13) Apulia coast – Italy (having also a cross-border component, see chapter 1)

Finally, it should be acknowledged that the identified areas provide some examples of LSI hotspots. Others are undoubtedly available in the AI Region and might deserve particular attention in terms of LSI analysis, as in the case of other port cities and towns, e.g. Ravenna and Ancona in Italy, Pula in Croatia, Tivat and Bar in Montenegro, Durres in Albania or Igoumenitsa and Patra in Greece.

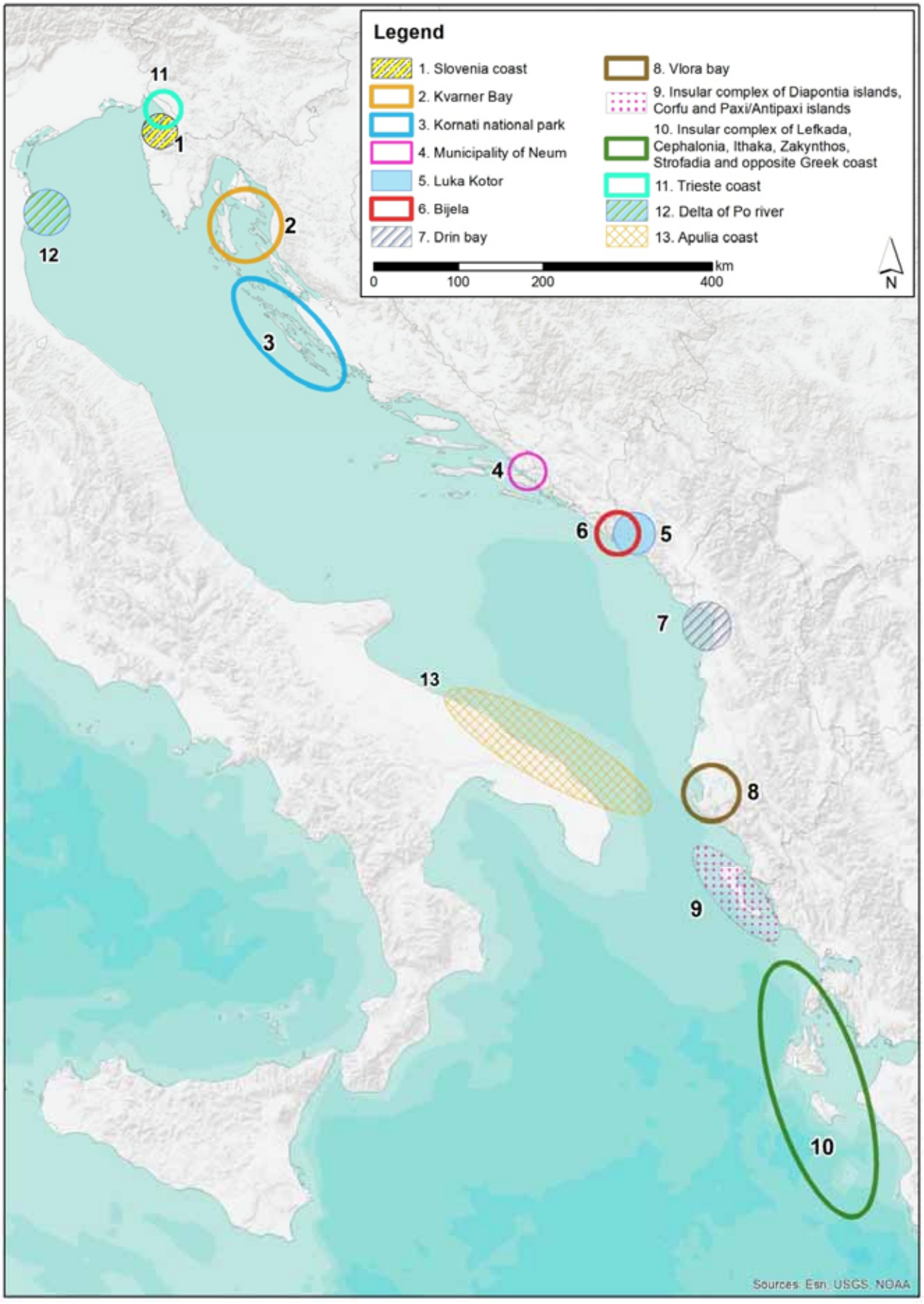


Figure 4-1. Areas at the national level with high LSI intensity in the Adriatic and Ionian Region.

1. Slovenian coast

In addition to the natural LSI described in 3.5.2, the Slovenian coast is interesting because of many LSIs linked to human activities. For example, maritime traffic, with the presence of the port of Koper and the vicinity of the port of Trieste, determines relevant LSI, such as implications for the terrestrial transport networks and related facilities, and interactions with coastal ecosystems (e.g. MPAs along the coast are influenced by sediment resuspension and induced turbidity).

LSI is also linked to marine litter pollution. It is well known that marine litter sources are mainly (on average 80%) land-based. In Slovenia, macroplastic litter on beaches has been observed and not only does it affect the environmental quality, but also the beach tourism sector. Moreover, the presence of microlitter in coastal waters could negatively affect marine aquaculture and local fisheries, which is considered an important sector in the coastal area [119].

2. Kvarner Bay (Croatia)

The Kvarner Bay is located in the northern part of the Adriatic Sea between the Vinodol-Velebit and the Istrian coasts. Krk, Cres, Lošinj, Rab and Pag, situated in the bay, are amongst the largest and most populated islands in Croatia. Indeed, the concentration of large islands near the coast is specific to the area. The islands of Krk and Pag are connected to the mainland by bridges, while the islands of Cres and Lošinj are interconnected by a bridge. Specific activity in the bay includes coastal industries activities, tourism, maritime transport and fisheries. Moreover, the coastal area of the Kvarner Bay has been subject to littoralization for a long period.

The whole area is under significant influence of the city of Rijeka, which acts as a macro-regional centre. Being the hub of large land and maritime routes, Rijeka has for many years grown to be a significant port and industrial area. The port of Rijeka has five basins: two central locations in the urban area and three separate locations in the Bakar Bay, the Omišalj Port Basin on the Island of Krk and the Raša Port Basin on the Istrian Peninsula). There are two important corridors (passenger and freight) related to the activities of the port of Rijeka and several ferry lines connecting the islands to the mainland.

Port activities, shipbuilding, metal and electrical industry, oil refining industry, petrochemicals, coke production and a number of other support service activities were developed in the surrounding area. The industrial activities are said to be in decline (e.g., coke plant is not active today, but the port of Bakar is still used for transhipment of coke), yet occupying the most ecologically valuable parts of the bay and (sometimes permanently) damaging its natural and landscape values. Tourism has been developing peripherally, in the coastal area of the Opatija and Crikvenica-Vinodol Riviera and the islands, competing for space with port and industrial facilities. Economic growth was accompanied by higher population density and the expansion of urban areas. One of the burning issues over a long period is the improper discharge of industrial and sewage wastewater into the coastal sea area.

In the spatial planning documentation,[53] this area was looked at through the prism of the connection of three parallel zones: land, sea and islands. All three belts have their own characteristics, but also inseparable interconnections. The sea, as a central belt, connects and unites the coastal and insular land. The spatial distribution of the sea and land (coastal and island zone) in the bay, as well as the combination of all the activities that take place therein, have resulted in strong land-sea interactions. The environmental burden of the marine and coastal areas is growing along with the further development of the port of Rijeka (the EU gateway) and tourism (especially on the islands), and the impact of industrial activities is still not negligible.

3. Kornati National Park (Croatia)

Kornati National Park is composed of an archipelago of 89 islands, islets and reefs and surrounding maritime area. Islands are mostly uninhabited. The

[53] (i) Urban Planning Institute of Croatia (in cooperation with inter-republic and international institutions), 1972, "Upper Adriatic Coordination Regional Spatial Plan"; (ii) Institute for Urban Planning and Construction of Rijeka, 1984 "Mutual Spatial Plan of Municipalities of Crikvenica, Opatija and Rijeka"; (iii) Institute for Spatial Planning and Environmental Protection of the Community of Rijeka, 1984 "Spatial Plan of the Community of Rijeka"; (iv) Spatial Plan of Primorje – Gorski kotar County (OG 14/2000, 12/2005, 50/2006); (v) Spatial Plan of Primorje – Gorski kotar County (OG 32/2013, 07/2017, 41/2018)

park is close to the coastal zone of Zadar and Šibenik-Knin counties, an area of high tourism intensity, and therefore it attracts visitors on a daily basis. The Kornati National Park has a spatial plan that comprises both land and sea area. The main LSI-related challenge lies in the full understanding, through research, of how direct and indirect interactions affect the preservation of the park's natural assets and phenomena. The main direct LSIs refer to nautical and underwater tourism, invasive species and marine litter, while indirect LSI refer to, for example, shipping operations on the outer sea.

4. Municipality of Neum (Bosnia and Herzegovina)

Neum is the only municipality in Bosnia and Herzegovina facing the Adriatic Sea. In this area, the main environmental issues land-sea related include (i) management of municipal solid wastes (unsanitary landfill) and (ii) management of communal wastewaters (partially constructed sewerage system) (see the National Action Plan (NAP) for the Mediterranean region in Bosnia and Herzegovina for prevention of pollution from land-based activities [120]).

The Municipality of Neum is building a sanitary landfill to remediate unregulated waste landfills and waste disposal sites from zones that have a negative impact on surface water and groundwater. The Municipality is also working to improve the wastewater collection system. Most of the system was built and put into operation in 1989. The public company "Mareco Neum" is responsible for its management system, regulated by the inter-state agreement between Bosnia and Herzegovina and Croatia on joint financing, maintenance and operation of the regional sewerage system Komarna-Neum-Mljetski kanal. It is an old system, which takes the waters to Croatia, where is a joint treatment station (primary treatment) and run-off in the open sea (-70 m). The length of the system is 31.8 km. In spite of the smooth cooperation with Croatia, the primary treatment system is getting obsolete and the secondary system is also incomplete. About 30% of households are not connected to the sewerage system at present, and they use unsanitary septic tanks. The collector Komarna – Duboka – Klek in Croatia should be in operation very soon and this small part of about 700 m should be finished by the end of 2019.

5. Port of Kotor (Montenegro)

This area is characterized by an intense port activity, so the anthropogenic component of LSI is particularly important in this case. The port of Luka Kotor specializes in picking and shipping. Activities are planned and in progress for the construction of new port facilities, as well as high-quality and modern solutions for the new generation of ships and boats. The objective is to increase the Port's potential so that it includes the reception of ships and passengers from ships on a round trip cruises. Improvement and restructuring of cruise tourism and facilitating the establishment of a ferry service can be accomplished by accommodating the port of Kotor facilities (allocation of a part of the port traffic) at Lipci terminal (separate passenger terminal). This solution would bring socio-economic benefits to the area. The issue of present and future LSI is very important given the plans for the future.

6. Bijela (Montenegro)

The area of Bijela in the Bay of Kotor is also interesting because of the anthropogenic component of LSI. In fact, the Bijela shipyard is the largest ship repair facility in the southern Adriatic. The shipyard is equipped for the repair and reconstruction of ships and other vessels of all types and uses. The future development of the Bijela shipyard should be directed towards the development of environmentally sustainable shipbuilding and ship repair, through modernization of the existing shipbuilding capacities, overhauling of yachts and construction of small vessels under ecological standards; improvement of business infrastructure, etc.

7. Drin bay (Albania)

The area of the Drin bay (gulf of Drin), in the north of Albania, is important from the LSI point of view. It is characterized by both anthropogenic and natural interactions. The area hosts one port (in Shëngjin) and two rivers deltas. The area is characterized by an intense erosion, as well as floods in specific periods. Both the marine area and the coastal area have several important habitats and species. The area has seen a sharp population increase and the growth of tourist activities over the past 10 years.

8. Vlora bay (Albania)

Also in Albania, the Vlora bay is very important from the LSI point of view. The bay hosts a commercial port, a fishing port and a terminal for the storage and related loading/unloading of oil and other products, several intensive aquaculture activities, a thriving tourism industry and the Trans Adriatic Pipeline that is being constructed. It also has a large river delta that is prone to flooding, and two lagoons with specific characteristics and high biodiversity value, including the only Marine Protected Area. It presents an interesting combination of the interactions between the numerous sea-based activities and land-based ones.

9. The insular complex of the Diapontia islands, Corfu and Paxi/Antipaxi islands (Greece)

Main human activities in this insular complex include tourism (which is very intense in Corfu, very mild in Diapontia islands, with fishing, tourist cruises and marinas in Paxi), some aquaculture and exploration for future offshore wind farms (in Diapontia islands) as well as the potential for fishing tourism. All these activities exhibit clear LSI.

The connection among these islands as well as with the mainland (Igoumenitsa) could be improved considerably. This insular complex, as expected because of its geography, is mostly communicating with the opposite Greek coast; exceptions are ferries connecting Corfu with Italy, and planes connecting this island with the world. Good practices from other areas with similar activities and type of LSI would be most helpful, as well as involvement in projects developing guidelines on how to address such aspects in a sustainable manner [116].

10. The insular complex of Lefkada, Cephalonia, Ithaka, Zakynthos, Strofadia and opposite Greek coast (Greece)

Main human activities in this insular complex include tourism, aquaculture (because of its ideal marine conditions), fisheries, medium ports, pipelines, both the existing ones and those under construction, and an adjacent area for hydrocarbon exploration. The area is also characterised by MPAs (e.g. Zakynthos Marina Park, various Natura 2000 sites, bird conservation in Strofadia) and shipwrecks. All these activities and characteristics imply LSI, while human uses may lead to cumulative effects. Good practices and involvement in preparation of guidelines for these activities and for governance issues would be very useful as remarked in [116].

11. Trieste coast (Italy)

The Trieste coastal zone hosts diverse and intense LSI related to both natural and anthropogenic features of the area. The River Isonzo/ the Soča and the Timavo River flow into the Gulf of Trieste on the Italian side of its coast. Considering the karst landscape of the territory, the inflow for groundwater also represents an important element of LSI in the area.

The coast is highly developed, both from the urban and the industrial point of view, and therefore it represents a hotspot area of LSI. The port of Trieste is among the most important ones, being located at the intersection of shipping routes and the Baltic-Adriatic and Mediterranean TEN-T core network corridor. It is an international hub for overland and sea trade with the dynamic market of Central and Eastern Europe (with 62 Mt of goods transited in 2017). The port activities have fostered the development of a large-scale land-based transport system: for example, more than 400 trains a month connect Trieste and the manufacturing and industrial areas of Northeast Italy and Central Europe. The cruise sector is also present in the port of Trieste, and represents another LSI element.

The crude oil Transalpine Pipeline starts from the Trieste port. It is a 753 km long pipeline passing through Italy, Austria and Germany. The marine terminal is located in the Bay of Muggia and is used for the unloading of oil.

The Trieste coast also hosts other important industries, such as the metallurgy and industrial and naval mechanics sectors (e.g. the biggest European ship engine production plant). The food industry is also well developed.

12. Delta of Po River (Italy)

Po River is the largest Italian river flowing into the Adriatic Sea and forms the articulated territorial system of its delta. It flows from Monviso, in the Alps, near the Italian-French border, and flows for over 650 km.

The Po delta represents a hotspot of natural LSI. Its delta has created high natural value ecosystems that stood the test of time: river branches, coastal dune systems and sand formations, sandbars, lagoons, fishing ponds, marshes, fossil dunes, canals and coastal pine forests, in addition to the vast and mainly brackish wetlands.

Relevant LSI are also linked to the delta as a source of nutrient pollution and contamination (including heavy metals, but also emerging and priority organic contaminants). Some areas of the Po basin are densely populated, and the river has suffered pollution from municipal wastewater discharges, stormwater runoff, sewer overflows, agricultural runoff and industrial waste discharges. River Po delta may also represent the source of marine litter, or high concentrations of litter that can be found on the beaches in the vicinity of the delta [25].

Fisheries and aquaculture (both mussel farming in the sea and clam cultivation in lagoons) are important economic activities in the area. They depend on the quality of marine waters and are therefore strictly interconnected with the water inflows from the delta.

In the delta area, in front of the village of Porto Levante (province of Rovigo, in the Veneto region) the Adriatic LNG Terminal is located 15 km offshore. It is an artificial island that acts as the LNG regasification terminal, located near Porto Levante, part of Porto Viro, in the province of Rovigo. The connecting pipeline reaches the shore near Porto Levante and crosses the Po Delta. The pipeline then continues towards the province of Bologna (in the Emilia-Romagna region), where it joins the national gas distribution network.

13. Apulia coast (Italy)

The southern part of Apulia coastline, stretching from Brindisi to Cape Santa Maria di Leuca, borders the Strait of Otranto (see chapter 5), which is characterised by multiple maritime uses with relevant interactions with the land. Tourism is one of the main economic activities along the coast, with a strong seasonal dynamic. Tourism growth has also determined a relevant expansion of tourist infrastructure and services (including marinas), exerting more pressure on the marine environment.

The entire area of the Strait of Otranto is characterised by intense maritime traffic, flowing out and in from the Mediterranean Sea to the Adriatic Sea. Apulia coastlines are therefore highly sensitive to accidental pollution caused by shipping, also considering the great vulnerability of its coastal and marine habitats and the economic activities they support. The southern part of the Apulia coast hosts the important port of Brindisi, which provides multiple functions: industrial, commercial and tourism ones (connecting southern Italy to the Balkans, and even Turkey). Small-scale fisheries, using smaller ports scattered along the coast, is still an important activity in the area, even if it is affected by the structural and market difficulties the sector is currently facing [121].

Additionally, the construction of a gas pipeline is planned, crossing the Strait of Otranto, to bring Azerbaijani gas to Italy through Greece and Albania, with important LSI implications related to the location of its Italian terminal and potential conflicts with environmental protection, tourism and fisheries.

5 Opportunities for cross-border and transboundary cooperation

One key objective of this study is the identification of opportunities for cross-border and/or transboundary cooperation on MSP, requiring the application of the common principles described in chapter 1. In this regard, thanks to the contribution of national experts, and by relying on available literature sources, the study identified possible areas (see the map in Figure 5-1) within the Adriatic-Ionian region where cross-border or transboundary cooperation on MSP and ICZM can provide added benefits in terms of shared planning and management. Some of the identified areas are also characterised by high LSI intensity, and in rare cases might overlap with those identified at the national level and described in the previous chapter.

While common MSP principles are relevant for all the areas, major transboundary challenges tend to be specific. Table 5-1 highlights the major challenges to be considered for cross-border and/or transboundary coastal and marine planning and management in each area. The challenges scored by the national experts (see chapter 1) are indicated in the table:

- Improving eco-connectivity of coastal and marine protected areas, applying a blue-green corridor approach ("Eco-connectivity" in Table 5-1);
- Protection of highly sensitive and high-value marine areas ("Protection of marine areas" in Table 5-1);
- Sustainable management of fish stocks and key habitats for fish commercial species ("Fisheries management" in Table 5-1);
- Shipping operation: improved shipping connection across the Adriatic and Ionian Seas and coordinated management of shipping traffic (included in "Shipping and ports" Table 5-1);
- Shipping safety: reducing the risk of ship collisions and environmental accidents (included in "Shipping and ports" Table 5-1);
- Improved connection in terms of energy grid and pipelines ("Energy grid and pipelines" in Table 5-1);
- Joint management of the exploitation of submarine natural gas and oil resources ("Gas and oil resources" in Table 5-1);
- Marine litter, including management of sources and identification of hotspot areas of litter accumulation ("Marine litter" in Table 5-1).

The table also indicates other two major cooperation challenges suggested by national experts: preservation of underwater cultural heritage ("UCH" in Table 5-1), and implementation of sustainable tourism management ("Tourism management" in Table 5-1). The further development of joint scientific research programmes, which was also suggested by involved national experts as a key component of the Adriatic-Ionian cooperation on MSP, is undoubtedly relevant for all the identified areas and it is therefore not analysed in Table 5-1).

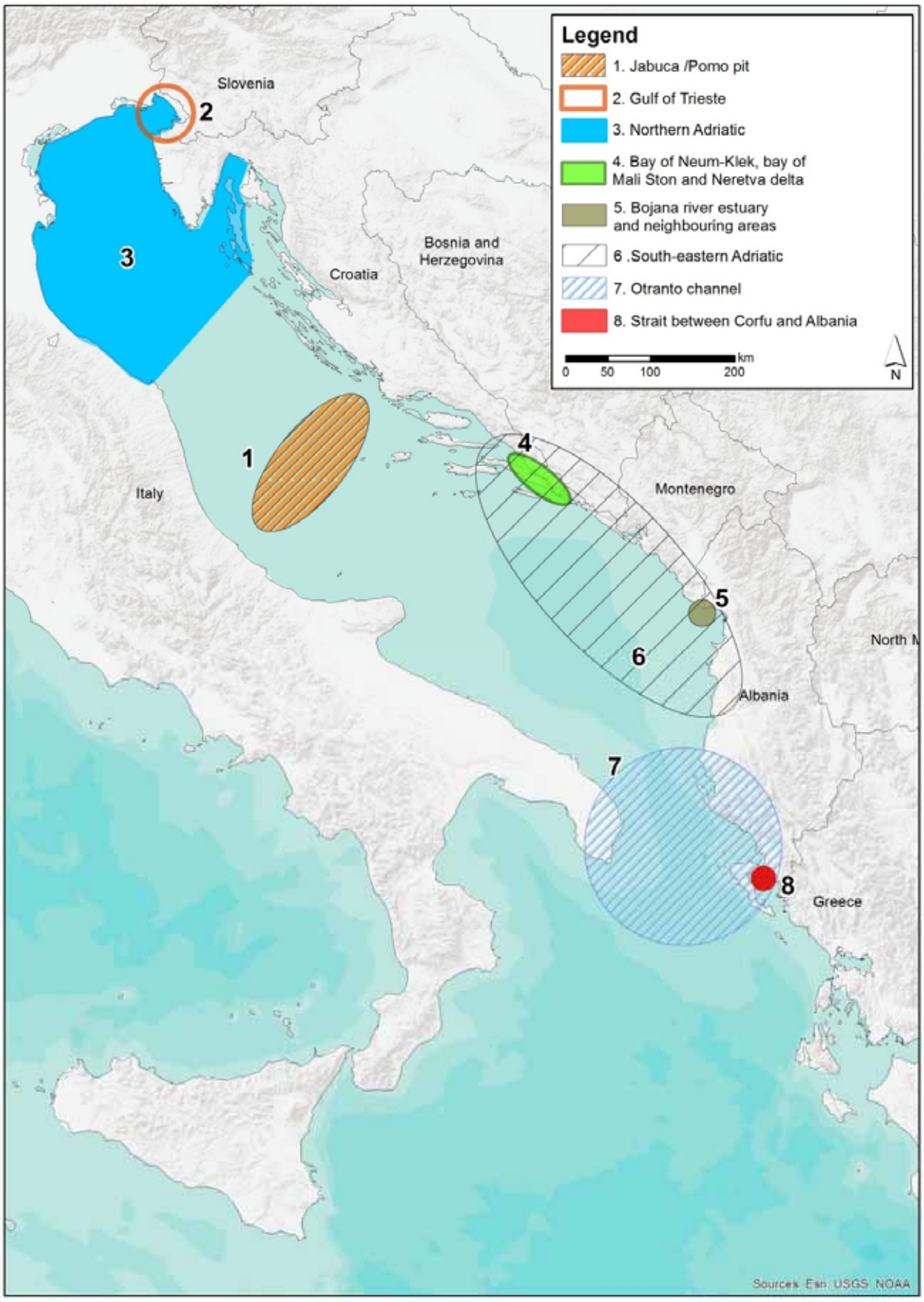


Figure 5-1. Examples of areas requiring cross-border or transboundary cooperation on coastal and marine planning and management, according to the consulted national experts.

Table 5-1 Main challenges for cross-border or transboundary cooperation on coastal and marine planning and management in the identified areas. Selected challenges (marked with X) are those that have priority.

Area	Involved countries	Major challenges requiring cooperative approaches								
		Protection of marine areas	Eco-connectivity	Fisheries management	Marine litter	Shipping and ports	Energy grid and pipelines	O&G resources	UCH	Tourism management
Jabuka/Pomo pit	ITA, CRO	X		X						
Gulf of Trieste and Northern Adriatic	ITA, SLO, CRO		X	X	X	X	X	X	X	X
Bay of Neum-Klek, bay of Mali Ston and Neretva delta	CRO, B&H	X	X		X	X				X
Bojana river estuary and neighbouring areas	MON, ALB		X		X	X				X
Southeastern Adriatic	CRO, MON, B&H, ALB		X		X			X		X
Strait of Otranto	ITA, ALB, GRE	X	X	X	X	X	X		X	X
Strait between Corfu and Albania	ALB, GRE			X						X

1. Jabuka/Pomo pit

For many years, national and supranational authorities (GFCM and the European Commission in particular), research institutes (e.g. through the FAO-AdriaMed[54] scientific cooperation initiative), NGOs and cooperation projects (e.g. MedReAct[55] and Adriatic Recovery Project[56]) have attempted to protect the valuable marine habitats of the Jabuka/Pomo pit in the central Adriatic Sea. The importance of cooperative approach to the scientific-based planning and management of this area, and specifically of its fishery stocks, related habitats and fisheries activities, has been also confirmed by the national experts involved in this study.

The FRA established by GFCM in the Jabuka/Pomo pit has a surface of approximately 3,000 km^2 and a maximum depth of 200 – 260 m. The scientific community agrees in recognising this as a highly sensitive and critical spawning and nursery zone for important Adriatic demersal resources, in particular the Norway lobster (***Nephrops norvegicus***) and the European hake (***Merluccius merluccius***). Although it covers less than 2% of the total surface of the Adriatic, it is one of the most important nursery and spawning areas of this sea, as well as an important fishing ground, especially for bottom trawl fishing, causing a high degree of fishing pressure on the resources in the area. Fish populations are vulnerable due to overfishing and high fishing pressure on juveniles.

In appreciation of its high ecological value, the Jabuka/Pomo pit was declared[57] an "Ecologically or Biologically Significant Marine Area" (EBSA)[58] in 2014, according to the criteria adopted by the 9th COP of the Convention on Biological Diversity (CBD).[59] On the 17 October 2017, at its 41st session, through the "Recommendation GFCM/41/2017/3 on the

[54] https://www.faoadriamed.org/html/adriamed_project.html

[55] https://medreact.org/

[56] This is an international alliance of environmental organisations and research institutions created to preserve the vulnerable ecosystems and essential fish habitats of the Adriatic Sea.

[57] https://www.cbd.int/doc/decisions/cop-12/cop-12-dec-22-en.pdf

[58] https://www.cbd.int/ebsa/

[59] https://www.cbd.int/doc/decisions/cop-09/cop-09-dec-20-en.pdf

establishment of a FRA in the Jabuka/Pomo pit in the Adriatic Sea", the GFCM adopted the EU proposal for the establishment of the FRA in the Jabuka/Pomo pit, banning demersal fisheries.[60] This proposal divides the FRA into 3 zones (Figure 5-2):

- Zone A for which any recreational and professional fishing activity with bottom-set nets, bottom trawls, set longlines and traps shall be prohibited;
- Zone B where fishing activities with bottom-set nets, bottom trawls, set longlines and traps shall be prohibited from 1 September to 31 October each year, starting from 2017 and allowed (for a maximum of one-two fishing days per week depending from gears) the rest of the year, provided that the vessel and/or its master is in possession of a specific authorization and that historical fishing activities in zone B are demonstrated;
- Zone C where fishing activities with bottom-set nets, bottom trawls, set longlines and traps and recreational fisheries shall be prohibited from 1 September to 31 October each year (starting from 2017) and allowed if the vessel or its master is in possession of a specific authorization and if historical fishing activities in zone C are demonstrated. In zone C bottom trawls shall be entitled to fish only on specific days and at certain hours.

The first analysis of scientifically gathered data has shown that the implementation of the FRA resulted in an increase in the spawning stock biomass of main species, along with the positive trend in length structure of the species. Improvement in stock biomass is also recognized in the border area around the FRA [122]. Even if overfishing is still present (to some extent), there are signs that the population of the European hake is recovering across the Adriatic basin.

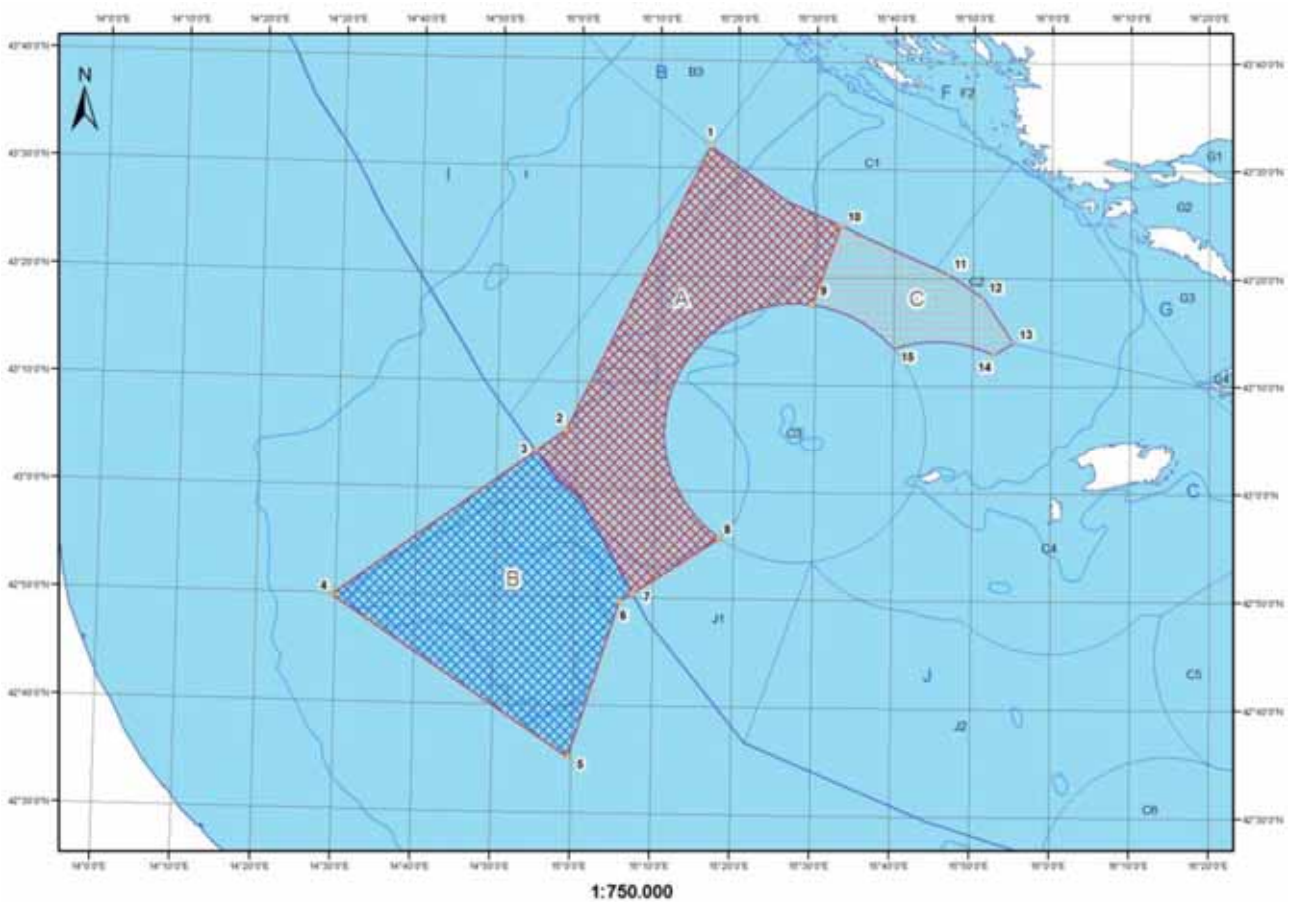


Figure 5-2. Spatial subdivision of the Jabuka/Pomo Pit FRA (source: Recommendation GFCM/41/2017/3 on the establishment of a FRA in the Jabuka/Pomo Pit in the Adriatic Sea).

60 http://www.fao.org/gfcm/data/reporting/frajabukapomopit/en/

The Regulation (EU) 2019/982 of the European Parliament and of the Council of 5 June 2019 amending Regulation (EU) No 1343/2011 on certain provisions for fishing in the GFCM (General Fisheries Commission for the Mediterranean) Agreement area[61] transposes the provisions of the Recommendation GFCM/41/2017/3[62] into ***aquis***.[63]

According to national experts involved in the study, cooperation in the Jabuka/Pomo pit area should continue to focus on sustainable management of fishing activity and natural resources and habitats, considering in particular:

- Regulation of access and fishing times within the FRA, as well as other activities that may affect the Jabuka/Pomo pit;
- Monitoring of fishing activities aimed at acquiring the management elements useful for the protection of the pit habitats and optimization of withdrawal activities;
- Joint development of scientific research programmes in the fields of ecology, marine biology and fisheries in order to ensure systematic knowledge of the area;
- Further strengthening of cooperation within GFCM so as to continue regulating fishing activities at the regional level (also applicable to third countries that are contracting parties to the GFCM).

2. Gulf of Trieste and 3. Northern Adriatic (Italy, Slovenia and Croatia)

The Gulf of Trieste (or Trieste Bay) represents the northernmost point of the Adriatic Sea and is approximately delimited by a line connecting the towns of Grado (Italy) and Piran (Slovenia). It is a relatively small gulf of about 25 km^2 with a maximum depth of 25 m. Moreover, the Gulf of Trieste is recognized as a site of shelf dense water formation that contributes to the North Adriatic Deep Water [117], which then flows cyclonically along the western Adriatic coast and eventually contributes to the Adriatic Deep Water exiting the basin through the Strait of Otranto.

Figure 5-3. The Northern Adriatic EBSA (source: https://www.cbd.int/ebsa)

[61] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02011R1343-20190710

[62] https://gfcm.sharepoint.com/:b:/g/CoC/EY-Z9FEx-41Ku3IM7UQgX9kBydhynal9CAOplqVZTEMnew

[63] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32011R1343&from=EN

The Gulf of Trieste is a very sensitive area, also due to its limited depth and, in particular, the presence of a significant number of coastal and marine socio-economic activities. It hosts two ports (Trieste in Italy and Koper in Slovenia), which are, with their cargo and cruise traffic, among the most important ones in the region.

More generally, the entire northern Adriatic plays an important role in terms of marine traffic: in this area, five ports (Koper, Ravenna, Rijeka, Venice, and Trieste) have become considerably important within the logistical platform of the North Adriatic Port Association (NAPA).

One of the most important environmental impacts of the maritime transport sector in the Adriatic Sea, specifically in the Gulf of Trieste, is represented by potential ship accidents and the consequent risk of oil spills. Maritime traffic is also related to marine pollution in general, marine noise and the introduction of invasive species through ballast waters, which seriously affect marine and coastal biodiversity. Maritime traffic is also considered a major LSI in the area due to the presence of ports connecting sea-land-borne transportation.

Conflicts for space may arise with other relevant maritime uses in the region, such as aquaculture and fisheries (particularly in the Gulf of Trieste), coastal and maritime tourism, exploration and potential exploitation of submarine hydrocarbon resources. Conflicting interests may also occur with the development of offshore energy installations, such as wind farms or oil and gas rigs, which may increase the risks of accidents. Moreover, the northern Adriatic hosts the ecosystems, habitats and species of great importance and vulnerability, and overlaps with one of the Mediterranean EBSAs (Figure 5-3).

Most of the maritime activities in the region show an upward trend; thus, the increase in conflicts and pressures on the environment, including significant LSI aspects, can be expected.

A common transboundary approach to MSP would contribute to solving major conflicts among maritime sectors and between maritime uses and environmental protection needs, and it would help prevent pollution (also due to marine litter), define common shipping operation and safety approaches, and decrease the oil spill risk. Cooperation could also investigate synergies among currently conflicting activities, as in the case of enabling specific typologies of fishing in the area of the separate navigation scheme in the Gulf of Trieste. Finally, as far as LSI is concerned, together with the presence of ports, the need for protection of the land-sea transition system should also be considered as a major issue in the area.

4. Bay of Neum-Klek, bay of Mali Ston and Neretva delta (Croatia and Bosnia and Herzegovina)

The bay of Mali Ston, the bay of Neum-Klek and the Neretva Delta form a very sensitive and high-value area, which requires a common cross-border approach to environmental protection and, more generally, coastal and marine planning and management. The upper part of the Neretva valley, called Hutovo Blato, is in Bosnia and Herzegovina and depends upon the water regime of the small Krupa River, while its lower part is situated in the Republic of Croatia, where the Neretva River branches create a large delta. Neretva Delta has been recognised as a Ramsar site since 1992, and Hutovo Blato since 2001. Both areas form an integrated Ramsar site that is a natural entity divided by the state borders. The Important Bird Areas programme, conducted by BirdLife International, covers protected areas in Croatia and Bosnia and Herzegovina.

Although still limited, pollution in this part of the Adriatic Sea may come from multiple sources: intensive maritime transport, which may result in oil spills and noise pollution, pollution from rivers as a result of excessive use of nitrates for agriculture purposes on land, insufficient wastewater treatment and improper landfill management. Neum bay in Bosnia and Herzegovina and Mali Ston bay in Croatia are considered "endangered areas" due to intensive aquaculture in the area close to the Neretva River Delta. In addition, tourism pressure in the area is responsible for impacts on the sensitive marine biodiversity. Results of the “South Adriatic” project (Regional spatial plan for south Adriatic, 1968 [124]) confirmed the relevance of a large-scale approach that needs to be applied in this area, considering it as a unique space.

Cross-border cooperation on MSP between Bosnia and Herzegovina and Croatia could provide benefits for the preservation and protection of this area. This cooperation should focus on the elaboration of methodologies and/or guidelines for common

approaches to MSP and on specific MSP issues, in particular: development of common visions, elaboration of common strategies and/or strategic objectives, data and information sharing, etc. Key elements deserving special focus include: protection of highly sensitive and high-value natural areas, management of economic and tourism pressure factors and improvement of eco-connectivity. Indeed, this area is relevant for the application of the blue-green corridor approach to enhance environmental protection and reduce conflicts with land and sea-based human activities.

Some instruments for cooperation are already in place in the area. Bosnia and Herzegovina and Croatia (specifically the Municipality of Neum and the Dubrovnik – Neretva County) are already collaborating through the framework of the 1996 Agreement, when they signed memoranda of understanding concerning joint financing, maintenance and operation of the regional wastewater system Komarna-Neum-Mljet channel, and agreed on the rights and obligations for the use of public water supply systems crossing the state borders.

5. Bojana/Buna river estuary and neighbouring areas (Montenegro and Albania)

The island of Ada Bojana, on the border between Montenegro and Albania, has been formed as a consequence of sedimentation of the deposits carried by the Bojana/Buna river to the Adriatic Sea. The island has been shaped under the influence of sea current and waves, which also modelled the seabed morphology, including underwater forms, which can create a great deal of problems for the local navigation. The beaches of Velika Plaža (in Montenegro) and on the island of Ada Bojana are important natural sites and have a considerable economic potential for the development of coastal tourism. South of the Bojana/Buna river, the Drin bay in Albania includes a commercial and fishery port and a well-developed coastal tourism industry. Drin bay also hosts important wetlands. A cross-border cooperation approach to the study of the Bojana/Buna estuary and neighbouring areas would make it possible to understand the current status, existing pressures, evolving dynamics and potential impacts of future development. Cross-border cooperation should also focus on the joint monitoring of the area and definition of strategies for the protection of high-value natural elements.

The relevance of such cooperation has been confirmed in a number of projects and studies. A recent one, funded through GEF and coordinated by GWP-Med, PAP/RAC and UNESCO-IHP [125] resulted in the preparation of the Integrated Resources Management Plan for the Buna/Bojana Area. The Plan considers upstream impacts from agriculture, tourism and urbanisation on coastal and water resources as well as marine impacts on the river delta and coastal aquifers. Such a multi-sectoral approach resulted in measures for strengthening cooperation for restoration and safeguarding the ecosystems of the area, increased resilience to climate change and supporting social welfare. This Plan can be relevant as a starting point for future cooperation initiatives.

6. Southeastern Adriatic (Croatia, Montenegro, Bosnia and Herzegovina and Albania)

Transboundary and cross-boundary cooperation can be useful to approach some common problems affecting the southeastern part of the Adriatic Sea, which also includes some of the areas mentioned above. Future exploration and exploitation of submarine hydrocarbons resources are some of the important issues in this area, in particular within Montenegro marine waters where significant reserves are detected and concerning potential exploring in the southern part of Croatian Adriatic. Coastal and marine pollution in general and marine litter in particular is another important issue extending beyond national borders in the area of southern Croatia (Dubrovnik), Montenegro, Bosnia and Herzegovina and Albania. Both hydrocarbons exploitation and pollution can negatively affect the high-value ecological and cultural heritage sites of the area that could impact tourism development. All these problems call for cross-border and transboundary cooperation.

7. Strait of Otranto (Italy, Albania and Greece)

The Strait of Otranto is a sea passage between the Apennine and Balkan Peninsulas, connecting the Adriatic and the Ionian Sea. Its length is 57 miles and its minimum width is 40 miles. The southern limit is 58 miles wide and it is composed of lines drawn from Cape Santa Maria di Leuca in Italy to the northern coast of the Corfu Island (between Cape Kefali and Cape Karagol), which belongs to Greece, and from

Corfu to the mouth of the Butrint River in Albania. The northern entrance is 67 miles wide and it is the line connecting the Italian port of Brindisi and Cape Semeni on the Albanian coast. The depth in the central area varies from 550 meters to the maximum of 1081 meters (south of the Othonoi Islet) [118].

The Strait of Otranto connects the Adriatic Sea with the Ionian Sea and separates Italy from Albania. Its width from Kepi i Gjuhës, Karaburun (Albania) to Punta Palascìa, east of Salento (Italy) is less than 72 km (45 mi). The strait has a very strategic position and has been a key to control all traffic flow to the Adriatic Sea from the rest of the Mediterranean for centuries. The general submarine morphology of this region approximates an irregular club-like shape basin reaching down to 1200 m, rimmed by steeped flanks, and narrowing southwards where it opens to the Ionian Sea [126]. More in detail, the morphology is quite complex and asymmetrical. The coasts of the Strait of Otranto are sometimes broad and sandy (whose waters at this latitude are characterized by rare spectacular colours and transparency), sometimes rocky, with cliffs dropping into the sea. There is quite a lot of ship traffic flow, which makes this strait a very sensitive area.

The limited size of the continental shelf, the variability and diversity of ecosystems, the presence of fish stocks of commercial interest, the seasonality of many species and their importance in terms of food and income, have allowed fishing, above all artisanal, to continue and resist the industrialization of the sector. Fisheries represent an essential component of the socio-economic development of coastal areas and an incentive for the development of activities such as tourism, owing to the preservation of traditions, customs and culinary habits. The main economic activity characterising and impacting the area is tourism, with a steady growth trend. Most of the ports are shipping with tourist facilities and play a key role in the national and international ship movement. The fishing industry, with a gradual increase of the mariculture-aquaculture, represents a significant component of the economic and productive structure of the region.

The coexistence of multiple uses of the area determines strong LSI both at the morphological level (coastal erosion) and at the chemical and biological level (alteration of the sea and brackish waters), causing land degradation, along with negative repercussions at a socio-economic level.

Otranto channel also overlaps with the EBSA of South Adriatic Ionian Straight (Figure 5-4), characterized by steep slopes, high salinity and a maximum depth ranging between 200 m to 1500 m. This area contains important habitats for Cuvier's beaked whales (***Ziphius cavirostris***), the Annex II species of the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean (SPA/BD Protocol) in the framework of the Barcelona Convention, and significant densities of other megafauna, such as the giant devil ray (***Mobula mobular***), striped dolphin (***Stenella coeruleoalba***), Mediterranean monk seal (***Monachus monachus***) and loggerhead turtle (***Caretta caretta***), all of which are listed in Annex II of SPA/BD Protocol. Benthos includes deep-sea cold-water coral communities and deep-sea sponge aggregations, representing important biodiversity reservoirs and contributing to the trophic recycling of organic matter. Tuna, swordfish and sharks are also common in this area.

The ongoing CAMP Italy-Albania project has identified the following topics for transboundary cooperation in the area [121]:[64]

- prevention and reduction of pollution from ships, combating pollution in case of emergency, linked and connected with maritime traffic, and maritime activities in general (including offshore);
- prevention of pollution by transboundary movements of hazardous waste and their disposal;
- protection of the sea against pollution from land-based sources and activities;
- prevention and elimination of pollution discharges from boats, airships, or incineration at sea (dumping);
- protection of the sea from pollution caused by offshore activities, exploration and exploitation of the continental Shelf, the sea floor and its subsoil;
- protection and improvement of the state of natural and cultural heritage, through the sustainable management of marine and coastal areas of

[64] It is worth noting that this CAMP involves Italy and Albania, but not Greece.

particular natural and cultural value and threatened and endangered species of flora and fauna, particularly through the establishment of Specially Protected Areas in order to conserve, protect and restore the health and integrity of ecosystems;

- sustainable development of coastal zones, sustainable management and use of their natural resources.

The following topics should be also considered in transboundary cooperation:

- The relevance of the landscape and seascape of the area in relation to sustainable tourism and its management;
- Marine litter, including the evaluation of impacts and the quantification of related costs for important industries such as fisheries and tourism.
- MPAs, Other Effective Area-Based Conservation Measures (OECMs) and other Area-Based Management Tools (ABMTs). The examination of legal instruments on transboundary cooperation in the area draws attention to sectoral ABMTs, from UNCLOS and the UN Fish Stocks Agreement, such as fisheries closures areas. The proposal of two FRAs should be cited as examples of another legal tool to protect the unique environment of this specific area, coherently with a sustainable economy of the sea: (i) the "Bari Canyon", located in the Southern Adriatic (GSA 18); and (ii) the area of "Otranto FRA", within the FAO fishing subarea Central-FAO Statistical Division 2.1 Adriatic and 2.2 Ionian – GFCM Geographical Subarea (GSA) 18 Southern Adriatic Sea.

Concerning the latter point, some of the national experts involved in the study highlighted the importance of applying the so-called "blue-corridor" approach in this area of interface between the Adriatic and the Ionian Sea to enhance protection of sensitive habitats and facilitate the circulation of cetaceans, marine turtles and other marine species. Blue-green corridors would contribute considerably to further protecting and interconnecting close-by areas too, such as number 8 and 9 identified by SPA/RAC as priority conservation areas in open seas (see Figure 5-5).

Figure 5-4. The Southern Adriatic Ionian Straight EBSA (source: https://www.cbd.int/ebsa)

Figure 5-5. Priority conservation areas selected in the Mediterranean open seas, including the deep sea, which meet the criteria for identifying ecologically or biologically significant marine areas[65] (source [6]).

Area 9 concerns Greece and the Ionian Sea and includes the marine park for marine turtles located in Zakynthos island. Marine turtles are also nesting on beaches of the Western Peloponnesus, in the Southern Ionian. Being an open sea area and for better protection and interconnection, area 9 certainly needs transboundary cooperation. Even if such action is mostly relevant to the Southern Adriatic and Ionian, indirectly it could have an impact on the entire Adriatic.

8. Strait between Corfu (Greece) and Albania

Within the wider area of the Strait of Otranto, the very narrow strait between Corfu and Albania is considered a specific area of interest for cross-border cooperation (Figure 5-6). Both land sides are characterised by beautiful landscapes, forests and tourist attractions. They are under future development pressure, too. It may be worthy to explore if there are interesting marine species and habitats in this sub-area and if the two countries would be interested in developing guidelines and activities for the common management of coastal and marine zone, including most important human activities (fisheries, tourist cruises, small ports, cultural exchanges, etc.).

Figure 5-6. The straight between Corfu (Greece) and Albania (source: Greek national expert involved in the study).

[65] 1 Alborán Seamounts; 2 Southern Balearic; 3 Gulf of Lions shelf and slope; 4 Central Tyrrhenian; 5 Northern Strait of Sicily (including Adventure and nearby banks); 6 Southern Strait of Sicily; 7 Northern and Central Adriatic; 8 Santa Maria di Leuca; 9 Northeastern Ionian; 10 Thracian Sea; 11 Northeastern Levantine Sea and Rhodes Gyre; 12 Nile Delta Region.

6 Concluding remarks

This study provides an overview of common principles and opportunities for cross-border and transboundary cooperation on ICZM and MSP in the Adriatic-Ionian region, coherently with the Conceptual Framework for Marine Spatial Planning in the Mediterranean Sea and the Common Regional Framework for ICZM in the Mediterranean and its Operational Guidelines.

With contribution from a group of national experts from all countries of the AIR, common challenges have been identified, related to planning and management of coastal and marine ecosystems in a context of sustainable Blue Economy. For example, "Protection of highly sensitive and high-value natural areas"; "Improving eco-connectivity of coastal and marine protected areas"; "Fisheries management"; and "Marine litter management" have been ranked high in the list of the challenges relevant in the AIR and requiring cooperation in order to be effectively tacked. Common MSP principles and elements have also been identified, together with practices, experiences and tools for their implementation: ecosystem approach; multi-scalar approach; cross-border and transboundary cooperation; adaptive approach to MSP, land-sea interactions analysis. These principles should be applied when implementing actions in ICZM and MSP contexts. Examples of coastal and marine areas in the AIR that would benefit from cooperation on planning and management are given to provide practical indications for next steps of ICZM and MSP cross-border and transboundary experiences. In each area, there are (some of) the common challenges identified as relevant at the Adriatic-Ionian scale.

Opportunities for integrating the results of this study in the know-how can be envisaged in the context of the Barcelona Convention, where the study could be shared and discussed at different levels: regional, sub-regional and country ones. Eventually, after the study has been refined, it could be shared with other sub-regions of the Mediterranean, as a good practice of background document supporting strengthened cooperation on MSP. As such, it could be used as a tool for initiatives of a cross – sub-regional dialogue.

Opportunities to capitalize on the results of this study are also envisaged in the context of EUSAIR. Cooperation on MSP is a strategic asset for Pillars 1 (Blue Growth) and 3 (Environmental Quality) of EUSAIR and its Action Plan. Indeed, MSP is a cross-cutting issue for all the EUSAIR pillars. Recently, the results of the meeting of the Technical Steering Group of Pillar 3, held in Budva (Montenegro) during the 2019 EUSAIR Forum, confirmed the opportunity to implement MSP-related topics through transboundary cooperation projects and actions in the AIR.

In the contexts of the Barcelona Convention and EUSAIR, as well as other contexts, the document could be used as a technical guide supporting a variety of actions:

- drafting future policy documents;
- securing possible funding and creating new funding opportunities;
- testing some of the common principles and elements through MSP-ICZM case studies;
- developing new projects (including new CAMPs under the Barcelona Convention system) to implement actions in the areas identified as key for cooperation;
- developing legal and technical studies to assist implementation of transboundary and cross-border cooperation in the AIR, e.g. on multi-level governance for MSP in the AIR; operational implementation of the ecosystem approach; operational implementation of LSI analysis (also aiming at refining criteria for the identification of LSI hotspots), etc.

To give momentum to these opportunities, welcoming and evaluation of possible ways of formal adoption (e.g. of a summarising policy document or several key points to be included in a wider context) could be proposed and discussed in the appropriate contexts.

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