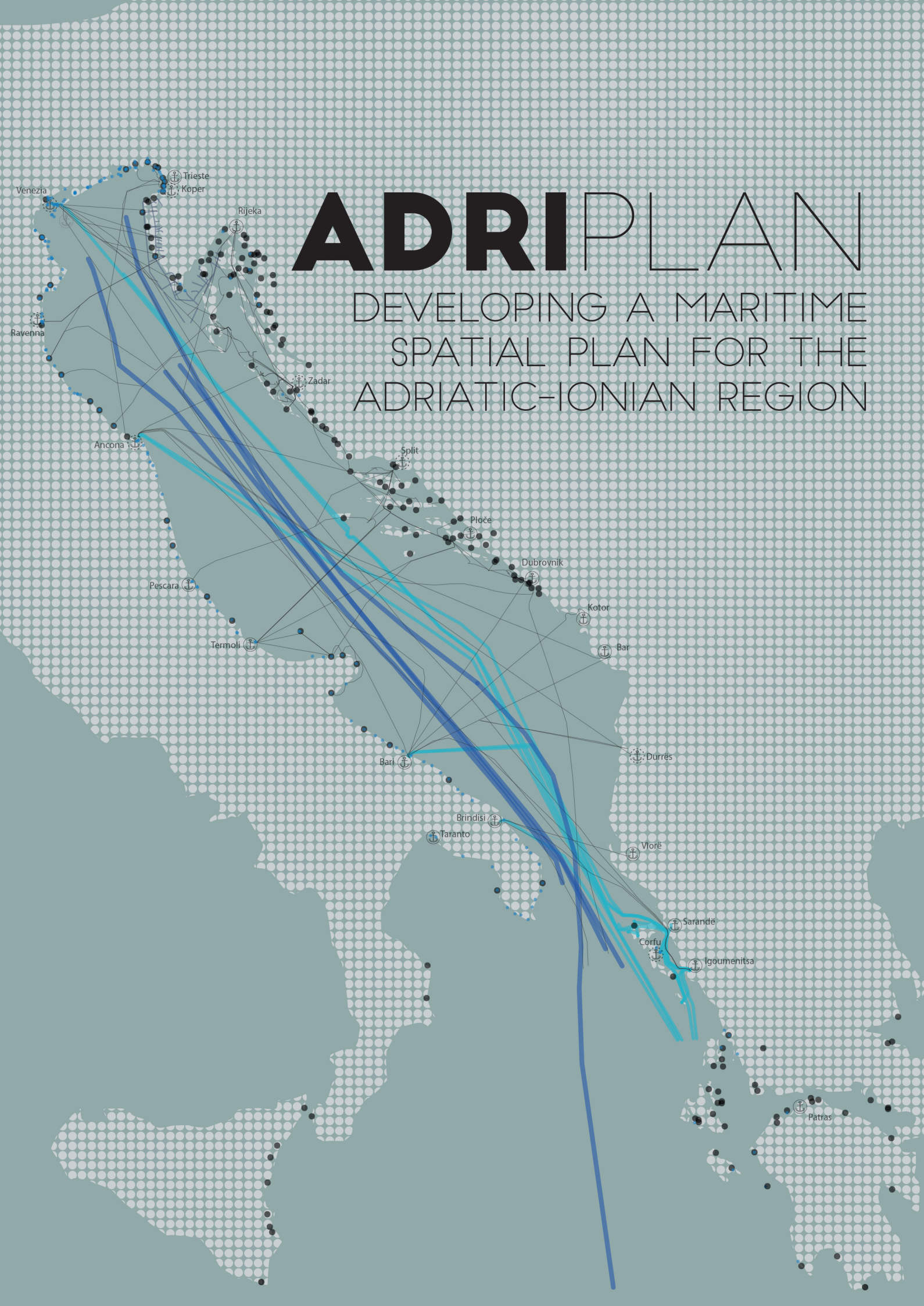

ADRIPLAN

DEVELOPING A MARITIME SPATIAL PLAN FOR THE ADRIATIC-IONIAN REGION

Developing a Maritime Spatial Plan for the Adriatic Ionian Region

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Stakeholders: A large number of other Public Administrations, Civil Society Organizations, private enterprises, representatives of EU projects and single professionals participated to the ADRIPLAN stakeholder workshops and to the related activities. They all deserve sincere thanks from the Project team for their valuable and free contribution, which was essential to the project results.

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Special thanks to the students of the Erasmus Mundus Master Course on Maritime Spatial Planning (EMMCMSP) 2013/2015: Josef Ansong Onwona, Maria Asuncion Barrionuevo Fernandez, Fatma Ben Said, Catherine Michaud Boyd, Daphnie Galvez, Alberta Jonah, Marija Lazic, Lin Liu, Milica Liumovic, Thomas Pavitt, Kemal Pinarbasi, Ricardo Haponiuk Ribeiro, Saha Kawshik, Oleksandr Shevchenko, Pascal Thoya Zawadi.

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All illustrations and maps have been produced by ADRIPLAN Project and are available in the ADRIPLAN Data portal. Data have been collected by Partners using also the results of other projects. While it is not possible to mention all the many information sources, ADRIPLAN built in particular on the European Marine Observation and Data Network (EMODnet) and on the results of the following projects: SHAPE(IPA Adriatic Cross-Border Cooperation Programme), COEXIST(FP7 project), COCONET(FP7 Project).

In the maps included in this book, where state borders are represented, please consider that the boundary between the Republic of Slovenia and the Republic of Croatia has not been determined and is subject to the pending arbitration.

ISBN 978-88-941335-4-7

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Co-funded by

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Suggested citation: Barbanti A., Campostrini P., Musco F., Sarretta A., Gissi E. (eds.) (2015). Developing a Maritime Spatial Plan for the Adriatic-Ionian Region. CNR-ISMAR, Venice, IT.

Contents

Foreword

The Mediterranean Sea is complex in its physiography (the average depth is 1,500 m, the deepest point is 5,267 m, with large shallow areas, like in the North Adriatic), in its ecology, in its social dimensions, in terms of interconnections between human activities and environmental characteristics. Surrounded by 22 countries, the coasts of the Mediterranean Sea house more than 150 million inhabitants together with a unique natural and cultural heritage, with over 400 UNESCO sites and several Marine Protected Areas. Today, is felt that the peculiarities of the Mediterranean offer major local opportunities for Blue Growth, from fisheries and tourism to energy and maritime transport. All traditional as well as emerging maritime economic sectors currently operating in the Mediterranean are expected to grow and expand over the next years with a consequent need to better consider the environmental impacts.

The need for protecting the vulnerable ecosystem has been recognized since the adoption in 1976 of the Convention for Protection of the Mediterranean Sea against Pollution (Barcelona Convention) by all countries with a Mediterranean shoreline as well as the European Union.

The situation is more complicated from the point of view of the use of resources. Most Mediterranean States have established a 12-mile territorial sea, reduced to 6 mile in some cases, but few started the process for establishing Exclusive Economic Zone (EEZ), as defined and regulated by the United Nations Convention on the Law of the Sea (LOSC). Therefore, the existence of a large area of high seas in the Mediterranean requires a high level of cooperation between coastal states to ensure the sustainable utilization of resources (e.g. for fisheries).

In this context, the challenge for a properly assessed allocation of marine space to the concurrent activities taking place on (and in) the sea, is higher, but probably also more necessary than elsewhere. The ADRIPLAN pilot project, focused in a part of Mediterranean quite complicated indeed, the Adriatic Ionian Region (AIR), is aimed to demonstrate that the MSP challenge in the Mediterranean is NOT a “mission impossible”.

In ADRIPLAN we run an experiment, almost free from the complicated alignment of different national political decisions, but involving the local govern institutions closer to stakeholders’ and citizens’ needs, i.e. the Regions. All the main economic sectors were took into consideration and most of them participated actively to this experiment. The result is represented in this book. It is not a “real” Plan, as it is not binding for anyone, and does not

involves or implies any endorsement of the Public Authorities (at any level) in the AIR.

Nevertheless, ADRIPLAN is a "realistic" experiment, where the actual needs, desires, perspectives coming from the territories faced to the Adriatic and Ionian seas were taken into consideration.

It represents a good step in the macroregional EUSAIR strategy, towards the adoption before the 2021, as required by the EU directive on MSP 2014/89/EU, of effective maritime plans in the area, providing guidelines and suggesting good practices valid for all the Mediterranean Sea. The proper spatial allocation of the activities is necessary also for reaching the goal of Good Environmental Status, as stated in the Marine Strategy Framework directive (2008/56/EC).

Finally, It is worth to mention the renewed attention to the Mediterranean Sea paid in these last years by EU institutions. It has been a pleasure, for a "Mediterranean EU citizen" like me, to run this pilot project in parallel with the development of the BLUEMED initiative, a Strategic Marine and Maritime Research and Innovation Agenda for Blue Growth in The Mediterranean Sea, that is going to be launched when ADRIPLAN is ending. Supported by a coordinated R&I effort, the sustainable use of the Mediterranean's richness, will help to put again this Marine Region at the centre, and not on the periphery of Europe.

The future Mediterranean, shall be more peaceful, respectful of human rights and justice, lower in poverty and in social disparity than the present.

Pierpaolo Campostrini

ADRIPLAN project coordinator

Member of IT delegation in JPI Ocean and in Horizon 2020 Program Committee on the Societal Challenge "Food Security, Sustainable Agriculture and Forestry, Marine, Maritime and Inland Water Research and the Bioeconomy",

Associated researcher of ISMAR-CNR and director of CORILA.

Introduction

The so-called "Blue Economy" in the Adriatic and Ionian Region (AIR) generates an annual turnover that exceeds € 21 billion, with an increasing growth trend. An effective spatial planning is an essential condition in order to guarantee a long-lasting development ensuring a sustainable use of marine resources for future generations.

Maritime Spatial Planning (MSP) is a practical way to create and establish a more rational organization of the use of marine space and the interactions between its uses, to balance demands for development with the need to protect marine ecosystems, and to achieve social and economic objectives in an open and planned way (Ehler and Douvere, 2009). MSP is also an opportunity to connect the marine and the maritime world, essential components of Blue Growth. The new Directive 2014/89/EU establishes a framework for maritime spatial planning, aimed at promoting the sustainable growth of maritime economies, the sustainable development of marine areas and the sustainable use of marine resources. According to the new Directive, Member States are required to develop national maritime spatial plans by 2021 and to review them at least every ten years, in order to better coordinate the various activities that take place at sea, ensuring they are as efficient and sustainable as possible.

While MSP plans are prepared and adopted, any public and private proponent of projects (new infrastructures, new permits) and plans (sectorial and general, including plans regarding the coast) concerning or affecting the marine environment should be requested or at least encouraged to adopt an "MSP approach", starting from the preparation and submission of Environmental Impact Studies and Strategic Environmental Assessments. The Directive is part of a wider strategic view on European Seas expressed, among others and specifically for the Mediterranean, by:

- the EU Cohesion and Neighbourhood Policy (ENP);
- Regional Strategies, established and under discussion, in the Mediterranean;
- the Barcelona Convention and Protocol;
- the Integrated Maritime Policy;
- the Blue Growth Initiative;
- the Marine Strategy Framework Directive (MSFD) and other relevant Directives on environmental and biodiversity protection.

MSFD is the main environmental pillar of MSP Directive, but other EU and International policy instruments contribute to address the so-called Ecosystem-Based Management approach in EU marine waters and in the Mediterranean (e.g. Water Framework Directive, Habitat & Birds Directive, Barcelona Convention).

The Ecosystem Based Management is an approach (EBA) that has become the overarching principle of EU and International policies on water resources, the marine environments, their resources and sustainable uses.

EBA recognizes the full array of interactions within marine ecosystems, with the goal of maintaining marine ecosystems in a healthy, productive and resilient condition, so that they can sustain human uses of the sea and provide goods and services.

Integrated Coastal Management (ICM) and Maritime Spatial Planning (MSP) are essential tools for EBA and provide the template on which it can be effectively implemented.

EBA requires transparent, participative and coherent transboundary planning efforts in coastal and marine areas. This implies the progressive improvement and implementation of harmonized and legally binding policies and legal frameworks. EU countries have adopted EBA as base principle of several directives and policies, while at

the Mediterranean level the Conference of Parties (COP) of the Barcelona Convention has recently adopted a Decision on the Ecosystem Approach (EcAp).

The process towards the Communication (COM(2014) 357 final), concerning the European Union Strategy for the Adriatic and Ionian Region (AIR), promoted and coordinated by the EC, with a strong and direct involvement of Member and non-Member States of the Region, brought to the recent delivery of the Action Plan of EUSAIR (SWD(2014)190 final; EC, 2014a; EC, 2014b), which has been finally adopted in October 2014. The Communication sets out the needs and potential for smart, sustainable and inclusive growth in the Adriatic and Ionian Region. It provides a framework for a coherent macro-regional strategy and an Action Plan, to address those challenges and opportunities, through cooperation between the participating countries.

The Action Plan is also the result of an intense consultation, involving public and private stakeholders, and was supported by studies on the potential of Blue Growth in the area (Eunetmar, 2014). The Plan is structured in four pillars, ten topics (Table i-1), a number of indicative actions and projects and it sets out the needs and potential for smart, sustainable and inclusive growth in the Adriatic and Ionian Region. Marine and maritime aspects are predominant in the Plan and MSP/ICZM are explicitly cited as cross-cutting tools to implement the Plan, both at national and cross-border level, on the basis of the ecosystem approach and making the best use of results of key EU research project.

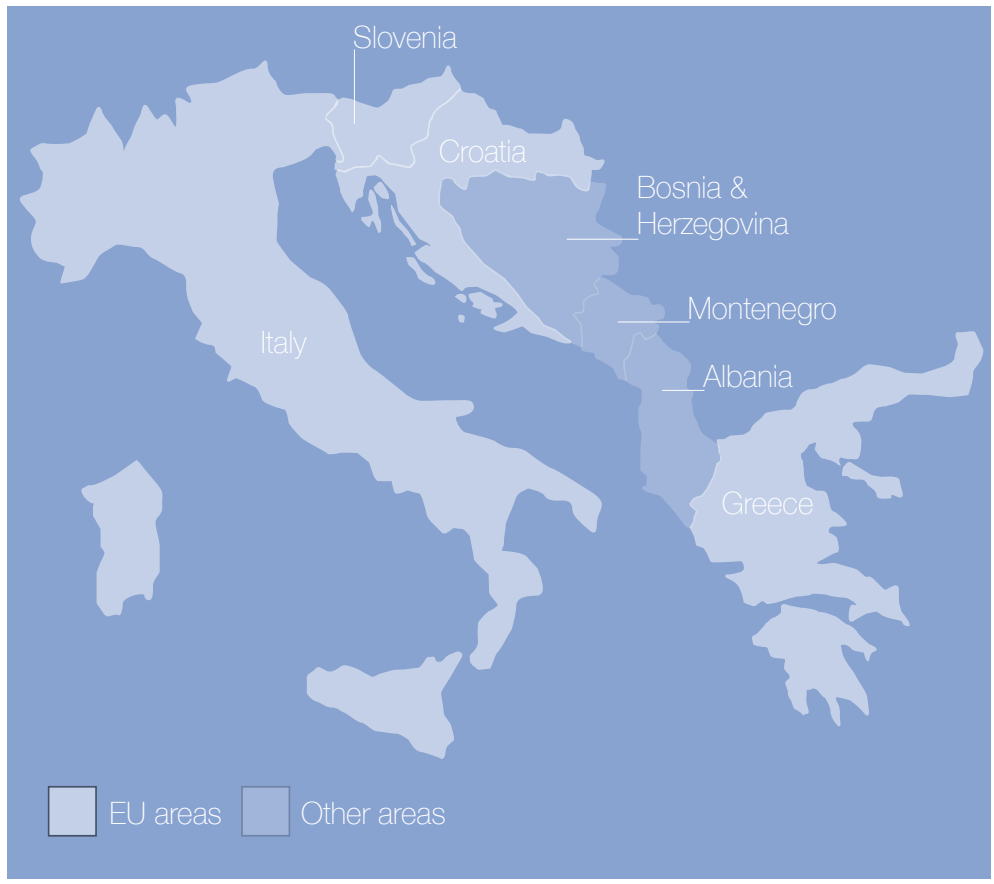


Fig. i-1: Map of the EU Strategy for the Adriatic and Ionian Macro-Region (AIR)
(Source: EUSAIR (COM(2014)357 final)

Pillars	Topics
Blue Growth	Blue technologies
	Fisheries and Aquaculture
	Maritime and marine governance and services
Connecting the regions	Maritime Transport
	Intermodal connections to the interland
	Energy networks
Environmental quality	The marine environment
	Transnational terrestrial habitats and biodiversity
Sustainable Tourism	Diversified tourism offer
	Sustainable and responsible tourism management

Table i–1: General structure of the EUSAIR Action Plan

Several projects addressed in the last years the issue of integrated management of coastal and marine areas and resources in the Adriatic and Ionian Sea (examples are: PLANCOAST, SHAPE, COASTANCE, ADRIGOV, MAREMED, PEGASO). This issue was also mainly promoted by the EU Recommendation on Integrated Coastal Zone Management (2002/413/CE) and by the ICZM Protocol under the Barcelona Convention (UNEP/MAP/PAP, 2008). The study committed by the EC (Policy Research Corporation, February 2011) performed a through analysis of the potential of Maritime Spatial Planning in the Mediterranean Sea, by applying a methodology based on the ten key principles of MSP, focused on the purpose of MSP in the area, the feasibility of MSP in that area and the conditions for cross-border/international cooperation. The study identified the Adriatic Sea basin (Albania, Bosnia and Herzegovina, Croatia, Italy, Montenegro and Slovenia) as one of the four areas having more potential for the application of cross-border/international MSP. In addition to that, a large number of projects addressed sectoral aspects and needs, adopting in most cases a wide angle and integrated approach, i.e. considering their impacts on ecosystems and their interference with other uses of the sea (examples are ECOSEA, ADRIAMED, THESEUS, COCONET, APICE, ADRIAMOS, BALMAS, MARLISCO, DEFISHGEAR, POWERADE). All these projects together produced and are producing data, tools, conceptual frameworks, awareness, best practices and recommendations. They are a good starting point towards the implementation of integrated ICM/MSP in the area, under the umbrella and the stimulus of the new MSP Directive, the MSFD Directive and Barcelona Convention ICZM Protocol.

The European Commission's intention is to support the development of MSP processes throughout the EU, by facilitating cooperation between Member States in the management of the maritime space in sea basins surrounding the EU. ADRIPLAN is the first Pilot Project co-financed by EC DG Mare (Grant Agreement MARE/2012/25) aimed at promoting MSP implementation in the Mediterranean Sea. ADRIPLAN is part of a wider strategy being deployed under the coordination of DG Mare (DG Mare, 2015) to support through a number of specific objectives and actions, among

which are the Pilot Studies, the implementation of Directive 2014/89/EU, establishing a framework for maritime spatial planning aimed at promoting the sustainable growth of maritime economies, the sustainable development of marine areas and the sustainable use of marine resources. ADRIPLAN has the overall objective to analyse and promote transboundary Maritime Spatial Planning in the Adriatic–Ionian Sea, a Mediterranean area crowded with multiple uses of the sea and valuable ecosystems to protect. The ADRIPLAN project develops proposals and recommendations for an operational cross-border MSP process which:

- Allows the development of different maritime activities, preventing conflicts for space allocations, while ensuring a good status of the marine ecosystems and supports the provisioning of Ecosystem Services (ES);
- Provides greater confidence for investment in infrastructures and in other economic activities, responding to the peculiarities of each area;
- Fully involves relevant regional and governmental bodies and other relevant stakeholders, also promoting an effective cross-border cooperation;
- Enhances coherence between terrestrial and Maritime Spatial Planning, also in relation with good ICM practices.

ADRIPLAN considers the whole AIR as its study area, with a specific attention to its transnational dimension, but it mostly concentrates its analysis and its proposals on two Focus Areas (see Fig. i-2), whose boundaries have been defined through a combination of criteria:

- Objectives of the project and the MSP effort (i.e. a generic or pilot study addressing specific issues of MSP in the area versus a full plan to be enforced);
- Legal jurisdictions on maritime waters and seafloors and governance;
- Issues related to trans-boundary and cross-border aspects;
- Maritime uses and economic domains;
- Key environmental components and dynamics.

Boundaries influences, among other aspects, data mining and collection and stakeholders' involvement process.

Figure i-2: ADRIPLAN study area (AIR, Focus Area 1, Focus Area 2)

ADRIPLAN is based on the best knowledge available, is developed through a transboundary partnership, with the support of Institutional partners and Observers and the involvement of relevant stakeholders, and is promoting the harmonized implementation under an ecosystem based approach of the EU legislative framework on marine and maritime issues.

This report intends to synthesize the main results of the intense and wide activity carried out during the 19 months of the project. These contents are complemented by an extended list of recommendations for MSP implementation in the AIR that are included in a specific Summary Report (*Conclusions and Recommendations - A short Manual for MSP implementation in the AIR*) and by other project reports that more extensively address specific issues. Structure, contents and language used in this report intend to make ADRIPLAN's results a basis for future work in the region and are therefore conceived in a way that makes them usable for planners and policy makers.

All aspects are covered, within the three sections of the report:

- Part I – Methodology

The section presents the step-by-step methodology developed to carry out the project, which is one of the most important legacies of ADRIPLAN and is proposed as a reference methodology for practically implementing MSP in the AIR.

- Part II - Defining an MSP proposal

All steps of the analysis, interpretation and planning phases are presented here, including the interaction with stakeholders that accompanied the whole process.

- Part III - Lessons Learned and future challenges

The section summarizes main lessons learned, focusing on a few topics of general interest: Environmental and socio-economic benefits from MSP in the AIR; Monitoring and evaluating MSP implementation in the AIR; Data needs and Tools for MSP in AIR; Land and sea interaction: connecting ICM and MSP; Transboundary and cross-border cooperation for MSP in the AIR.

PART I
Methodology

1.1 Introduction to the methodology

Maritime Spatial Planning can be defined as a strategic, forward looking planning tool for regulating and managing human activities and protecting the marine environment, through the allocation of space. It addresses the multiple, cumulative and potentially conflicting uses of the sea, ideally through a series of long-term plans at different spatial scales, focused around marine regions and using an Ecosystem-Based Approach (Gilliland and Lafolley, 2008).

In other words, MSP is a practical way to create and establish a more rational organization of the use of marine space and the interactions between its uses, to balance demands for development with the need to protect marine ecosystems, and to achieve social and economic objectives in an open and planned way (Ehler and Douvere, 2009).

An ecosystem based MSP process is

- Ecosystem-based, balancing ecological, economic, and social goals and objectives toward sustainable development;
- Integrated, across sectors and agencies, and among levels of government;
- Place-based or area-based;
- Adaptive, capable of learning from experience;
- Strategic and anticipatory, focused on the long-term;
- Participatory, with stakeholders actively involved in the process.

MSP does not lead to a one-time plan. It is a continuing, iterative process that learns and adapts over time.

The MSP proposal for Adriatic and Ionian Region (AIR), with the two focus areas, will consider a short-term revision of the Plan of 6 years, according to the Directive on MSP (2014/89/EU). Starting in 2014, the first short term projection in 2020 coincides with the milestone of EU programs and policies, as well as with EUSAIR projections 2014-2020. The complete revision is projected in approximately 20 years, according to Gilliland and Lafolley (2008), after three cycles of the planning process

1.2 The ecosystem-based approach (EBA) and its application in the project

The Marine Strategy Framework Directive "MSFD" 2008/56/EU and the European Directive on Maritime Spatial Planning 2014/89/EU, which establish a framework for Maritime Spatial Planning and Integrated Coastal Management in the European marine waters, suggest to use an Ecosystem-Based Approach (EBA) to reach objectives on sustainable uses in the marine domain.

In general, the Ecosystem-Based Approach is "a way of making decisions in order to manage human activities in a sustainable way, recognizing that humans are part of the ecosystem and that anthropogenic activities both affect the ecosystem and depend on it" (Curtin et al., 2010). This assumption could be translated into an approach that considers in an integrated way all the ecosystem components, such as human activities, habitats, species and physical processes. Thus, central to the EBA approach is to develop a common vision of a healthy and resilient marine environment that considers socio-ecological system as a unit (Sardà et al., 2010). The key principle of EBA consists in the fact that only healthy, productive and resilient ecosystems are able to provide a large range of different ecosystem services from which humans can benefit (McLeod et al., 2005). The key concepts that form the foundation for an ecosystem-based approach to management are listed in Table 1.2-1.

The central goal of the EBA approach, as indicated in the EBM manual, published by UNEP (2011) is to "make the marine and coastal management more effective, more efficient and less costly than the uncoordinated sectorial management".

EBA is trans-boundary by definition, meaning that it should face the challenge to manage the mismatches between ecological boundaries (based on ecosystems, environmental dynamics and functioning) and administrative and legal boundaries derived from different jurisdictions on marine and coastal areas. EBA requires taking into consideration trans-boundary and cross border effects of different activities in and out the case study areas, based on the transportation effect of highly dynamic marine and coastal environment, as required also by MSFD (EC, 2008).

Moreover, from the institutional point of view, coordination and active dialogue among National Governments, between them and economic actors operating at international and local scale, with strong impacts at multiple levels, both on the socio-economy and on the environment, is required as the base to support MSP based on EBA (McLeod et al., 2005). The aim is to face and manage trans-boundary effects as well as to evaluate and eventually harmonize discontinuities between regimes and policies, discontinuities that might have strong impacts on other areas.

Connections	Include the linkages between marine ecosystems and human societies, economic and institutional systems as well as those inside the biological and geomorphological ecosystem (connectivity).
Biodiversity	Maintain the good environmental status of native biodiversity in ecosystems to provide resilience to both natural and human-induced changes.
Cumulative impacts	Identify not only how individual actions affect the ecosystem services, not only single effects but also the interactive and cumulative effects of multiple human activities at once
Interaction between sectors	Set common goal for ecosystem management and protection; Involve all stakeholders through participatory governance that accounts for both local interests and those of the wider public.
Multiple objectives	Look at diverse benefits provided by marine system rather than single one;
Embracing change and precautionary approach	Incorporate measures that acknowledge the inherent uncertainties in EBA and account for dynamic changes in ecosystems; consider system resilience. In general, levels of precaution should be proportional to the amount of information available so that the less is known about a system, the more precautionary management decisions should be.
Changing public perception	Inform people and sustain public co-learning processes;
Multi-level Governance	Create complementary and coordinated policies at global, international, national, regional, and local scales, including between coasts and watersheds. Ecosystem processes operate over a range of spatial scales, and thus appropriate scales for management will be goal-specific.
Bridging science and policy	Strengthen communication between managers, resource users, scientists, government bodies and additional stakeholders.
Learning and adaptation	Use an adaptive management.

Table 1.2-1: Key concepts of EBA (Based on McLeod et al.,2005 and McLeod and Leslie, 2009)

The Blue Growth strategy (COM(2012)494, EC, 2012) suggests that the future economic development of European countries should maximize the sustainable use of marine environments and their services. At the same time, the Marine Strategy Framework Directive (EC, 2008) forces the Member States to assess their marine waters' quality and to achieve a Good Environmental Status (GES) by 2020. There is a quite large range of opportunities for a MSP to obtain benefits from both the strategies aiming at a sustainable development of the maritime regions. As a matter of fact of the achievement of a goodenvironmental status, MSFD aims at maintaining the system capacity to provide Ecosystem Services (ES) that could be exploited by humans to increase productivity and development.

Therefore, core of the proposal for MSP in the Adriatic and Ionian Region in ADRIPLAN is to maximize the benefit of exploiting marine environment resources with-

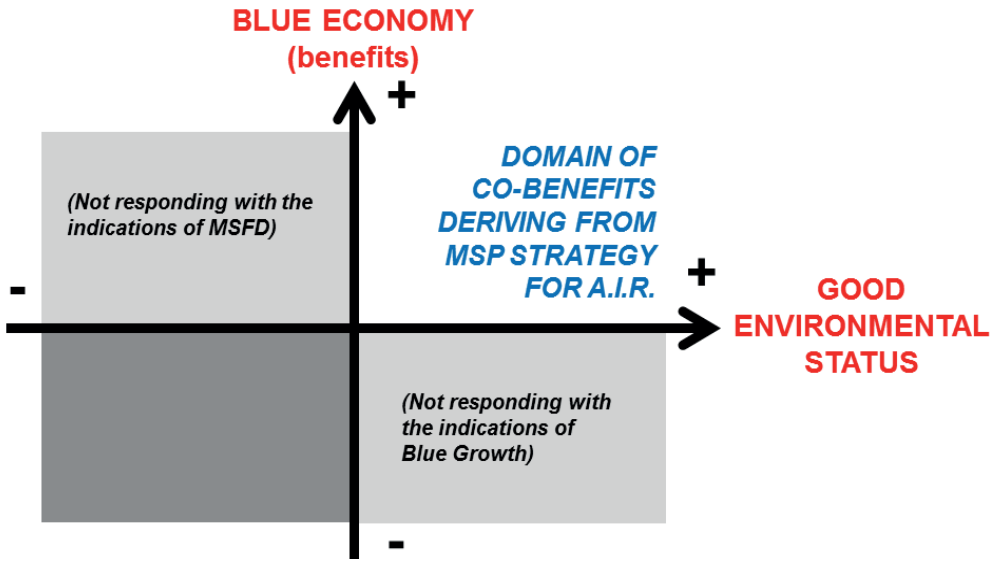


Figure 1.2-1: Scheme representing the domain of action in which the MSP proposal for the Adriatic Ionian Region should be developed

out compromising the whole system functionality and capacity to provide services. The domain of action of MSP under ADRIPLAN, in coherence with the indications of MSFD, can be depicted in Figure 1.2-1.

As general approach, ADRIPLAN proposal integrates the principles from MSFD as a general framework of reference to implement an MSP for AIR based on Ecosystem-Based Approach (EBA). Different maritime activities are located in maritime spaces. Interactions between activities can be of different types, from competition from space in time, to competition and interference on the same marine natural resources. In fact, human activities in maritime areas can benefit from ecosystem services, but they also represent drivers of change producing pressures on ecosystems. Single and cumulative impacts on biophysical structures and processes can alter ecosystems functioning, on which the delivery of ES is grounded, considering the cascade approach proposed by Haines-Young and Potschin (2009). According to the MSFD (EC, 2008), the state of the marine and coastal environments should be described and monitored through 11 descriptors and related indicators. Those descriptors are structured to represent functional characteristics of marine ecosystems (Borja et al., 2010). Under the MSFD activities, thresholds and limits of the indicators will be identified for each marine region and sub-region, to define environmental targets to achieve good environmental status by 2020. Human uses and activities can act directly on the consumption of ES, expressing a demand of them that can be in balance or not with the capacity of the ecosystems to deliver the services required. Human uses can also act indirectly on the capacity of the ecosystems to provide ES, through the alteration of their functioning.

The main goal of the ADRIPLAN MSP proposal for AIR consists in allocating maritime uses and activities in a sustainable way (Ehler and Douvere, 2009), not altering the capacity of the ecosystems to provide services and maximizing the benefits deriving from marine resources. According to the general framework proposed, MSP strategies and actions can work on different levels (Figure 1.2-2):

- While allocating uses and working in re-organizing the demand for ES, ADRIPLAN MSP towards Blue Growth can promote innovation, research and sustainable de-

mand, based on sustainable provisioning of ES;

- MSP can work indirectly to support the provisioning of ES while allocating uses and elaborating strategies that do not interfere with key ecosystem functioning identified for the study areas. In this way it is possible to control and reduce pressures on marine environment, considering the analysis of cumulative impacts of maritime activities on environmental components;
- MSP strategies can be confronted to the environmental target by MSFD (EC, 2008), through the monitoring of the changes induced in MSFD descriptors, to stay within the thresholds of the GES, as domain of reference.

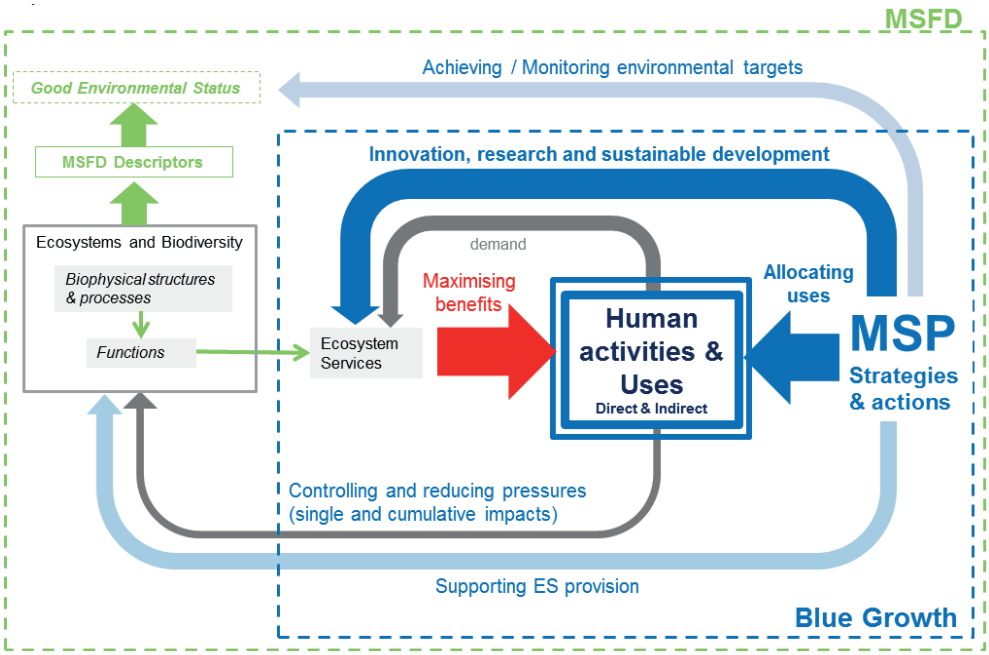


Figure 1.2-2: Conceptual scheme of the role of MSP for AIR under EBA in ADRIPLAN (blue arrows) considering the relations between Human activities and uses, Ecosystem Services and functions, MSFD descriptors within the framework of Blue Growth and MSFD 2008

Aim of the ADRIPLAN methodology is to adopt an Ecosystem Based Approach (EBA) to the management of maritime activities, considering the characterization of maritime activities interrelations, as a theoretical and operational link between human activities in coastal and marine space and ecological and environmental components. The methodology is detailed in an operative framework for the construction of a MSP process that operationalizes an EBA, focusing on the integration of human uses, environmental dynamics and placed-based supplied services.

1.3 Phases of the ADRIPLAN methodology

The methodology adopted in ADRIPLAN is divided in several phases, organized in a flowchart (Figure 1.3-1). Cross-cutting issues take place in different steps along with the implementation of the planning process, as for the activities related to stakeholders' participation, as well as to monitoring the planning process.

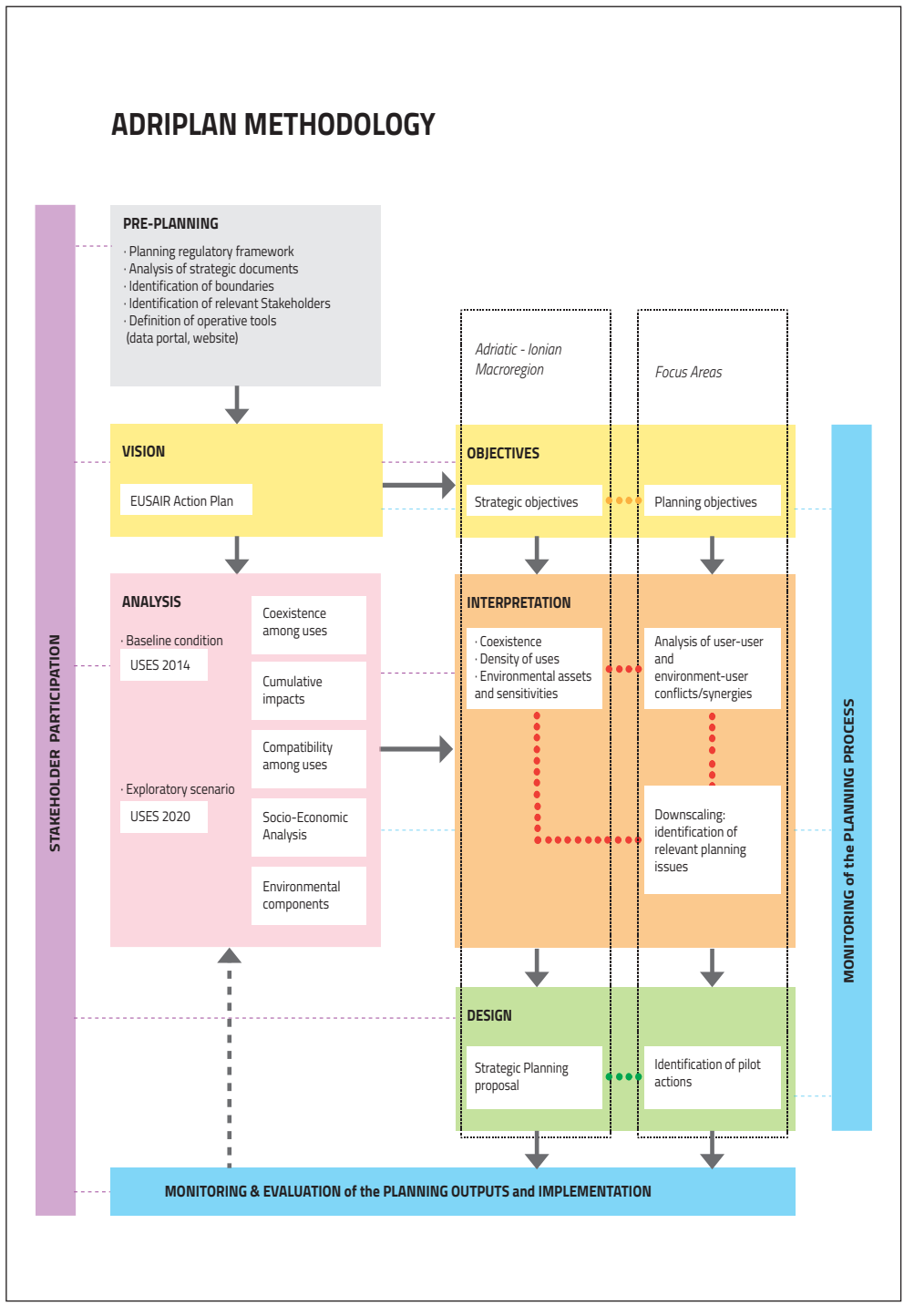


Figure 1.3-1: Flowchart of the activities developed under ADRIPLAN methodology

1.3.1 Stakeholders' participation

Stakeholders' participation informs the entire planning process, considering several contributions from data sharing till the elaboration and verification of planning measures. In ADRIPLAN, a multiple set of tools have been adopted, as workshops, questionnaires and institutional meetings, bilateral meetings with institutional partners.

Stakeholders play a significant role in the planning process: e.g. relevance for the building of a common knowledge, attempt to foster a common understanding of key transnational dynamics, direct involvement of stakeholders that will play a major role in the real implementation of MSP plans in the future. Within the planning process, results from the stakeholders' participation program support the identification of main needs and priorities; identification of key transnational and local issues to be addressed by MSP plans; identification of main conflicts/synergies among uses and between uses and environmental components as perceived by relevant stakeholders; identification of planning measures; etc. The planning proposal is submitted to the Institutional partners before the finalization of proposed actions.

1.3.2 Monitoring of the planning process

This activity is related to the process of planning elaboration. The core of this phase is to assess the planning process within the decision making process while it is ongoing. It is strictly related to the phases of the construction and the elaboration of the planning process (pre-planning, identification of goal and priorities for planning, elaboration of the planning options and finalization of the planning proposals). This phase is internal to the planning process; in ADRIPLAN, it corresponds to the assessment of effects and benefits of the planning process that is structured according to the methodology. ADRIPLAN simulates the planning procedure, so that the assessment of the planning procedure is performed within the other activities by the end of the planning process.

1.3.3 Pre-planning

The phase of pre-planning consists in setting the ground of MSP, establishing the knowledge framework for the activities of analysis, interpretation and design of MSP in the AIR.

The analysis of the strategic documents, and specifically of the EUSAIR Action Plan, constitutes the initial step as well as the identification of the geographical scope of MSP at two scales through the definition of boundaries of analysis: the southern boundary of the AIR and the boundaries of the two Focus Areas. Boundaries were defined according to some criteria established within ADRIPLAN (Table 1.3-1).

The phase of pre-planning considers also the analysis of existing conditions of the different domains involved in the process of MSP. The activity consists in the recollection of all information related to the topics as follows: (i) maritime uses: description of the human activities per sector, considering type, location, dimension and magnitude of the activity in AIR, as well as in the North Adriatic (NA) and South Adriatic (SA); (ii) socio-economic aspects related to maritime uses; (iii) legal issues: international and national legislation on exercise of jurisdiction and cooperation in AIR; (iv) planning regimes and tools: spatial planning, sectoral planning, permit issuing and concessions; the area of analysis consists in the inland, in the area related to the tools in force from the coast line according to different sectors and level of planning; (v) environmental

characteristics for AIR: spatial location of main environmental and ecological values present in the AIR and in the two Focus Areas. The main goal is to map the environmental, biophysical and ecological conditions of the planning areas. Environmental categories, used to describe AIR, NA and SA, were discussed within technical partners under the coordination of OGS. GES descriptors have been considered in the analysis, according to MSFD (EC, 2008).

In this phase, supporting tools are defined and proper actions for the implementation foreseen. In ADRIPLAN, a website as well as a data portal are considered.

Trans-boundary and cross border issues	The boundaries should intercept maritime areas which pertain to different countries, to directly tackle cross-border discontinuities and governance issues, especially for the two focus areas
Maritime uses/Economic domains	Intensity of Maritime Uses (density of uses = n. of uses/area)
	Potential future uses and conflicts/synergies emerging from Sub-Task 1.2.1. Integrated analysis for trans-boundary planning areas (Adriatic Ionian Region, North Adriatic, South Adriatic)
	Relevant domain and scale to intercept uses at the scale of analysis, concerning both AIR (transboundary themes and uses to be treated at AIR), and the two Focus Areas (regional issues which can be considered and managed at the scale of transboundary regional domain).
Legal jurisdictions and borders	Operability and direct applicability of measures and actions related to MSP (legal boundaries and national competences; existence of governance bodies, with specific competences over the management of maritime uses - e.g. Port Captaincy and Regional Authorities in Italy, which operate on a regional scale.
	Enforceability (existence of a regulatory system capable of supporting strategies and measures to be implemented).
Governance issues	Intensity of (trans-boundary) relations among stakeholders (existing cooperation agreements, considering both intra-sectorial agreements - e.g. NAPA - and inter-sectorial agreements).
Environmental boundaries	1) Existence of environmental dynamics that define specific domains within AIR and the two focus areas - 2) environmental dynamics or key-factors significantly affecting the whole AI Basin and the two Focus Areas.

Table 1.3-1: Criteria to establish priorities on AIR, NA and SA and geographical scope (boundaries) for AIR and for the two Focus Areas

1.3.4 Vision

The phase of visioning aims at identifying priorities and needs for the AIR, and for the NA and the SA, considering indications and targets of EUSAIR for the AIR and the information collected in the Initial Assessment. Different levels of detail are considered for the AIR and for the two Focus Areas. At macroregional scale, the strategic level related to national and international interests on Maritime Uses, as EU policies and National strategies, and related strategic and planning tools, information, and data are considered. At the Focus Areas scale, transboundary regional issues related maritime

uses, and the related punctual and local information, data and emerging conflicts and synergies are considered.

To establish a common vision on the AIR, coherent with the two Focus Areas (FAs), according to EBA co-learning and integration principles, the discussion with the stakeholders is drawn on the identification of (based on Maes et al., 2013):

- Synergies between activities and future maritime development, considering the main benefits deriving from anthropogenic activities (from Stakeholders' involvement);
- Priorities with respect to economic development, clustering and innovation, strategies of blue growth (through SHI, Planning and Policy review - see Initial Assessment - and EUSAIR strategies and established objectives).
- Barriers/conflicts: barriers are intended as structural or operational bottlenecks which might slow down or impede virtuous processes of innovation, as recognized by stakeholders according to their experience; conflicts can be of different types, as use-use or between legislative or planning regimes, or between environment-use, also considering jurisdictional and legal aspects (from Stakeholders' involvement).

1.3.5 Analysis

This phase considers different activities, which are implemented separately to constitute the framework of reference for the subsequent activities of interpretation and planning.

Initially, the analysis of uses at years 2014 and 2020 is performed through the elaboration of maps with the support of the ADRIPLAN data portal. The aim is to identify the baseline conditions and reference scenario for each use independently. The analysis enables to identify distribution of uses, existing/potential spatial conflicts among uses, to identify main spatial trends of sectoral development.

In parallel, the analysis of coexistence among uses is performed. This analysis aims at identifying areas which are most intensively used and where activities from different sectors more likely overlap in space and time. These areas are the ones where competition for space in time would be more likely to happen. The method that was adopted derives from the implementation of the one from FP7 project "COEXIST - Interaction in European coastal waters: A roadmap to sustainable integration of aquaculture and fisheries" (Stelzenmüller et al., 2013). A general matrix with scores of the overlapping between uses is applied to the AIR, most intensively used areas have a higher score than the others.

For the areas that are more intensively used, a qualitative analysis of compatibility between uses has been performed, considering a compatibility matrix (Ehler and Douvere, 2009, adapted). This analysis aims at interpreting the results of the coexistence analysis and to identify cases in which uses can conflict.

In socio-economic terms, a qualitative analysis of the synergies and conflicts among different maritime uses was achieved. Two matrices for each area (AIR, FA1 and FA2) have been developed in order to better understand the socio-economic profile and dynamics of each maritime activity. The first matrix assesses each activity in terms of three criteria highlighting its socio-economic contribution. More specifically, uses were analysed in terms of value, intensity and flows. In order to extract value estimations, an index method was employed measuring the relevant levels of activity of uses at a local scale against the respective levels of activity at a EU level. Furthermore,

the levels of activity were also weighted by taking into account the employment and Gross Value Added generated by each use at an EU level in order to benchmark the uses according to their generated socio-economic value. Additionally, intensity and flows criteria were quantified through ordinal and dummy variables. Weights have been assigned to the three criteria and their value aggregation led to the estimation of a Maritime Socioeconomic Index (MSI), which reflects the significance of each use to the Blue Economy for each of the three areas. By employing MSI, the technical difficulties occurring during the unification of data are reduced as the index-based scores are unit free and easy applicable. The second matrix has considered the same criteria and indicators for each maritime use, however, expressing the indicators through their change over time using the same methodology (scores, thresholds and dummy variable) described above. The outputs provide the development and function of each maritime use in socio-economic terms expressing possible interactions (comparison of dynamics among uses over time). It should be noted that the conceptual assessment model described above could be adapted according to the availability of data and possible spatial and temporal constraints.

As result, areas where use-use conflicts can take place are identified to be addressed by the planning proposal.

To understand the relation between uses and marine environment, the analysis of cumulative impacts is performed, with the support of the data portal. The analysis aims at spatial identification of zones where environmental components are highly impacted by the pressures generated by anthropogenic uses. The analysis is based on a consolidated methodology adopted for the world oceans (Halpern et al., 2007), for the Mediterranean (Micheli et al., 2013), for the Baltic Sea (Anderson et al., 2013; Korpinen et al., 2012). The analysis of the sensitivities of the environmental components to pressures deriving from maritime uses is performed through an expert opinion survey. From the analysis of the results it is possible to identify most impacted areas, as well as areas with similar behavior in terms of patterns of cumulative impacts. The analysis can support the identification of areas where maritime uses induce high impacts on the environment, and actions to reduce pressures from maritime uses can be considered.

1.3.6 Interpretation

In this phase, the synergies and conflicts among uses, as emerging from stakeholders participation process, are recollected and analysed at once, to put in evidence emerging issues and demands for planning. Synthesis maps with spatial identification of main conflicts/synergies emerged through the previously performed analysis are elaborated. In the map the following issues are reported and, if possible, spatially localized:

- Use-use conflicts/synergies;
- Environment-use conflicts/synergies;
- Regulatory/management/ planning conflicts;
- Main planning needs and priorities (from the results of the stakeholder involvement process, main issues emerged by dialogue with institutions and analysis of uses at 2020). The spatial explicit analysis depicts macro-conflicts/synergies, to be potentially addressed by the strategic plan, as well as meso- and micro-scale issues to be potentially addressed by specific planning measures in the two focus areas.

The results of coexistence and cumulative impacts were overlapped, in order to identify the relation among the spatial-temporal intensity of uses and the cumulative

impacts generated on selected environmental components. It enables to identify the spatial distribution of impacts/uses, thus allowing the formulation of indications/ recommendations to be specified in the strategic plan and, possibly, in the pilot actions of the two FAs. This kind of analysis enables to make some considerations about the existence of use-environment conflicts (see Ehler and Douvere 2009).

The intersection of coexistence scores and cumulative impacts enables to identify:

- Areas where both coexistence score and cumulative impacts are high: the allocation of uses are further investigated to understand the causes of impacts and of spatial/temporal conflicts; a re-allocation of some uses might be suggested;
- Areas where coexistence score are low, but cumulative impacts are high: in this case, environmental components may be particularly sensitive to the use(s) insisting on the area;
- Areas where coexistence score are high and cumulative impacts are low: in these areas, the coexistence of more uses does not have high impacts on the environmental components; possible reallocation of uses for competition in space and time can be considered.

1.3.7 Design: Planning Elaboration for the Adriatic-Ionian Region and the two Focus Areas

Within the process of stakeholders' participation, as well as with the constant dialogue with the institutional partners, strategic objectives and planning objectives are identified respectively at the Macroregional level and for the two FAs.

The strategic planning proposal is built on the following issues - upon which the planning process has been built:

- Reference to main strategic docs insisting on the AIR (EUSAIR);
- Sources for data acquisition (other projects: e.g. SHAPE, COCONET etc.)
- Main processes of knowledge building (SH involvement, institutional dialogue, …);
- Key transnational topics (briefly outlined in the Vision phase);
- Reference to vision & objectives for the AIR identified in previous docs (table of high-level goals and strategic management objectives).

The process that leads to the development of a strategic planning proposal is composed of different steps. Firstly, the analyses are performed for each use, and use-use/ environment-use and management conflicts/synergies are identified. Secondly, all the element previously emerged are analysed together, and further relevant issues are identified and interpreted. Finally, a strategic planning proposal is drafted for the AIR.

At the macroregional level, the strategic proposal considers the identification of different management zones, which are characterized according to the uses insisting in the areas, as well as to the legal jurisdictions under which the areas are subjected, and environmental characteristics and features, as values and assets for blue growth.

For the identification of planning measures on the two focus areas, the following scheme was adopted.

(i) Identification of relevant issues to be addressed by planning measures: relevant planning issues were identified through a direct process of stakeholder involvement and through a dialogue with interested institutional stakeholders. The

problem to be solved through MSP is identified and described, with the support of maps and excerpts of previous analysis (coexistence, cumulative impacts, synergies and conflicts);

(ii) Definition of SMART planning objectives and connections of planning objectives with the previously identify high-level/strategic goals;

(iii) Draft of a planning measure: planning measures are preliminarily elaborated in accordance with needs and indications of the institutional partners and stakeholders. They are described according to the scheme as follows:
   - What, i.e. description of the planning measure and definition of its contents;
   - Why, i.e. rationale underlying the choice of the planning measures in the light of the results of the analysis performed (e.g. resolution/minimization of specific existing/future spatial, user-user and environmental-user conflicts, creation/strengthening of synergies among uses etc.);
   - When, e.g. time-frame of the planning measure, expected run for the accomplishment of the set objectives, temporal development of the measure;
   - Where, i.e. localization of the measure and zoning proposal;
   - How, i.e. possible tools to be adopted for implementing the planning measure;
   - Who, i.e. identification of public/private subjects and/or typology of stakeholders that should/could be involved in the implementation of the planning measures.

The finalization of the planning measures was conducted after a careful revision from the Institutional partners.

1.3.8 Monitoring and Evaluation

Monitoring and Evaluation (M&E) constitute a fundamental phase within the MSP process, and should be conceived as an integral part of MSP itself. Before defining the specific relevance assumed by these two phases for MSP, it is worth clarifying the precise meaning of the two terms.

Evaluation is a management activity that assesses achievement of a policy or a program against some predetermined criteria, usually a set of performance standards or objectives (Elher, 2006). Evaluation is also defined as "the systematic assessment of the operation and/or the outcomes of a program or policy, compared to explicit or implicit standards, in order to help improve the program or policy." (Weiss, 1998, in Carneiro, 2013).

Monitoring is defined as "a continuous management activity that uses the systematic collection of data on selected indicators to provide managers and stakeholders with indications of the extent of progress toward the achievement of goals and objectives" (Ehler and Douvere 2009, Douvere and Ehler 2011).

Within ADRIPLAN, monitoring and evaluation are organized in three phases, according to the project structure:

- Phase 1 – "ex ante Assessment", described as a cross cutting theme above;
- Phase 2 – "in itinere Assessment", related to the implementation of the plan proposal: this phase is related to the assessment of the implementation of the planning proposal elaborated in the previous planning phase, and it is related to the monitoring and evaluation of the advancements of the implementation, as well as to the effectiveness and efficiency of the plan with respect of objectives of the plan and with respect to the achievements because of the plan;
- Phase 3 – "ex post Assessment" related to the final assessment of the plan before its revision: this phase is related to the evaluation of the plan implementation at the

established date at which it should be completed, to orient the process of revision of the planning proposal and to give place to the subsequent planning cycle. This phase of the evaluation is related to the monitoring of the state of the environment, as well as to the performance of the plan as well as to the effectiveness and efficiency of the plan with respect to the objectives and of the achievements in real of the plan itself. This phase of evaluation gives place to the revision of planning goal and objectives and to the re-elaboration of the plan according to the institution of a second round of planning process.

ADRIPLAN ends with the elaboration of planning proposals for the two Focus Areas and for the AIR, but the implementation is not part of the project. For this very purpose, ADRIPLAN identifies specific indicators and guidelines, which might be adopted in the implementation and revision of the planning proposal.

1.3.9 Compliance with MSP principles

Within the activities of monitoring ang evaluation of the planning process and of planning outputs, a fundamental aspect is related to the respondence to MSP principles, described in table 1.3-2.

	Principles	Compliance in ADRIPLAN Methodology
1	Using MSP according to area and type of activity	The analysis, as well as the planning proposal are articulated according to the scale and the geographical scopes identified for the AIR and for the two FAs. They are aimed at identifying and differentiating the planning proposals according to peculiarities and characteristics of each area of application (Adriatic-Ionian Region and Focus Areas).
2	Defining objectives to guide MSP	In ADRIPLAN the management objectives are defined on the basis of the regional strategies set up in the EU Strategy for the Adriatic-Ionian Region (EUSAIR) described in the Action Plan (COM(2014)357final)
3	Developing MSP in a transparent manner	ADRIPLAN provides transparency of all the documents and procedures related to MSP, through accessible tools as website and data portal; MSP is elaborated through a transparent and consistent stakeholder and planning team involvement in all the phases of the project, to acquire feedback on planning elaboration procedures; monitoring of the planning process is performed in all phases.

4	Stakeholders participation	ADRIPLAN MSP is based on an intense consultation process involving a wide range of Partners and Stakeholders from the Adriatic-Ionian Region representing National, regional and local authorities, but also the private sector, academia, scientific institutions and civil society.
5	Coordination within Member States – simplifying decision processes	ADRIPLAN has verified the emergent MSP systems among the Member States involved in the project, to be considered in the definition of strategic proposal as well as planning measures.
6	Ensuring the legal effect of national MSP	ADRIPLAN has identified the competent authorities related to the relevant governance levels connected to the MSP Directive implementation in each Member State and Third Countries within the macroregion to be considered when setting the planning proposals.
7	Cross-border cooperation and consultation	ADRIPLAN has promoted cross-border consultation during the Stakeholders participation activities. Moreover, the analysis have ben set to identify barriers and issues in cross-border harmonization, both related to data and to sectoral policies, as well as to MSP issues. As results, ADRIPLAN provide guidelines and recommendations for overcoming barriers and the implementation of cross-border MSP process within the macroregion and the two Focus Areas, on the basis of an integrated overall assessment.
8	Incorporating monitoring and evaluation in the planning process	A program of monitoring of the planning process has been performed in ADRIPLAN. Guidelines have been provided for a transparent monitoring and evaluation mechanism on a regularly base, in order to allow the plan to be revised in due course.
9	Achieving coherence between terrestrial and maritime spatial planning – relation with ICZM	ADRIPLAN has investigated the relation between MSP and ICM and put in evidence the development of sea-base activities that have influence on land.
10	A strong data and knowledge base	ADRIPLAN has initially recollected all available knowledge and information on the AIR, with the means of the Initial assessment and the data portal. The MSP proposal is based on the elaboration of best available knowledge, on the basis of existing information and scientific knowledge; ADRIPLAN develops the data portal (data.adriplan.eu) where MSP data are collected and MSP tools developed.

Table 1.3-2: Compliance with the 10 key principles of MSP (COM (2008) 791)

Barriers and bottlenecks in the methodology implementation

1. The Framework Directive on Maritime Spatial Planning 2014/89/EU establishes some key requirements for that each planning process should be informed of. The methodology which shapes the planning process and plan elaboration is left to be established to each competent authority, as also the Roadmap for MSP establishes only key elements for MSP. Such flexibility is positive as the process is place-based and context dependent. On the other hand, the effectiveness and efficiency of the process should be carefully monitored and evaluated. In ADRIPLAN the planning process has been evaluated.

2. Proposals with respect to MSP planning process are various in literature; consolidated guidelines are the one from Ehler and Douvere (2009), which has been considered in ADRIPLAN. MSP planning process should be tailored to the specific (legal, environmental, social) context and to the geographical scope of MSP.

3. The MSP process is strongly dependent on the mandate and authority in charge of it. ADRIPLAN has been shaped to answer to the mandate of DG MARE and to the Institutional partners, as well as stakeholders that the partnership has been able to mobilize. Different mandate and related authority/ies would have informed the process in a different way. However, with some degrees of flexibility and site-specificity, the overall process to produce an MSP plan should be standardised to grant the accomplishment of all basic components as required by the MSP Directive (2014/89/EU). Moreover, Member States are under the process of defining the competent authorities in MSP. ADRIPLAN has tailored the process considering the planning culture and the sensitivities of different authorities which took part to the process, but that not necessarily will be involved with the same role or responsabilities in the planning process once the Directive would be acknowledge by Member States.

4. Bridging science-policy interface is a challenge that entails the issue of operationalization between analytical thinking and strategic thinking. Collaboration between scientists involved in the analysis, decision makers and planning team is a main issue. Mechanisms to support the collaboration of scientists (beside economic remuneration) should be envisaged to answer to several crucial questions: how to make the scientists participation appealing for their careers? How to make applied science appealing for scientists?

5. Operationalizing EBA is a key issue, as several activities of different nature should be gathered and integrated. MSP process is structured on the coexistence of activities devoted to the analysis of characteristics of planning area, including marine ecology, maritime activities and stakeholders' analysis. The elaboration of the vision, and consequently of the planning measures, is based on the synthesis and interpretation of the analitycal inputs, mediated and elaborated by the understanding of the decision makers and stakeholders who took part in the process. The planning team, as mediators and facilitators of the entire process, has the role to translate and make explicit through the plan the results of the process. Importat attention should be devoted to coordination between activities, because day-by-day feedbacks are necessary to maintain a good level of communication and integration between i) contents and activities, ii) between components of the planning team in charge of different parallel activities; iii) between the planning team and stakeholders involved in the process.

PART II
Defining an MSP Proposal

2.1 Preliminary Analyses: building basic knowledge for the MSP

The full content of this analysis is reported in the Initial Assessment (IA) (Project Deliverable AIP-1.2-1.1).

The IA comprises a comprehensive description of current state of maritime uses and environmental state of the Adriatic Ionian Region, stressing the needs for cross-border MSP. More precisely, borders, goals, operational objectives and targets relevant policy frameworks, as well as mayor human activities and bio-physical features were described in the document, moving from the maritime uses relevant for the study area to the environmental state through the descriptors of the Marine Strategy Framework Directive "MSFD" (2008/56/EU;EC, 2008)

In addition, the identification of strengths and weaknesses was based on current experiences, also considering opportunities for cross-border MSP. A strong heterogeneity emerged from the preliminary analysis performed. The strong data and knowledge base showed the least deviations across the countries in the AIR. In this context, the definition of common principles based on stakeholder participation and on the achievement of a coherent marine spatial planning framework was identified as fundamental for future MSP processes.

From this first analysis for a process of cross-border MSP, some key issues to be further explored in ADRIPLAN were identified. These are:

(I) Defining the regional basis for cross-border MSP;
(II) Testing the appropriateness of existing conventions, networks and institutions to facilitate cross-border MSP;
(III) Scoping the willingness of regional stakeholder groups to participate in a MSP process;
(IV) Assessing the feasibility of a central data and knowledge base, and
(V) Assessing the feasibility for a coherent planning and permitting system.

Going into details, the Initial assessment is based on the analysis of existing conditions of the different domains involved in the process of MSP. The report contains a recollection of information related to the following topics:

- Maritime uses: description of the human activities per sector considering type, location, dimension and magnitude of the activity in AIR, as well as in the NA and SA;
- Socio-economic aspects related to maritime uses;
- Legal issues: international and national legislation on AIR;
- Planning regimes and tools: spatial planning, sectoral planning, permit issuing and concessions; the area of analysis consists in the inland, in the area related to the tools in forced from the coastline according to different sectors and level of planning.
- Environmental characteristics for AIR: spatial location of main environmental and ecological values present in the AIR and in the two Focus Areas. The main goal is to map the environmental, biophysical and ecological conditions of the planning areas. Environmental categories used to describe AIR, NA and SA are discussed within technical partners. The aim is to put the basis to a complete spatial description of AIR, aiming at covering with different level of precision (scale) the entire AIR.

2.1.1 Analysis of the legal framework

The normative framework relevant for MSP is found at three levels.

The international level includes:

(I) Customary international law, which is binding for all States;
(II) Treaties, which create legal obligations for States that have ratified them or that have acceded to them;
(III) Decisions adopted by international organizations, which create legal obligations for member States.

The European level includes EU legislation, i.e. regulations, directives and decisions. The domestic level, which includes national legislation and regulations, as well as regulation adopted at the regional and local level.

An overview of the relevant international treaties, as well as EU legislation relevant for setting a proper framework for developing MSP in the Adriatic and Ionian Sea is listed in Table 2.1-1.

International level
United Nations Convention on the Law of the Sea (UNCLOS – UN, 1982)
IMO treaties, including: • International Convention for the Safety of Life at Sea (SOLAS – IMO, 1988) • International Convention for the Prevention of Pollution from Ships (MARPOL – IMO, 1973) • International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW – IMO ,1978) • International Convention on Maritime Search and Rescue (SAR – IMO, 1985) • Convention on the International Regulations for Preventing Collisions at Sea (COLREG – IMO, 1972)
Convention for the Suppression of Unlawful Acts Against the Safety of Maritime Navigation (SUA – UN/IMO 1988) and the Protocol for the Suppression of Unlawful Acts Against the Safety of Fixed Platforms Located on the Continental Shelf (SUA PROT – UN/IMO, 1988)
Maritime Labour Convention (MLC – ILO, 2006)
Convention on Biological Diversity (CBD - 1992)
Convention on the Protection of Underwater Cultural Heritage (CPUCH – UNESCO 2012)
Barcelona Convention and Protocols (UNEP, 1976)
ICZM Protocol (UNEP 1976, 1995)
Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and Contiguous Atlantic area (ACCOBAMS – CMS, 1996)

General Fisheries Commission for the Mediterranean (GFCM, EU Commission since 1997)
International Commission for the Conservation of Atlantic Tunas (ICCAT, funded in 1966)
Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus Convention – UNECE, 1998)

European Level
Regulation no 1380/2013 on the Common Fisheries Policy
Marine Strategy Framework Directive (MSFD – 2008/56/EC)
Water Framework Directive (WFD – 2000/60/EC)
Habitats Directive (1992/43/EEC)
Birds Directive (2009/147/EC)
Floods Directive (2007/60/EC)
Environmental Impact Assessment Directive (EIA Directive – 2011/92/EU)
Strategic Environmental Assessment Directive (SEA Directive – 2001/42/EC)
Sectoral framework: • Safety of Offshore Oil and Gas Operations Directive (2013/30/EU) • Renewable Energy Directive (2009/28/EC)
Maritime Spatial Planning Directive (2014/89/EU)

Table 2.1-1: Review of the main normative framework relevant for MSP

First, existing boundaries have been analysed, as they allow to locate with precision the extent of each State's regulatory and enforcement jurisdiction. Thus, it is possible to identify the State or States competent for each area at sea. The rules for the definition of territorial sea are generally established by UNCLOS (1982). In the study area, territorial sea was delimited between Italy and the former Yugoslavia (1975; Croatia and Slovenia have succeeded in the agreement). A 1999 agreement between Bosnia-Herzegovina and Croatia for the delimitation of Croatian internal waters and Bosnian territorial sea was drafted, but it did not enter in force as it has not yet been ratified by both parties. The delineation of territorial waters between Croatia and Slovenia is still disputed.

For what concerns continental shelf delimitation, agreements have been concluded between Italy and the former Yugoslavia (1968; Croatia, Montenegro and Slovenia have succeeded to the agreement), Greece and Italy (1977) and Albania and Italy (1992). A provisional agreement between Croatia and Montenegro for the delimitation

of their maritime boundary has been adopted in 2002.[1] The agreement provisionally applies to the internal waters and the territorial sea of the two states, while it does not delimit their continental shelf and other jurisdictional zones. It contains complex arrangements of a provisional nature concerning the closing line of the Bay of Boka Kotorska and creates a special zone wherein both States are granted powers concerning the protection of the marine environment, fishing and the enforcement of laws and regulations.

Concerning Greece, two bilateral agreements have been reached, one with Italy (May, 1977) on the delimitation of the respective continental shelf areas of the two states for the protection of the marine environment of the Ionian Sea and its coastal region (entered into force in November 1980) and one with Albania on the delimitation of their respective continental shelf areas and other maritime zones to which they are entitled under international law (Tirana, 27 April 2009. Ratification of the agreement is still pending, also following a decision by the Constitutional Court of Albania stating that the agreement was in violation of the Albanian Constitution).

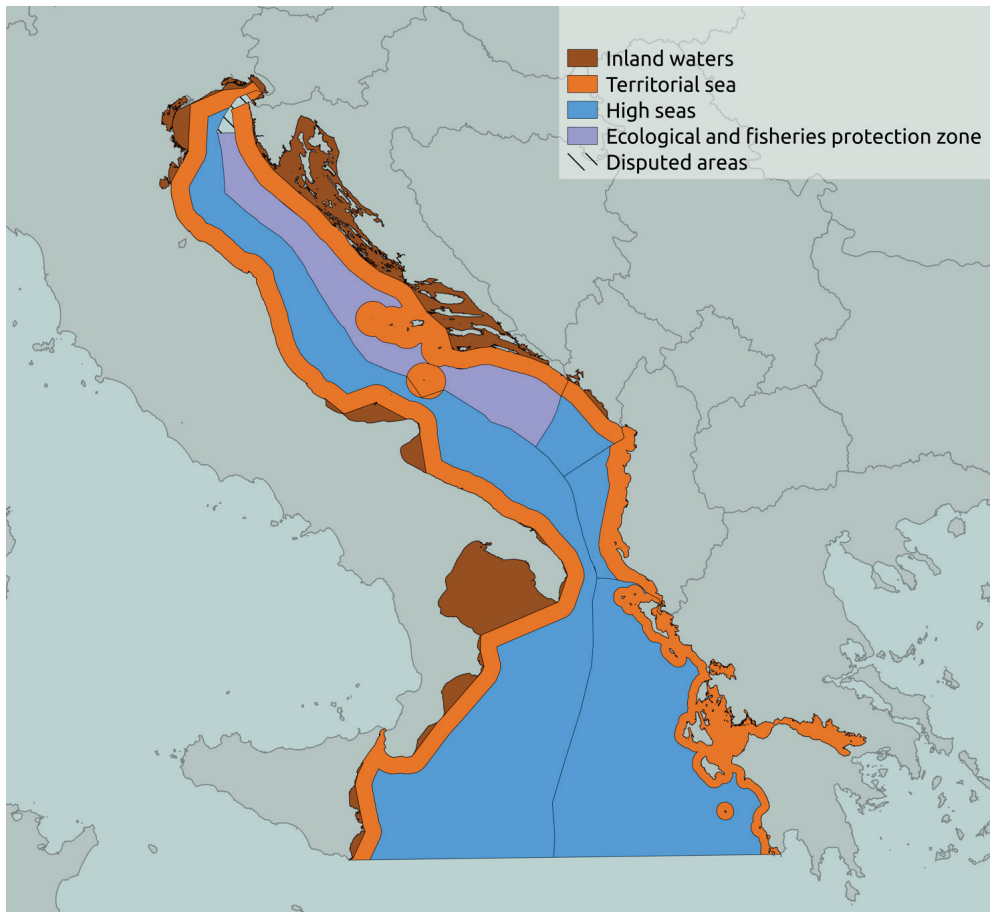


Figure 2.1-1: Legal status area (source: ADRIPLAN Dataportal)

[1] Protocol on the interim regime along the southern border between the Republic of Croatia and Serbia and Montenegro (Grbec, 2014)

In the following part, pending delimitations and critical issues on boundary definition will be briefly reported.

One of the main disputes in the area concerns the definition of maritime boundaries between Croatia and Slovenia. This is due both to a complex geographical and political situation and to legal issues related to the Slovenian claims that the entire bay of Piran should be considered as Slovenian internal waters and that Slovenia is entitled to a maritime area beyond its territorial sea, to be reached by a high seas corridor cutting through Croatian territorial waters. The two States also disagree on the legal status of a text containing principles for the delimitation of their maritime areas, which was initialled by the Parties representatives in 2001 but that has neihter been esigned nor ratified afterwards. In 2009, the two States agreed to submit the dispute to arbitration. The arbitral tribunal was constituted in 2012 and it is currently examining the case. A decision was expected towards the end of 2015, however due to procedural issues it is now unlikely that this will come in 2015. In the case of boundaries delimiting only the continental shelf, it is not clear whether these have been formally extended to the delimitation of the superjacent water column. Jurisdiction over waters is therefore uncertain.

A second critical issue concerns high seas pockets. Some coastal States have not extended fully their jurisdiction. Albania, Greece, Montenegro and Italy have not claimed any exclusive economic zone nor *sui generis* zone beyond the territorial sea. As a consequence, parts of the Adriatic-Ionian waters fall still under the regime of the high seas, and coastal States do not have any right (or duty) beyond those generally applicable to all states. This is particularly so with respect to Focus Area 2, which includes portions of high seas between Albania, Greece and Italy. In the long run, this situation is likely to be addressed by coastal States, possibly with the extension of their jurisdiction to cover all areas of the Adriatic and Ionian sea. In the short term however, plans will need to limit themselves to areas where coastal States can exercise jurisdiction under current law of the sea rules or will need the involvement of international organisations that have the mandate to regulate activities in areas beyond national jurisdiction.

A third element is related to divergent marine zones, i.e. divergent types of maritime zones claimed by coastal States. Even when coastal States have proclaimed zones, their practice is not always consistent and again does not allow for a maximum exercise of jurisdiction. For example, only Italy has proclaimed a 24 nm archaeological contiguous zone, while only Croatia and Slovenia have declared exclusive economic zones. This heterogeneity in maritime zones has an impact on cross-border MSP, since the States involved may not be granted the same rights. This is particularly true for Focus Area 1. While the long-term solution is the uniformisation of maritime zones, this outcome is not likely to be achieved soon. It will be therefore particularly important to design maritime spatial plans in a way that allows minimizing unwelcome results of cross-border effects deriving from unregulated activities taking place in areas that are not subject to the jurisdiction of the coastal States.

In general terms, the lack of clear boundaries is a critical issue to be carefully considered when defining spatial management strategies. As previously mentioned, in many cases coastal States have not agreed upon maritime boundaries delimiting their respective maritime entitlements. As a consequence, there are significant areas in which two or more States may advance claims. MSP in these areas needs to take into account this factual situation. Particular attention should be paid to advancing proposals that involve all interested parties, also in application of Arts. 74(3) and 83(3) UNCLOS. In these cases, the interests of different states should not be prejudicing (nor perceived as prejudicing). Once again, this is particularly true for Focus Area 1, given the present dispute between Croatia and Slovenia.

Finally, in some cases, States in the region are bound by different substantial standards related to activities relevant for MSP. This is primarily due to the fact that not all coastal States are members of the EU, so that not all are bound by the EU regulations, directives and decisions. To a lesser extent, this is also due to the fact that not all States are parties to all the relevant treaties. While a State cannot be obliged to apply legal rules that do not bind it, there is the necessity to coordinate measures on both sides of the border so as to enhance transboundary cooperation.

2.1.2 Analysis of the planning system

The basin area of the Adriatic Ionian Region is mainly regulated by institutional agreements and strategic initiatives rather than regulative plans. In this perspective, the following survey – mainly based on Shape analysis and on specific questionnaires sent to all ADRIPLAN project partners – offers a reconstruction of the existing planning framework at national and regional level. Here, the basic features of relevant planning system are summarised at national level. Maps showing competence areas of different plans, as well as an overview of existing and future plans relevant for MSP, can be found in ADRIPLAN data portal.

In synthesis, what emerged is a highly fragmented planning framework, in which competence levels and authorities largely vary in different sectoral policy fields and across different states.

Italy

Sub-national territorial organizations in the Italian Republic are regions, provinces and municipalities. In Italy, the planning documents related to the management of maritime spaces are diverse and heterogeneous. A plan explicitely addressing the different dimensions of MSP is missing, and regulatory/management competences of interest for maritime and coastal activities are highly fragmented and distributed along different policy levels. A strongly sectoral approach characterizes the planning framework to be analysed. In general terms, territorial waters are managed at the state level, while planning has been decentralized to the regional level. More specifically, for what concerns coastal areas and territorial waters (i.e. waters within the 12 n.m., established in accordance with UNCLOS 1982), these are included – as already highlighted in the legal framework - in the Italian maritime state property, which is part of the state public property. In this case, competences over planning and management are divided among the state, the regions and the provinces, and some specific sectoral competences (e.g. issuing of licences and concessions) have been even decentralized at the municipal level.

Within the Italian context, strategic and land use plans that can affect coastal areas include:

- Regional plans, including specific territorial plans regulating specific areas within the regional boundaries (“Piani d’area”);
- Provincial plans (“Piani Territoriali di Coordinamento Provinciale”);
- ICZM plans (implemented only in some Italian Regions. A national ICM Plan is under development);
- Municipal plans (“Piano Regolatore Generale”);
- Port Regulatory Plans.

Furthermore, sectoral plans and regulatory documents developed by different competent authorities should be carefully considered. These refer to a number of sectors

relevant for MSP such: energy, transport, coastal defence, tourism, sand extraction, fishery and aquaculture.

Slovenia

Slovenia does not have a specific legislation for coastal zone management, but the regulation of coastal zones is attributed to the national spatial planning legislation. The most significant acts in this respect are the following:

- Spatial Planning Act, published on the Official Gazette of the Republic of Slovenia, nr. 33/07. Even if MSP is not explicitely included in the act, the law can also be applied to coastal and maritime areas;
- Spatial planning of arrangements of national significance, published on the Official gazette of the Republic of Slovenia, nr. 80/10. In this act, the spatial arrangements at the sea are recognised as spatial arrangements of national significance.

The Spatial Planning Act establishes three kinds of plans: national, municipal and intra-municipal. The Ministry of the Environment and Spatial planning - Spatial planning Directorate is responsible at the national level, while municipalities are responsible at the local level. More specifically, the competences are allocated as follows:

- "The State is competent to determine the objectives of spatial development, determine the policies and guidelines for spatial planning at all levels, plan spatial arrangements of national significance and supervise the legality of spatial planning at the municipal level;
- Municipalities are competent to determine the objectives and guidelines for spatial development at local level, determine the land-use and set the conditions for spatial development and plan spatial arrangements of local importance at terrestrial level" (EC-Maritime Affairs 2011).

Notably, since territorial waters are conceived as a national public good, MSP lies with the State, and all the strategic interventions to be implemented within the sea have to be issued on the basis of the National Spatial Planning Act (2007). The competence for setting down of strategic objectives and initiatives to be implemented within the Slovenian Territorial Waters is shared among diverse institutional stakeholders, listed in the spatial planning of arrangements of national significance (2010).

Croatia

Territorial organizations in the Republic of Croatia are counties, towns, municipalities and settlements. The Croatian coastal area belongs to the country's most valuable economic and natural assets (see socio-economic indicators). Croatia is characterized by the predominance of a sectoral approach in regulating uses (EC-Maritime Affairs, 2011:6). In the allocation of competences with respect to spatial planning, Croatia displays a centralized planning structure, with all the relevant initiatives being established at the national level.

The basic physical planning positions are determined by the:

- Physical Planning and Building Act (OG 76/07, 38/09, 55/11, 90/11, 50/12, 55/12);
- Physical Planning Strategy of the Republic of Croatia (1997);
- Physical Planning Programme of the Republic of Croatia (1999).

The Physical Planning Strategy of the Republic of Croatia (1997) is a starting document for the interpretation of basic positions. According to it, the main starting point

for planning the area of the Croatian Adriatic is reduced to four requirements:

- Protection of the area is given precedence over other requirements and interests;
- Extension of building areas has to be planned on sites away from the coast;
- In the coastal area realization of a public interest is given precedence over other interests;
- Islands have to be planned as unique planning units, regardless of the number of local- self-government units, while smaller uninhabited islands cannot be included in building areas.

Under provisions of the Physical Planning Act, the Strategy is the basic physical planning document used for the project development decisions, land-use planning in smaller areas, and development of the local land-use plans. The Physical Planning Strategy goals are:

- Maintaining of preserved areas;
- Systematic remediation of threatened areas;
- Ensuring minimization of space degradation in new spatial development programs;
- Keeping the current share of anthropogenic areas;
- Stipulating development of medium-size urban communities.

Montenegro

The spatial planning policy in Montenegro is set by the spatial plans, which cover all relevant areas and components that can have a physical change in the area those plans are covering. Spatial plans are divided in: (a) strategic – development plans that have regional character and are adopted for the longer period, and (b) regulating plans that represent the urbanistic solutions for the strategic targets from the development plans.

Notably, as for the other states analysed, spatial plans in Montenegro do not take into account, or at least not in the adequate manner, the sea area. For that reason, the 1995 Law on planning and development of space proposed the development of the Spatial plan for the coastal area. However, the adoption of this plan in 2007 did not resolve this problem, since this plan, although it took into account the territorial sea of Montenegro, did not give clear guidelines for the development of activities, protection and use of the marine area.

Another important aspect of the spatial planning system in Montenegro is the principle of integrated planning, which ensures that all spatial plans have social, economic, environmental and spatial components. The spatial planning system represents the basis for the integrated management. The main problems are the undeveloped practice of sea-use planning and poor harmonization of sectoral programs for the management of different activities in the same space.

Different activities at sea and on the coast are regulated by different laws, strategies and programs that should be harmonized, but in practice, the level of harmonization is low. At the same time, the management of these activities is divided among different institutions at different levels. The highest level of integration in spatial and management is achieved in ICM. The coastal zone is defined by law as an integrated area of the land strip and territorial sea – as established by the ICZM Protocol of the Barcelona Convention. Furthermore, a unique managerial institution was set, even if it has limited jurisdiction, especially at the sea.

The Law on Spatial Development and Construction of Structures (adopted in 2008)

is the key legal document that prescribes the obligation and procedure for drafting spatial plans at different levels in Montenegro. Formal and planning basis for programmed spatial development is a Five-Year Programme of Spatial Development which, for public areas, are enacted by the Government. As previously highlighted, strategies and plans for certain sectors are proposed by relevant bodies and enacted by the Government.

Albania

Albania does not currently have a specific strategy for ICM. The development of coastal areas and the management of coastal activities are regulated through a fragmented legislative framework, which mainly relies on sectoral policies and provisions. The competences on coastal zones management are mainly shared between the Ministry of Environment, Forestry and Water Administration and the Ministry of Public Affairs, Transport and Telecommunications. Also other national Ministries (i.e. he Ministry of Tourism, Culture, Youth and Sports and the inter-ministerial Council for Territorial Development) have responsibilities related to coastal management.

Even if an ICM plan has not been developed, a Coastal Zone Management plan was approved in 2004. It results from (1) the Coastal Area Management Programme (CAMP) for the central Albanian coastal region and (2) the Albanian Coastal Zone Management plan (northern and southern regions).

For what concerns MSP, a regulatory and planning framework has not been established yet, and competences over the development of MSP procedures have no been set.

Bosnia - Herzegovina

The regulatory framework for spatial planning is established by the Federal law on Spatial Planning. Currently, there is no ICM or MSP in the country. As reported by the EC (Maritime Affairs, 2011) "there are no legislative instruments, mechanisms or procedures for coastal management, and bodies or agencies for integrated management of the coastal area are not present:

- Coastal area planning and management have not been implemented in practice;
- There are strategic governmental documents defining the country's direction towards its coastal zone;
- Several documents mention the importance of the coastal area and guidelines for its arrangement are given; however, these guidelines do not take into account a sustainable development of the coastal zone;
- There is no institutional context for a systematic and permanent management of the coastal area in Bosnia and Herzegovina; management of the coastal area on the Cantonal level is realised through several Cantonal departments (e.g. for spatial management, environmental protection, inspection); however, in general, there is no integration among them".

Greece

A comprehensive framework for ICM and MSP does not currently exist in Greece. The planning system is mainly centralized at the national level, even if some plans are also established at lower institutional and administrative levels through a process of administrative decentralization that started in the '80s and '90s. The main responsibility for (Maritime) Spatial Planning at the national and regional level lies with the Ministry of Environment, Energy and Climate Change. In order to develop integrated spatial

plans, the Ministry often collaborates with other Greek Ministries, such as Ministry of Culture and Tourism. The Ministry of Environment, Energy and Climate Change also collaborates with regional authorities in establishing specific planning frameworks.

The Greek planning system can be synthetically described as follows. At a national level, the main planning instrument is the "General Framework for Spatial Planning and Sustainable Development", provided by law 2742/1999 and updated through a join Ministerial decision in 2008. The GFSPSD *de facto* is a multi-sectoral plan containing guidelines for the organization, management and development of the Greek territory. These guidelines cover the following topics (IsoCaRP, 2002: 190):

- Main national development poles and axes;
- Technical infrastructures;
- Productive sectors;
- Metropolitan areas, in relation with their relation with the wider territorial context in which they are embedded;
- Management of natural resources and protection of national cultural heritage;
- Creation of viable administrative units.

The second planning tool provided by the law 2742/1999 is the "Special Frameworks for Spatial Planning and Sustainable Development". These are *ad hoc* guidelines covering specific areas or sectors. In 2002, a draft was proposed for a Special Framework for Spatial Planning and Sustainable Development in Coastal Areas and Islands" was proposed, but it has never been approved, since the integration of the ICZM objectives into different sectoral policies and plans was considered as a more preferable option (see next section of sectoral planning tools for more details). However, a "National Framework for Spatial Planning of Coastal Areas and Islands" has been recently adopted to guide policy to provide a common platform through ICM.

2.1.3 Data Collection

Data collection, in a project dedicated to Maritime Spatial Planning, such as ADRIPLAN, is a fundamental part of the process and it has to be started as soon as possible and to continue for most of the duration of the project. Data are, in fact, diverse per domain, geographical area, spatial and temporal scale, quality and completeness of description, availability, possibility to reuse (data policy); this has to be considered when information are collected and procedures have to be set up to try to solve integration issues.

Data needs and mining

One of the first steps in WP2 (Task 2.1 "Data needs, data availability and data policy") was the definition of the data needed as basis for the MSP activities in the project and to know where these data were to be collected. This task was run in parallel with other activities of WP1, namely the definition of the methodology framework and the initial assessment.

As a first step, a questionnaire was prepared for collecting data priorities and availability corresponding with a list of maritime uses and environmental information. The questionnaire was sent collectively to all partners (both technical and institutional), requesting information on what data they could provide in ADRIPLAN and other metadata useful for the collection and use of those data during the subsequent phases of the project.

Data needs were collected as an input for the definition of MSP priorities and needs in discussion in the WP1; data availability constituted a catalogue of all information collected by ADRIPLAN's partners as a basis for the planning activities.

Even if not uniform both in terms of timeliness and completeness, this information contains a very broad collection of data fundamental for the project, forming a useful inventory of MSP-related information in the Adriatic-Ionian Region to be used in the following data recollection activities.

Data acquisition and priority maps

Acquisition and organization of data related to the MSP is one on the most important preliminary steps necessary to provide a sound informative basis to the following phases of the project. The collection of information followed various phases, adapting to the evolving needs and maturity of other Tasks of the project.

Since the very beginning of ADRIPLAN, marine and maritime data were accessed from existing projects and portals having as a main objective the collection of information generally related to the MSP context in the Adriatic and Ionian Areas.

Data acquisition has been progressively focused, according to the results of the data needs and availability questionnaire, and the Initial Assessment and the evolving deliverables on the MSP methodology and boundary definition.

Data have been collected from various sources of information (Figure 2.1-2), starting from the project's partners, other local, regional and national administrations, and capitalizing the great work done in already available data portals (e.g. European Atlas of the Seas, EEA, SeaDataNet, EMODNET) and other past and on-going projects (e.g. SHAPE, MAREA-MEDISEH, CoCoNet, Eunetmar, etc.).

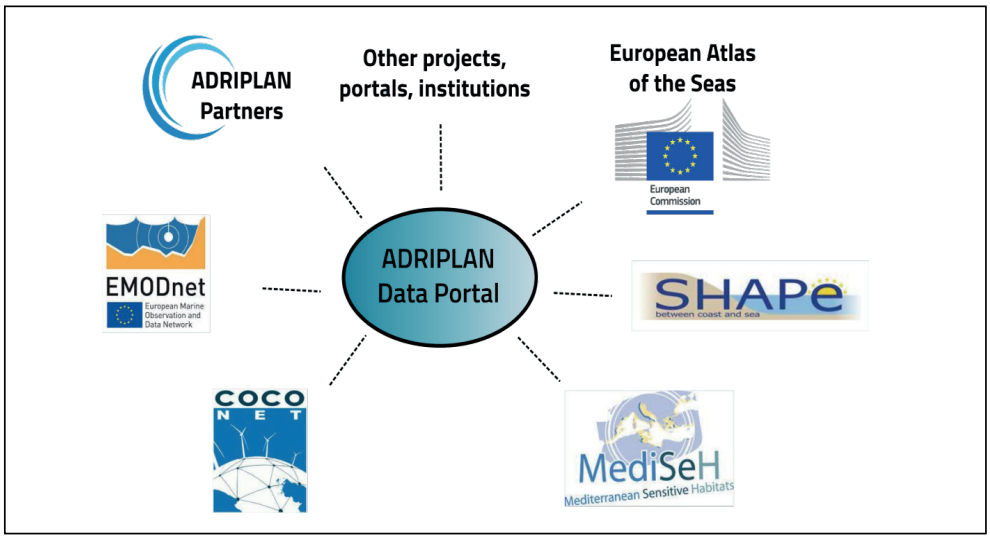


Figure 2.1-2: Main input to data collection and capitalization for the ADRIPLAN Data Portal

As an example, the SHAPE Project and its Adriatic Atlas (http://atlas.shape-ipaproject.eu/) have been extensively used as source of information for many priority maps. The SHAPE Atlas contains many layers that already cover the basic information needed for various ADRIPLAN maps. The layers are provided as WMS and/or WFS ser-

vices and they are all described by standard metadata compliant with the INSPIRE Directive. In addition to that, most of the data are openly distributed with CC-BY or CC-BY-NC Licences; this allows an easy and clear redistribution of data and an effective capitalization of the effort done for the organization of those information.

Based on the analysis of the answers to the questionnaires on data availability, other data from partners, more specific and consistent with the scope of the project, were added as potential input to the Data Portal. The amount and variety of data that have potential relation with MSP objectives is too big to be faced with a generalist approach and the time to be invested in such a collection cannot fit the timeline of the project. The goal of ADRIPLAN was not to delineate a detailed spatial plan for the whole AIR, but to concentrate on priorities defined in the methodology and to achieve clear and concrete results in a short time.

For these reasons, to make the collection of data more concrete and organised, and to focus on the production of specific thematic maps, a list of Priority Maps were discussed and then agreed. A list of 35 maps (see Table 2.1-2) was produced, containing the most important information that the ADRIPLAN project needed to organise and make available as basis layers for the development of maritime spatial plans. This list contains data on Environmental components (e.g. habitats such as coralligenous outcrops and Posidonia meadows), Maritime uses (e.g. Maritime transport, Oil and gas), Physical description of the system (e.g. Coastal trends, Oceanographic conditions), Socio-economy, Legal status, and the Planning framework.

Each map had a partner responsible to collect the data, contact relevant providers, send requests for accessing relevant information, process (where needed) the data and make them available through the data portal. In general, the partner responsible for a specific map was the same who guided the description of the corresponding information in the Initial Assessment.

Themes	Maps
Environmental component	Bathymetry
	Seabed geology and texture
	Coralligenous formations
	Nursery habitats
	Posidonia seagrass
	Special Features
	White corals
	Birds
	Marine mammals
	Turtles
	Eutrophication
	Habitats

Legal status	Legal status
Maritime Uses	Aquaculture farms
	Coastal and Maritime tourism
	Dumping areas for dredging
	Fisheries
	Military permanently or temporary interdicted areas, including foul areas
	Offshore sand deposits
	Wrecks
	Protected areas
	Cables and pipelines
	LNG terminals
	Maritime transport
	Oil and gas
	Renewable energy facilities
Physical description of the system	Coastal erosion / aggradation
	Coastline and main watersheds
	Metocean
	Ecosystems (according to Micheli et al., 2013)
	Main oceanographic conditions
Planning framework	Planning framework
Socio-economic data	Employment on maritime activities
	GDP (NUT3 for AIR plus local statistics) and revenues from coastal and maritime activities
	Population, coastal cities and population density and coastal population density increase in touristic season

Table 2.1-2: List of priority maps

Barriers and Bottlenecks

Data related to the eastern Adriatic are less homogeneous and more difficult to collect than the Italian ones; this is particularly true for data from Albania and Montenegro, due to the fact that ADRIPLAN does not have specific partners from these areas. Albania and Montenegro have been anyway involved in the project as observers and their representatives participated to some workshops organised by the project.

The Ionian region south of the Focus Area 2 is another area where data were more difficult to be gathered. This is due to the fact that Calabria and Sicily regions were not partners in the project and also that this area has been less intensively studied compared to the Adriatic Sea. Despite these difficulties, ADRIPLAN had all priority maps described at the whole Adriatic-Ionian Region scale, allowing a more detailed analysis at the two Focus Areas.

2.2 Vision and Objectives for the Adriatic-Ionian Region

The aim of this section is to present the Vision that has guided ADRIPLAN in achieving its results, highlighting in particular its role and how has been developed starting from the definition of high level goals to the identification of management objectives, also on the basis of the future developments analysis carried out during the third phase of the project, i.e. the planning phase.

Defining and declaring a Vision and management objectives is an important step for a successful integrated maritime spatial planning approach: it is an overall goal, which unites all stakeholders and guides their activities. It is indeed useful to build consensus around them, especially in the transboundary context.

The Vision of Adriplan is directly derived from the European Union Strategy for the Adriatic and Ionian Region - EUSAIR and its Action Plan (COM(2014) 357 final and the accompanying SWD (2014) 190 final) and reflects the ten main principles for MSP (COM(2008)791 final), providing a guide for achieving better coherence in the development of the MSP. The main objective is to promote sustainable economic and social prosperity of the Region by improving its attractiveness, competitiveness and connectivity, while preserving the environment and ensuring healthy marine and coastal ecosystems.

The EUSAIR Action Plan is focused on four pillars: (1) Blue growth; (2) Connecting the Region; (3) Environmental quality; (4) Sustainable tourism. Each pillar is articulated in topics including an indicative list of eligible actions and project examples. Therefore the Action Plan, which is a result of the wide consultation with the participating states and the stakeholders, will provide the common framework and priorities for the Region.

The Vision has to be clearly projected towards the future: ADRIPLAN Vision refers to the time frame 2014-2020, considering that within 2021 Member States have to develop their national maritime plans (new MSP Directive 2014/89/EU) and that 2020 is the deadline to achieve the Good Environmental Status according to the Marine Strategy Framework Directive (Directive 2008/56/EC), which is the basis of the MSP Directive. The analysis of future developments is thus important in order to build a future scenario at year 2020 taking a picture of future at year 2020. Scenario at 2020 is explorative for possible future conditions: it explores possible emerging drivers of change, in relation to raising conflicts and synergies among maritime uses, as well as in relation to emerging pressures and impacts to AIR environment.

The analysis of future development was carried out taking into consideration the most relevant EU policy and legislation, international strategic documents, national development strategies, as well as European and national programs and projects that are contributing to the definition of future development. The analysis provided an overview on the main socio-economic development trends of different sectors. For building the scenario at 2020, a list of interventions/actions/projects already approved and under approval was considered.

Concerning socio-economic aspects, the dynamics of each use, according to different current and future political and economic states, was evaluated taking into account the uses' dynamics and the progress of various projects, which are directly affecting the future development of each sector. As far as the commercial transport

is concerned, the increase of world trade volumes, the low oil prices and the successive completion of the planned projects are crucial factors which can significantly strengthen the activity levels of the use in the area. Additionally, passenger transport is expected to retain its' crucial role for local economy. The development is expected to be more intense in a situation where economic trends of the region will remain positive in the long run with oil prices fluctuating at low levels. The prospects of coastal tourism are also considered as highly positive. The sector will be at risk only if a regional or international economic downturn occurs or if congestion problems of over visited regions of AIR will not be successfully managed. However, the sector is in general expected to keep its current activity levels. Low oil prices and a more stable political environment in Southern Mediterranean are the crucial factors of the sectors' expansion in the near future. Fishing sector is not going to face dramatic changes: the key issue is whether fishing could be more sustainable, thus ensuring that fishing stocks will not be altered in the near future. In the case of aquaculture, fish farming production is expected to expand mainly due to its high exportable nature, despite the strong competition imposed by other countries, such as Turkey and Spain. A great barrier, which could slow down the development of the sector, is the lack of spatial planning for new establishments that could trigger heavy conflicts with tourism and transport uses. Renewable energy is tightly connected to the levels of oil prices and the degree of EU devotion to the 20-20-20 targets. The development of offshore wind farms will be intensified while oil prices are recovering since renewable forms of energy will provide a less costly and greener path to energy demands' coverage than this of oil resources. Additionally, oil and gas production will retain its current levels, as existing drillings will be further exploited whatever the oil price levels. Nevertheless, further development of relevant activities to additional blocks is questioned mainly because of oil price fluctuations. Finally, the low levels of oil price also affect the planned gas and oil pipelines because if these levels prevail for a long time the projects may be aborted due to low prospects of becoming profitable.

Therefore, considering the principles at the basis of the Vision and the future development analysis, the Vision in ADRIPLAN was built defining the high level goals, successively declined to management objectives, which have to flow from goals and have to be as much operational and quantitative as possible (Stelzenmuller et al., 2013; Sievanen et al. 2011; Gleason et al. 2010; Holland et al., 2010; Ehler & Douvere, 2009). The development of increasingly operational objectives, spatially based, with indicators and reference levels, was a critical part of the planning process, and it was fundamental to identify outcomes and trade-offs.

To be effective and useful for evaluating the management performance of spatially managed areas, operational objectives need indeed to be SMART (ICES, 2005; Katsanevakis et al., 2011): (1) Specific: objectives should clearly specify the state to be achieved, and be interpreted unambiguously by all stakeholders; (2) Measurable: objectives should relate to measurable properties of ecosystems and human societies, so that indicators and reference points can be developed to measure progress towards the objective; (3) Achievable: it should be possible to achieve all objectives, which should not conflict; (4) Realistic: it should be feasible to implement the objectives using the resources (research, monitoring, assessment and enforcement tools) available to managers and stakeholders; and (5) Time bound: there should be a clearly defined time scale for meeting objectives (Ehler, 2014).

High-level goals and management objectives were identified, in FA1, FA2 and AIR, taking into account the peculiarities of the three domains. The main high level goals and related management objectives were identified for each sector considered.

Coastal and Maritime Tourism	
High level goal	**Sustainable maritime tourism**
Management Objectives	Enhance the attractiveness of tourism in the region to international tourists and reduce seasonality
	Improvement of port infrastructure (cruise and tourist ports) and nodes of intermodal transport (road and railway transport system) to coastal tourism
	Promote cruise tourism
	Cluster maritime tourism destinations thematically (e.g. with cultural heritage sites)
	Develop and promote an integrated tourism product involving a network of ports, a network of marinas
	Develop tourism development indicators
	Promote sustainable tourism activities and routes, building a common brand of the region, diversifying the cruise and nautical sectors and enhancing the value and appreciation of natural and cultural heritage
	Reduce the impact of tourism related structures on the environment
	Improve quality and diversification of the tourism product offered
	Promote temporary and removable structures for touristic purposes in beaches and coastal zones
	Introduce more intensive cooperation in the region among public and private stakeholders
	Improve coordinated governance in the tourism sector
	Strengthen the UNESCO sites
	Reduce coastal and maritime tourism environmental impact
	Establishing proper monitoring mechanism

Table 2.2-1: Management Objectives – Coastal and Maritime Tourism

Maritime Transport	
High level goals	Sustainable maritime transport
	Spatial integration
	Market internationalization
Management Objectives	Reduce present and future maritime traffic congestion, allowing the expansion of cargo and passenger traffic, while limiting environmental impacts and conflicts with other uses
	Reduce pollution from ship traffic
	Develop a Vessel Traffic Monitoring System
	Improve Efficiency and Security of Ports (Improve Management, Develop Infrastructure, Implement ISPS Code)
	Promote short-sea shipping
	Promote measures to facilitate better connection of islands and long distance intra AIR ferry passenger transport
	Enhance and develop intermodal transport
	Identify and work on new trading routes
	Improve connections on a North-South and East-West axis and in connection to TEN-Ts Motorways of the Sea
	Smart Integration in the global Supply chain through shipping
	Optimization of interfaces, procedures and infrastructures to facilitate trade

Table 2.2-2: Management Objectives – Maritime Transport

Energy	
High level goals	Safe and sustainable hydrocarbon search and exploitation
	Interconnection of electricity grids and promotion of the development of integrated energy market, also from renewable energies
	Gas networks for diversified and efficient supply
Management Objectives	Support a sustainable development of search and exploitation activities, reducing conflicts with other uses and facilitating a thorough environmental permitting at the right spatial scale
	Ensure safety & security of search and exploitation activities
	Improving cross-border electricity interconnections, minimizing conflicts with other uses in the area
	Locate offshore wind farms
	Enhance the transportation of natural gas from Eastern Europe
	Support the location of new LNG terminals and the best use of the areas surrounding the existing LNGs and realizing main pipelines, minimizing conflicts with other uses in the area

Table 2.2-3: Management Objectives – Energy

Climate change (cross-cutting issue)	
High level goal	Risk management and Climate change adaptation in coastal areas
Management Objectives	Coastal defense against erosion and flooding, developing a strategic approach (proper spatial scale; priorities; intervention and constant maintenance) and using marine sands (relict and of new deposition) as a strategic resource for beach nourishment and protection
	Promote the establishment of the setback zone (as defined in the ICZM Protocol, Art.8)
	Enhance the retreat of urban structures and facilitate the rebuilding of natural defense morphologies (sand dunes, beach vegetation, etc)

Table 2.2-4: Management Objectives – Climate Change

Fishery and Aquaculture	
High level goals	Sustainable development of fishery
	Sustainable development of aquaculture
Management Objectives for Fishery	Zoning of fisheries to reduce overfishing of pelagic and demersal species, with particular attention to fishery in nursery areas and coordinated management of stocks
	Promote the role of small scale fisheries in the area, considering its important and peculiar socio-economic value for coastal communities
	Assisting to adapt fishery methods and gears to the new obligations deriving from the Common Fishery Policy Reform
	Creation of a control system of fishing effort (to tailor the EU fishery policy on regional specificities, filling the existent gaps in the southern Mediterranean areas)
Management Objectives for Aquaculture	Improve sustainable aquaculture (including offshore aquaculture), through proper space planning for the development of new sites, co-location with other activities and facilitation of permitting procedures
	Improve productivity, quality and environmental sustainability of aquaculture (including offshore aquaculture) through proper space planning for the development of new sites co-location with other activities and facilitation of permitting procedures
	Explore and improve possibilities for cross-border collaborations according which specific objectives should be selected.
	Introduction of new species with high commercial value

Table 2.2-5: Management Objectives – Aquaculture

Environmental Conservation and Protection (cross-cutting issue)	
High level goal	Achieve Good Environmental Status (GES)
Management Objectives	Enhance the network of Marine Protected Areas. Move towards 10% surface coverage by 2020 of the Adriatic and Ionian Seas by Marine Protected areas, in line with international commitments
	Implement the obligations of the WFD, MSFD, H&B Dir (GES, FCS and Targets) and other national relevant environment protection obligations, using the Ecosystem-Based Management approach, to reduce impacts and pressures on species, habitats and ecosystems
	Reduce information gaps about the impact of the protection regulation on adjacent marine habitats/species
	Establish common assessment methodologies and monitoring plans throughout the Adriatic and Ionian states
	Reduce/eliminate the most destructive fishing practices
	Harmonize MPAs management and create MPAs networks
	Enhance management skills and communication strategies
	Address eutrophication by transnational coordinated actions
	Reduce Marine Litter
	Integrate climate change into MPAs monitoring
	Establish network on information on Non-indigenous species
	Preserve sea-floor integrity
	Preserve food-web integrity
	Limit risk of Non Indigenous Species introduction
	Supporting the production of management plans for SCIs
	Definition of shared Management Plans

Table 2.2-5: Management Objectives – Environmental Conservation and Protection

Underwater cultural heritage	
High level goal	Preservation and sustainable use of underwater cultural resources
Management Objectives	Support the identification, documentation and research of cultural heritage on the seabed and coastal areas, facilitating the adoption of the long-term strategy for management and preservation of underwater sites of cultural importance
	Strengthen co-operation and sharing information across the region
	Achieve high standards in preventing and reducing threatening impacts and interventions
	Adopt the measures and solutions for the preservation of archaeological sites and historical wrecks
	Promote the presentation of underwater cultural heritage in situ
	Adopt the measures and solutions for sustainable touristic use of the cultural resources and its development and establish and manage parks and protected areas in internal and territorial waters
	Exchanging experience and sharing best practices for preservation and presentation for underwater cultural heritage through joint research projects and education programmes
	Examine the options for establishment of a joint technological platform for the research of underwater cultural resources

Table 2.2-6: Management Objectives – Underwater Cultural Heritage

Management objectives are partly operational, depending on the dimension of the problem and the scale of the area interested. In addition, other (non spatial) factors affect the operationality of the objectives. Furthermore, many of the management objectives are interlinked and may be locally conflicting in their achievement. Such potential conflicts will be managed, where possible, through the planning activity.

Goals and objectives set out in the Vision have been considered along the entire ADRIPLAN MSP process. The Vision designed by ADRIPLAN has been shared with the main regional stakeholders and in particular with the regions and the local administrations partner of ADRIPLAN. The pilot actions for FA1 and FA2, and in particular the relative SMART objectives and draft planning measures have been selected with the final aim to implement the Vision. In the same way, the strategy elaborated at regional level (AIR) is consistent with the Vision.

Barriers and Bottlenecks

The vision designed by ADRIPLAN, focused on the Adriatic-Ionian context, takes into account the existing environmental and socio-economic objectives already defined under the EUSAIR Strategy, including the targets and indicators in line with the EU requirements. The most difficult task was to specify the SMART objectives starting from the goals and management objectives identified for the three spatial domains. This is a fundamental step in the MSP in order to identify the planning measures and to achieve outcomes that are measurable. Therefore this task has to be faced since the beginning of the MSP process, involving all the relevant informed stakeholders.

Concerningthe design of the future scenario at 2020, the most difficult task was to collect all the relevant information concerning the investments/projects /programs in different sectors at national and European level. Furthermore, despite the best available knowledge, it is, in any case, difficult to foresee the future. Therefore, in order to achieve the sustainability objectives for the area, it is necessary to adopt a flexible and adaptive approach to be able to learn step by step from experiences and to develop solutions on a case-by-case basis.

2.3 Engaging stakeholders in the Adriatic-Ionian Region

2.3.1 Stakeholders in the Maritime Spatial Planning

Dealing with Maritime Spatial Planning (MSP) means including different human dimensions connected to the marine area (cultural, social, economic and institutional), throughout the whole planning phase. The MSP will only succeed with the understanding and consensus of people and stakeholders implementing the plan. Therefore the stakeholders' involvement and public participation is an important and mandatory part of the environmental decision-making process.

According to Art. 9 of the Maritime Spatial Planning Directive (Directive 2014/89/EU), "Member States shall establish means of public participation by informing all interested parties and by consulting the relevant stakeholders and authorities, and the public concerned, at an early stage in the development of maritime spatial plans". The EC Roadmap for MSP (COM(2008)791 final) stresses as well the importance to involve all stakeholders in order to achieve a broad acceptance, ownership and support for MSP implementation. Stakeholders' participation is also a source of knowledge that can significantly improve the quality of MSP. Furthermore, in areas beyond national jurisdiction, it is only the involvement of international stakeholders that will ensure regulation.

A bottom-up approach has more possibilities to succeed since the responsible authorities face considerable obstacles in dealing with marine areas due to multiple levels of competences and overriding international regulations.

MSP requires stakeholders' involvement during the different steps of the process: in the design, development and implementation of the plan and finally in monitoring and evaluation of it (Ehler and Douvere, 2009).

It is recognized that the involvement of stakeholders in the planning process can bring various benefits such as:

- Contribute to the transparency of the planning proposals, monitored by the different stakeholders that are involved;
- Achieving consensus at an early stage can reduce conflicts;
- Build trust between stakeholders with different objectives but same interests;
- Achieve a better understanding of the complexity (spatial, temporal, and other) of the marine management area;
- Gain a better understanding of underlying desires, perceptions and interests (often sector-oriented);
- Examine existing and potential compatibility and/or conflicts of different uses;
- Contribute to generate new options and solutions that may not have been considered individually;
- Sharing of information and data exchange.

The duration of ADRIPLAN project was very limited (18 months) and, therefore, it was difficult to apply a consequent and time consuming participatory process. Nevertheless, the project has foreseen to ensure the dialogue with stakeholders during the whole project phases and in each participating country.

In ADRIPLAN the stakeholders' role consisted in contributing to:

- Identification of main needs and priorities;
- Identification of key transnational and local issues to be addressed by MSP plans;
- Definition of visioning, priorities and synergies;
- Identification of main conflicts/synergies among uses and between uses and environmental components;
- Data collection and sharing;
- Elaboration of future scenarios;
- Evaluation of planning options;
- Fostering a common understanding of key transnational dynamics;
- Reach consensus.

2.3.2 Partecipatory Strategy

Public participation of different stakeholders in the decision-making process introduces a wide range of ideas, experiences and expertise, which motivate the development of alternative solutions. The result is also an improvement of the know-how of actors involved in the project.

In the ADRIPLAN project some relevant stakeholders were included into the partnership as inner-outer partners. This inclusion aimed at ensuring the participation of the key institutions in the elaboration of the MSP proposal. In addition, they have functioned as driving forces in involving other key stakeholders through a cascade effect.

The approach of participatory planning is a particularly popular method because it is aimed at establishing a decision-making processes concerning MSP issues within a wider arena of public and private actors. This approach allows taking into account the diversity of interests in the Adriatic - Ionian area contributing in reducing conflicts arising by changes processes.

The ADRIPLAN participation strategy has been carried out in different ways: ranging from "communication", with the elaboration of a web interface and of different tools for disseminating project information and results, to "stakeholders involvement", with the real participation of different stakeholders and decision makers in the MSP process. This allowed an actual cooperation with stakeholders in formulating visions, priorities and objectives of the MSP, as well as the elaboration of strategies and actions and the achievement of consensus on the MSP proposal.

The stakeholders' involvement strategy includes stakeholders' identification and mapping, meetings and workshops organization, stakeholders' analysis, evaluation of the involvement process and reporting.

The elaboration of an engagement plan has been the first step to determine the objectives of the stakeholders' involvement, to clarify the role of the stakeholders and the results to be achieved. The engagement plan is a process that can be adapted according to the project needs and timeframe. In ADRIPLAN a revision of the involvement strategy took place after the first macro-regional workshop in Rijeka. In order assess the work to be carried out, a Stakeholder Plan has been established. It aimed at monitoring the accomplishment of the foreseen activities in due time and at putting in relation the stakeholders' involvement according to the different planning steps of the project (Figure 2.3-1).

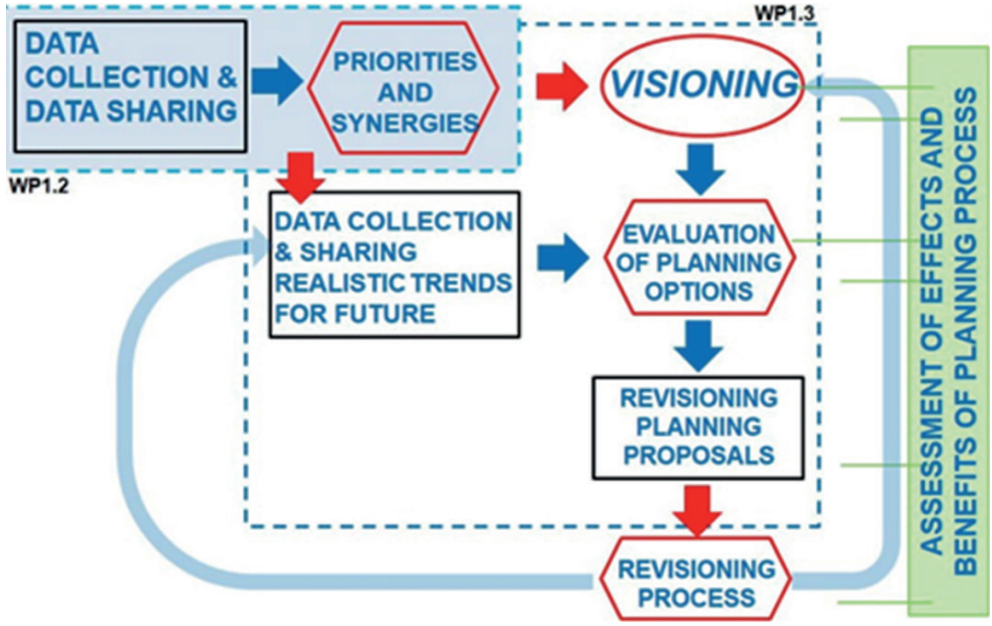


Figure 2.3-1: Planning steps and related SH involvement steps

2.3.3 Stakeholder's Mapping and Involvement Process

There are no strict rules for selecting stakeholders. The selection of stakeholders depends from the purpose of the engagement and the wider policy and project objectives. In ADRIPLAN an initial stakeholders' classification has been carried out in order to invite stakeholders to the first macro-regional workshop in Rijeka, Croatia taking place the 2nd month of the project. Since the stakeholders' involvement should occur from the beginning of a planning process, a preliminary stakeholders list has been elaborated, based on existing data bases, capitalizing in this way the work carried out in similar projects. The project partners provided their own stakeholders' list, which were inserted in the common database that included already around 300 names for engagement and communication purposes. This list has been continuously updated up to 400 names.

The list has been used for addressing a target communication, for inviting stakeholders to the project events, send them information material, identify the key stakeholders, select persons to be interviewed, ask data and information and ensure that all maritime sectors are represented by adequate organizations/persons.

The stakeholders' list has been merged in a database and continuously updated. The list has been structured with also the aim of grouping different categories of stakeholders according to their interests, themes and possible synergies (Figure 2.3-2).

After this phase of "mapping of the existing" it has been necessary to enlarge the list in order to avoid possible exclusions. The final version included over 400 names.

Selection of key stakeholders

A key question to be answered in the MSP process is: who are the stakeholders that are entitled to take part in the planning discussions?

Not all stakeholders are equally important or relevant; therefore, it is necessary to

weight them according to a list of criteria. Thus, from the preliminary list a new one has been produced, including only the key stakeholders. The criteria adopted for the selection of the core group of stakeholders are:

- Decision making role;
- Representation;
- Knowledge;
- Experience;
- Willingness to cooperate;

The last criteria were determined by the participation to the project workshops and by the persons answering the workshops evaluation questionnaires.

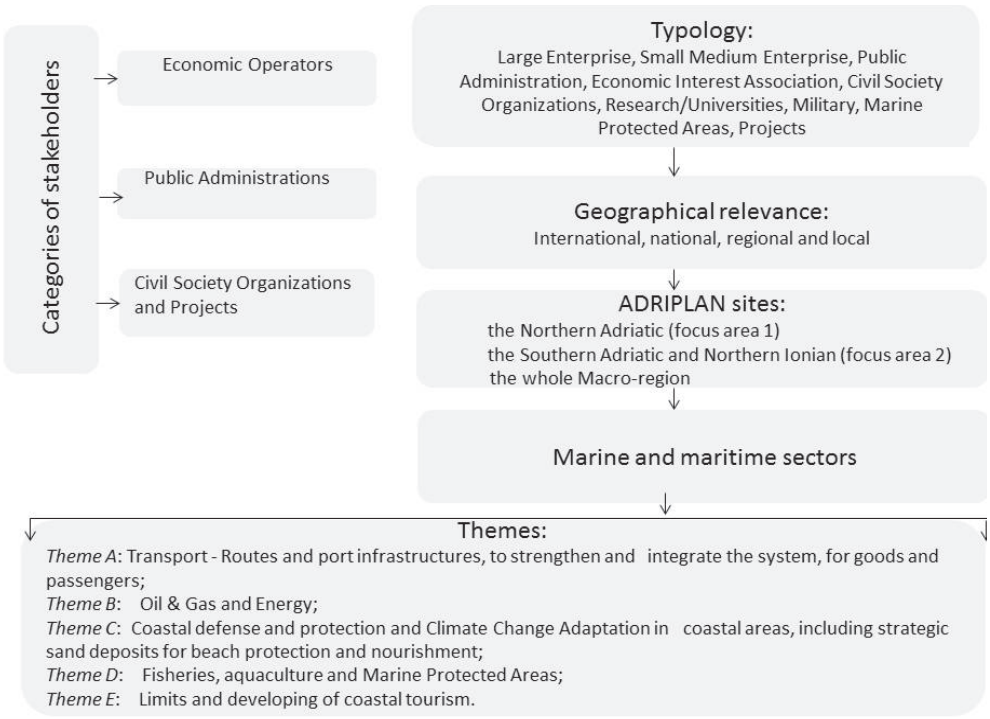


Figure 2.3-2: Stakeholder mapping

SECTORS	COUNTRIES/ORGANISATIONS	
ECONOMIC OPERATORS	**ITALY**	Fincantieri
	AMA Associazione Mediterranea Acquacoltori	Trieste Port Authority
	ARENARIA Srl	Telespazio SpA
	Assoporti	
	Venice Port Authority	**GREECE**
	CONFITARMA	Corfu Port Authority
	Ditenave - Distretto Tecnologico Navale e Nautico del Friuli Venezia Giulia	Corfu Sea Farm S.A.
		Aquaculture Association of Thesprotia
	Federcoopesca	Corfu Sea Farm Sa
	Legapesca	Corfu Port Authority
	Risposte & Turismo	
	Terminale GNL Adriatico S.r.l.	**SLOVENIA**
	TAP- Trans Adriatic Pipeline AG	Port of Koper
	Venezia Terminal Passeggeri S.p.A	Eles d.o.o.
	Soc. Coop. HYDRA	

	TECNOCADIMA Srl Ente Zona Industriale Porto Marghera Shoreline Società Cooperativa Ancona Port Authority Trans Adriatic Pipeline	**CROATIA** Port Authority Rovinj Port of Rijeka Authority j.s.c. **MONTENEGRO** Public Enterprise for Coastal Zone Management
PUBLIC AUTHORITIES	**INTERNATIONAL** CHEAM- Mediterranean Agronomic institute of Bari UNEP-MAP FAO FORUM OF THE ADRIATIC AND IONIAN CHAMBERS OF COMMERCE JRC – Joint Research Centre **ITALY** Veneto Region Emilia Romagna Region Friuli Venezia Region Marche Region Molise Region Apulia Region Adriapan Adriatic Protected Areas Network ARPA Puglia Municipality of Manfredonia MPA Ente Parco Nazionale del Gargano MPA - Miramare MPA Porto Cesareo MPA Torre Guaceto MPA Tremiti ISPRA Ministry of Environment Land and Sea Corpo Forestale dello Stato GAC Lagune del Gargano CMCC Municipality of Venice COISPA Tecnologia e Ricerca Direzione Marittima Ravenna	Università degli Studi Ferrara Università Politecnica delle Marche Università di Macerata **GREECE** Ionian islands Regional Council City of Corfu Region of Epirus Region Of Ionian Islands Municipality of Igoumenitsa Ministry of Environment, Energy & Climate Change Ministry of Maritime Affairs Decentralised Administration of Epirus and West Macedonia Focal Point of EUSAIR in Greece Ministry of Tourism **SLOVENIA** Ministry for Economic Development and Technology Ministry of Infrastructure and Spatial Planning University of Ljubljana, Dept of Archaeology Institute for Nature Conservation, Regional Unit Piran Josef Stefan Institute University of Ljubljana, Department for Archaeology Ministry of Development and Competitiveness **CROATIA** Ministry of Maritime Affairs, Transport and Infrastructures Institute for physical planning of Region of Istria Zadar County
CIVIL SOCIETY ORGANIZATIONS AND PROJECTS	**ITALY** WWF Italia RITMARE project Fondazione Cetacea Onlus Uomini delle navi **SLOVENIA** Working Groups Cittadini per il Golfo	**EU PROJECTS** MONALISA 2.0, COCONET, COEXIST, DEFISHGEAR, PLANCOAST, SHAPE, ADRIGOV, ECOSEA, DEFISHGEAR, BALMAS, ADRIAMED, NETCET, PERSEUS, PEGASO, MARLISCO, POWERADE, APICE.

Table 2.3-1: List of key stakeholders

2.3.4 Tools for Stakeholders' Engagement

Once identified the key stakeholders, the best communication methods to maximize the effectiveness of stakeholders' participation in the MSP process were selected. Due to the complexity of the MSP issues, ADRIPLAN adopted different tools and techniques to engage various stakeholder groups. Outreach tools, such as project website, social networks, factsheets, questionnaires, brochures, data portal, conferences and workshops, were used to disseminate the project's activities and communicate key results. The main tools were:

- Meetings/workshops/conferences

During the project lifetime, several meetings have been organized, in particular with institutional bodies. The aim was to introduce the project objectives, and asking for inputs in developing a shared maritime spatial plan for the Adriatic-Ionian Region. Toward the end of the project this activity has been intensified in order to discuss with the institutional stakeholders the strategies and actions defined and to achieve consensus. In Figure 2.3-3 the most relevant meetings are summarized

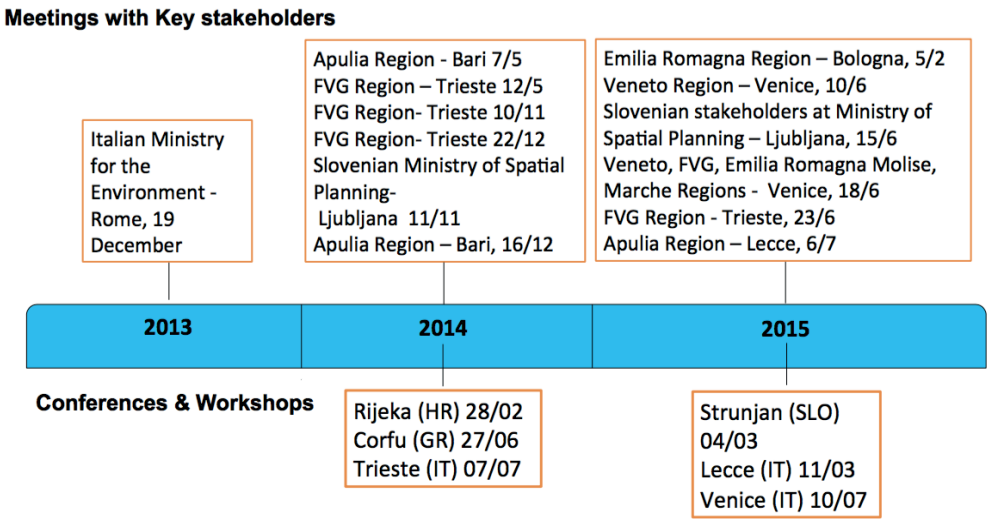


Figure 2.3-3: Most relevant meetings and workshops

The engagement of stakeholders has been consolidated mainly through workshops. The workshops have been organized in an interactive way including discussion tables where stakeholders could express their point of view using maps and visual tools. Before the events a set of informative material has been sent to the stakeholders list and inserted on the project web site in order to provide them with relevant information on the workshops' topics.

Six milestones events with stakeholders have been organized by the project:

First macro-regional stakeholders workshop and conference, 28 February 2014, Rijeka, Croatia (23 participants from 3 countries).

The workshop, structured in parallel sessions, was aimed at identifying different stakeholders' interests and the key issues for transboundary Maritime Spatial Planning (MSP). The workshop was also the occasion to verify the possibilities of sharing local

knowledge useful for the planning process. The discussion was articulated around the following themes:

1. Transport - Routes and port infrastructures, to strengthen and integrate the system, for goods and passengers;

2. Oil & Gas and Energy;

3. Coastal defense and protection and Climate Change Adaptation in coastal areas, including strategic sand deposits for beach protection and nourishment;

4. Fisheries, Aquaculture and Marine Protected Areas;

5. Limits and developing of coastal tourism.

Second and third stakeholders workshops, 27 June 2014, Corfu, Greece (34 participants from 4 countries) and 7 July Trieste, Italy (54 participants from 3 countries).

The first workshop in Corfu was dedicated to the FA2, and involved stakeholders from Greece, Albania, Montenegro and Italy. The second workshop in Trieste held on 7th July 2014, was dedicated to FA1, involving stakeholders from Italy, Croatia and Slovenia. The two events aimed at presenting ADRIPLAN's initial assessment results and discuss, with private and public stakeholders, from local to international levels, the needs and priorities for an MSP process, current strategic programs and projects undertaken in the two focus areas, existing barriers, present and potential conflicts and synergies at Focus Area level. This stakeholders' consultation has been essential for setting the planning exercise framework.

Fourth and fifth stakeholder workshops "Let's make a real Adri Plan", 4 March 2015, Strunjian, Slovenia (52 participants from 3 countries) and 11 March 2015, Lecce, Italy (27 participants from 2 countries).

The two workshops, dedicated respectively to FA1 and FA2, had the main objective of performing a real "planning exercise", discussing planning scenarios and spatial configuration of human activities visualized in maps, identifying possible planning options and elaborating a spatial allocation (zoning) draft in a proposed area, within the two Focus Areas.

Final conference "Planning the Sea - Towards an effective Maritime Spatial Planning in the Mediterranean Sea", 10 July, Venice, Italy. The conference aimed at presenting the outcomes of the project, in particular the strategy elaborated at the macroregional level, and the planning measures pointed out for the two Focus Areas.

The full reports of each workshop are available on the project web site (http://adriplan.eu/index.php/stakeholders/stakeholder-workshops). Each workshop has been prepared by a series of meetings (see Figure 2.3-3) with regional and national authorities and economic associations in order to better define the discussion key issues, to share the planning measures proposed and to reach a larger consensus on the main project outcomes.

Questionnaires/Interviews

A first questionnaire was issued before the Rijeka event and was addressed to technical/institutional partners and observers aimed at knowing their MSP needs and case studies. The questionnaire offered inputs for the workshops' discussion. During the

second semester, the ADRIPLAN project elaborated a specific questionnaire in order to collect information about different interests, needs and priorities of actors/stakeholders involved in the use and management of marine space of the Adriatic-Ionian area. The questionnaire was developed with the aim of better characterizing real and emerging conflicts among sea-based activities and of identifying potential synergies. The responses give also an overview on the main strategic programs and projects undertaken in the Adriatic Ionian Region.

In order to increase the number of responses, the technical partners interviewed the key stakeholders, using the questionnaire as guideline. In this way the response rate was almost 40%. The received responses to the questionnaire are 73. Most of the respondents were from the public sector, in particular from public bodies (18% of responses from national public body –, and 30% from regional and local public bodies). Only 7 respondents were from Economic Interest Associations representing in particular fishing and aquaculture sectors. The responses cover equally the two Focus Areas (29 FA1 and 22 FA 2) and 21 for the macroregion.

The results of the questionnaires (deliverable AIP-5.2-1.3.1-1.0) were presented during the stakeholders workshops taking place in Strunjian and Lecce and were published on the project website.

Project web site and social media

At the very beginning of the project a communication plan, containing the dissemination strategy, was issued, aimed at involving stakeholders. Due to the short project duration, a strong effort has been made to deliver the most important dissemination tools as soon as possible.

The ADRIPLAN website (**www.adriplan.eu**) has been set up at an early stage to make the project immediately visible and to provide stakeholders with information related to the project events and activities. The social networks (Facebook and Twitter) have been continuously updated. A specific section of the web site is dedicated to the stakeholders and workshops with photos, save the dates, registration forms and agendas, supporting material and workshops' reports. In this way also who could not attend the event, had the possibility to be informed continuously on project progresses and workshops' outcomes and react accordingly.

Data Portal

This tool allows stakeholders to access, share, comment and process available data, and suggest new datasets. In addition, GIS maps with the visualization of the spatial situation, forecasts and sectoral analysis used in the workshops, have been very useful tools.

2.3.5 Evaluation of Stakeholders Engagement Processes

An evaluation of stakeholders' engagement process has been carried out during the project lifetime in order to be able to reflect and re-think the involvement methods in case necessary. At the end of each workshop an evaluation questionnaire has been distributed to the participants. The aim of the questionnaire was to have the participants' opinion about workshops' organization and to understand the arguments discussed. It can be stated that the questionnaires enabled to have some feedback about both, the structural organization of the workshop and the contents. The workshops were generally considered as relevant for stakeholders' activities and the facilitation, as well as presentations and provided information, were assessed as sufficiently clear and useful. Also the materials sent to the participants for the preparation of the workshop have been generally considered as adequate. The results of this survey have been described in each workshop report posted on the project web site.

2.3.6 Results

A transparent and consistent stakeholders' participation in all phases of the project proved again to be essential to progress towards the plan construction. In most situations, it was necessary to insist in the participation of key stakeholders, since the awareness of the importance of the MSP process was not yet perceived. The project has provided stakeholders with the opportunity to express their opinion about the MSP at cross-border level, at the same time the project staff has learnt the different needs and planning perspectives presented by the representatives of each country involved in the project.

The participation of the stakeholders to the workshops can be considered very satisfactory in terms of number of participants, interest and feedback provided. The participation of stakeholders to the workshops organized by the project has been positive (190 delegates attended 5 workshops) with a good gender balance (55% men and 45% women). Concerning the number of attendance per country the high number concerns Italy (111 participants) followed by Slovenia and Greece with 30 participants each, Croatia 12, Montenegro 3, Albania 1 and EU 2. Regarding the type of organization the Public Administration represented the highest percentage with 71% followed by Economic Operators with 17.3% and Civil Society with 11.5%. There was not a substantial difference between the two focus areas regarding the gender balance and the types of organizations attendance. Also the response rate to the second questionnaire (40%) can be considered very positive.

The mix of different tools adopted proved to be a good approach to face the challenge to involve stakeholders of the different countries, even if they did not had time and/or resources to attend the cross-border workshops.

As said stakeholders have been involved since the very beginning and their precious contribution resulted in the provision of data for the Initial Assessment Report and discussion about existing barriers, present and potential conflicts and synergies at focus area level. Their inputs about needs and priorities for their areas, as well as the spatial allocation of uses within the two Focus areas, have been taken into consideration by the project team and included into the final maps.

Barriers and bottlenecks

From ADRIPLAN experience we can highlight several key aspects that need to be taken into account when developing a MSP process.

The majority of barriers and bottlenecks derived from an insufficient understanding of MSP process by several stakeholders who were not sufficiently conversant with MSP. Although the engagement of public administration representatives are fundamental for the MSP development, the under-representativeness of the private sector (Large Enterprises and SMEs) is a critical factor to take into consideration as well as unbalance country representativeness (problem present in Focus Area 2 due to the lack of financial resources for attending the event). To obtain attention from the private sector it is necessary to have a mandate and be accredited by relevant institutions. Furthermore, the involvement can be more productive if the discussion is developed around pre-identified/ developed draft scenarios and measures.

Different cultural contexts in the macro-region and language barriers can reduce the cross-border perspective favouring the discussion on local issues and the acquisition of data can be very difficult due to bureaucratic reasons.

There is a multitude of laws related directly or indirectly to MSP in the involved countries but a consistent common set of laws directing MSP governance and management is lacking. The main policy frameworks governing the development of the marine space are usually planning instruments that have very limited room for the integration of different sectors and participation of stakeholders. The EUSAIR strategy represent a solid base for a shared MSP in the Adriatic region and the planning exercise applied in ADRIPLAN can represent a good example for the integration of stakeholder in the MSP process.

2.4 The process of planning elaboration

2.4.1 Analysis of present and future maritime uses

As highlighted in the description of ADRIPLAN methodological approach (par. 1), the first step of the process of planning elaboration consists in the analysis of present uses (reference year: 2014) and the definition of an exploratory scenario based on the analysis of strategies, projections of maritime uses and projects to be developed in a near future (reference year: 2020). The information have been acquired through a critical review of strategic policy and planning documents, also looking at relevant programmes and projects that have been approved or that are under approval. Most of the inputs have been acquired thanks to the contribution of scientific and institutional partners. A relevant contribution in data collection derives from other projects (e.g. SHAPE, COCONET, RITMARE, etc).

The results of this first step of the analysis consists in identifying the distribution of uses, to support the drafting of some first considerations about the spatial distribution of maritime uses and about the main spatial trends of the considered sectoral development.

The analysis of current and future uses is developed considering the different identified categories of maritime uses (i.e. energy, fishery & aquaculture, maritime transport & tourism, environmental protection, sand extraction and military areas). Positive and negative interactions with other uses are analysed more in depth through the analysis of synergies and conflicts among uses (see par. 2.4.3). Notably, the analysis of present and future conditions is based on the available data and information, which can be easily updated with available new information, because of the structure and methodology for data analysis supported by the data portal as open repository (see par. 2.1.3). Some information are derived from the discussion with the stakeholders along with the ADRIPLAN stakeholders' participation program (par. 2.3.2).

The following sections, describing the information acquired on current and future uses, are organized considering single sector categories, in line with the identification of relevant sectors described above. Firstly, the contents included in each group of uses are specified. Secondly, selected information about uses at present and future conditions is presented on the base of a division in sub-categories, as shown in Table 2.4-1. Each sub-category is identified with a logo, which is used also in the cartographic outputs. The dotted line around the logo indicates future uses, while the continuous one is used for current uses. Finally, the map representing the allocation of current and future uses withing the AIR is presented. Notably, the layers reported in the maps of uses correspond with the layers uploaded in ADRIPLAN data portal.

Categories	Maritime uses/activities
Energy	- Oil & Gas Research - Oil & Gas Exploitation - LNG facilities - Cables and Pipelines - Renewable Energy Facilities
Maritime Transport & Tourism	- Coastal and maritime tourism - Maritime Transport - Naval Base Activities
Fishery & Aquaculture	- Trawling - Small scale fishery - Aquaculture
Sand Extraction / Coastal Defence / Military areas	- Offshore Sand Deposit - Coastal Defence Work - Military Areas - Dumping areas for dredging
Environmental and Marine Protection	- Protected Areas (MPAs, Natura 2000 sites)

Table 2.4-1: Categories and Sub-categories of uses

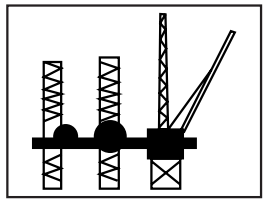
Energy

The category "energy" includes different anthropogenic uses such as:

- LNG terminals and facilities;
- Hydrocarbon investigation and exploitation blocks;
- Cables and pipelines;
- Powerlines and electricity grids.

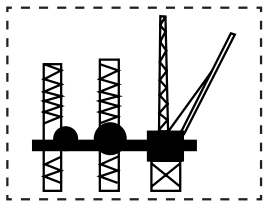
The energy sector is crucial for MSP, due to its strategic and socio-economic relevance, to its transboundary dimension and to the current and potential interactions with other uses and with relevant environmental components.

LNG Facilities



Current uses

- The Adriatic LNG (Porto Levante) is the only offshore LNG terminal in the Mediterranean Sea.

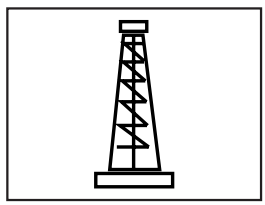


Future uses

- Projects for the localization of onshore coastal LNG terminals in Krk (HR) and Monfalcone (IT) have been approved.

- Project for the localization of onshore coastal LNG terminal in the North Adriatic still to be decided. Original siting inside the port of Trieste ("Zaule").

Hydrocarbon Research and Exploitation



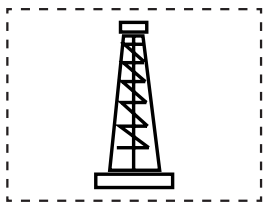
Current uses

- The Adriatic Sea represents ENI's main production area in Italy.

- Hydrocarbon production is mainly concentrated at the offshore drillings near the Italian coast.

- Greece has one hydrocarbon extraction platform.

Future uses



- An intensification of energy uses is foreseen in the whole Adriatic-Ionian Macro-Region.

- New concessions for hydrocarbon research and exploitation are granted in Italy, in line with the National Energy Strategy.

- Croatia established 29 extraction blocks from Istria to Dubrovnik and 19 oil extraction platforms, whose localization has not yet been specified. Extraction platforms are expected to be operative within 2019.

- Hydrocarbon extraction platforms are expected to be operative in Albania by 2020.

- 10 hydrocarbon extraction platforms are expected to be operative in Montenegro by 2018.

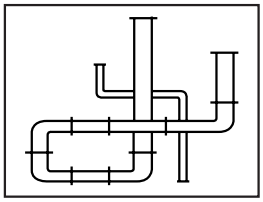
- The promotion of hydrocarbon exploitation across the Ionian Region is foreseen by the Greek national legislation, as it is expected that there is an 80% possibility of hydrocarbon deposits in the area.

- The future prospects of the hydrocarbon sector are tightly connected to the international oil price levels as these affect the future production of the current drillings as

well as the research and exploitation of new sources.

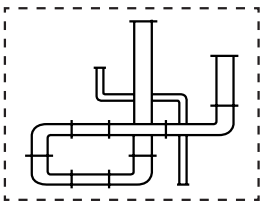
- 50 Projects of Community Interest should be realized (gas).

Cables and Pipelines



Current uses

- The Adriatic-Ionian Macro-Region is a cross-road for East-West and North-South energy connections.



Future uses

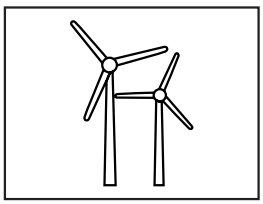
- 12 Strategic infrastructures and 100 Projects of Community Interests (electricity) should be realized.

- The realization of a submarine cable connecting Veneto Region and Slovenia is foreseen (PCI project).

- The planned gas pipeline projects of Trans Adriatic Pipeline and Interconnector Turkey-Greece-Italy provide hints that the potential of AIR on becoming an energy cross-road will be fully exploited. The construction of the Greek part is provisioned to start on 2016 and end at 2019. The Agreement was signed on 19/06/2015.

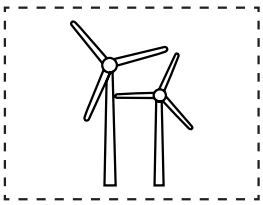
- The South Stream project, which foresees the localization of a pipeline connecting Italy and Greece, would be aimed at realizing a pipeline system connecting Russia with EU countries, and would have be realized within 2017/2018. It is unlikely to be realized.

Renewable Energies



Current uses

- Currently there are no Offshore Wind Farms on the Adriatic-Ionian Macro-Region.



Future uses

- Several projects exploring the possible localization of Offshore Wind Farms have been developed in Greece and in Italy.

- In Greece, offshore wind farms could be developed only in specific areas proposed by the National Government (Law 3851/2010), located in FA2. However, four investment companies have expressed their interest in developing offshore wind farms in Dapontia Islands and one in the area between the Amvrakikos Guld and Lefkada Island.

- Increased maritime traffic and unrevealed potential of wind and tidal power generation have probably hindered the development of the sector.

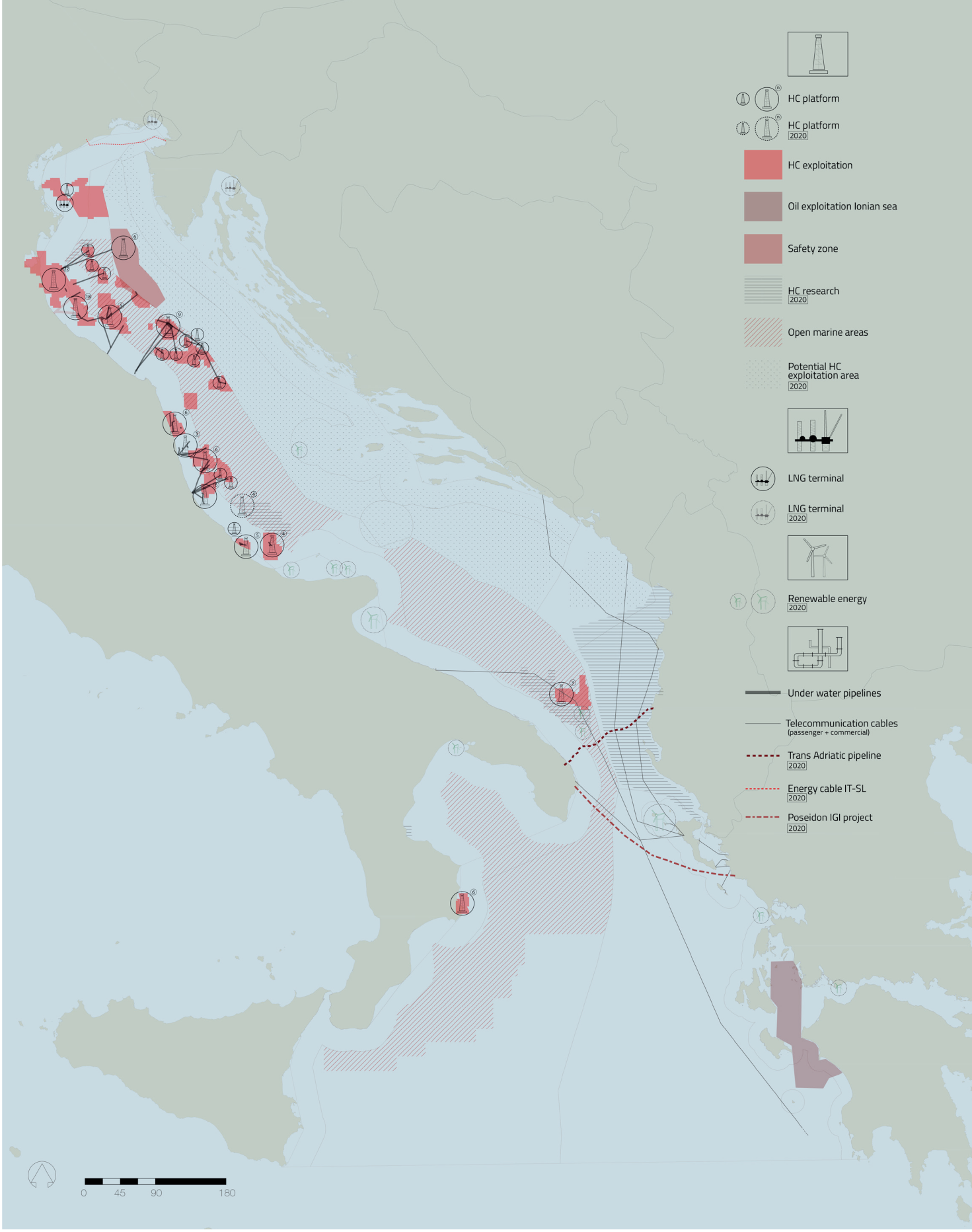


Figure 2.4-1: Map of current and future uses - ENERGY

Fishery and Aquaculture

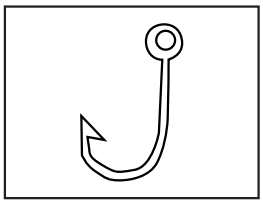
The category "fishery" includes both commercial and recreational fishery. The uses considered are:

- small scale fishery (1-12 and 12-24 m vessels);
- pelagic trawling;
- bottom trawling;
- recreational fishery.

The category "Aquaculture" includes marine farms and aquaculture sites

.

Fishery



Current uses

- In the whole AIR, from a socio-economic point of view fishery activities are predominantly at small-scale.

- For what concerns the Italian side, fishery is one of the leading economic sectors.

- Bottom trawling is the predominant regional activity considering vessels capacity, while static gears, typical of small-scale fisheries, are still used by the largest number of boats, although the variety of crafts is getting poorer if compared to the past.

- Recreational fishing is widely practiced in this area, especially during summer, although there are no official data, with the exception of marine protected areas.

- In Croatia, 80% of the fleet is composed by 1-12m vessels; 90% of the catches are sardines, anchovies and small pelagic species.

- Croatia exports demersal fish in Italy (EUROFISH, 2015).

- Data on Croatian small scale fisheries are very few and difficult to be recorded due to the huge number of small fishing ports scattered all along the coast line.

- Italy created in 2010 the North Adriatic fishing district, which includes marine and coastal areas of Friuli-Venezia-Giulia, Veneto and Emilia Romagna.

- In Italy bottom trawling is prohibited in ecological sensitive areas since 2006.

Although Croatia has the highest number of vessels, Italy has the highest total gross tonnage.

- In Italy, around 10% of fishermen declares that they might leave fishery if compensated in a proper way.

- In Greece, a total of 678 fishing vessels operates in the Greek part of FA2, the majority of which (77.6%) are registered at the Port of Corfu Island. The small-scale fishing fleet (647 vessels) is primarily located close to the city of Corfu, operating mainly in the Corfu straits.

- In Greece, the bulk of the fishing effort of trawlers and purse-seiners is limited in the

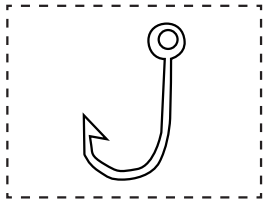
straits between Corfu Island and Epirus, and to a smaller extent in the waters north of Corfu Island, in the area of Diapontia Islands. Both fleets also operate at the marginal territorial waters of Greece and Albania, competing with the fleets from these countries for the same fishing stocks.

- 120 out of 450 assessed and reviewed stocks in the Mediterranean are potentially subjected to overexploitation.

- The fishing fleet per NUTS III region of AIR is exceeding the European average by 55%, thus providing hints for a specialization of AIR in the sector.

- The most active regions in fishing activity can be found at the Italian coast, where fish production contributes almost only to supply the domestic demand, while in countries such as Croatia, Albania and Greece, fish products are highly exportable.

- Relevance of fisheries for the Macro-Region is not based on its economic contribution to GDP, rather than on its social and cultural value due to the high level of employment in the sector.

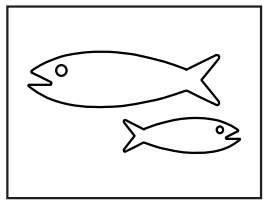


Future uses

- Recreational and sport fishing are increasing in the Adriatic-Ionian Region.

- The fishing fleet of the region is steadily reduced on a year-by-year basis; however, its average length and power is increasing.

Aquaculture



Current uses

- The Adriatic region is the most important area for mussels production. The most active sub-regions are located in the North Eastern coast, at the Croatian coast and Thesprotia at the Greek Ionian coast.

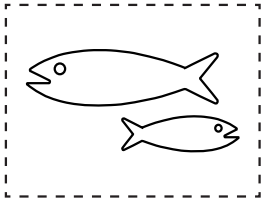
- On the Italian side, Apulian productive base in consolidating. It currently consists of 15 active fish farms.

- In Croatia (2012), sea bass and sea bream aerate represent 60% of the total mariculture production volume, followed by tuna (25%).

- In the Ionian part there are several aquaculture farms and few process units that operate in the Sagiada strip, and one unit in the Northern area of Corfu (Kassiopi).

- In Greece there is an overuse of marine areas for aquaculture production, however Greece has already prepared the Aquaculture Operation Plan identifying new potential fish farms sites.

- The production of the sector is considered as highly exportable thus strengthening significantly the local and national economies of the Region.



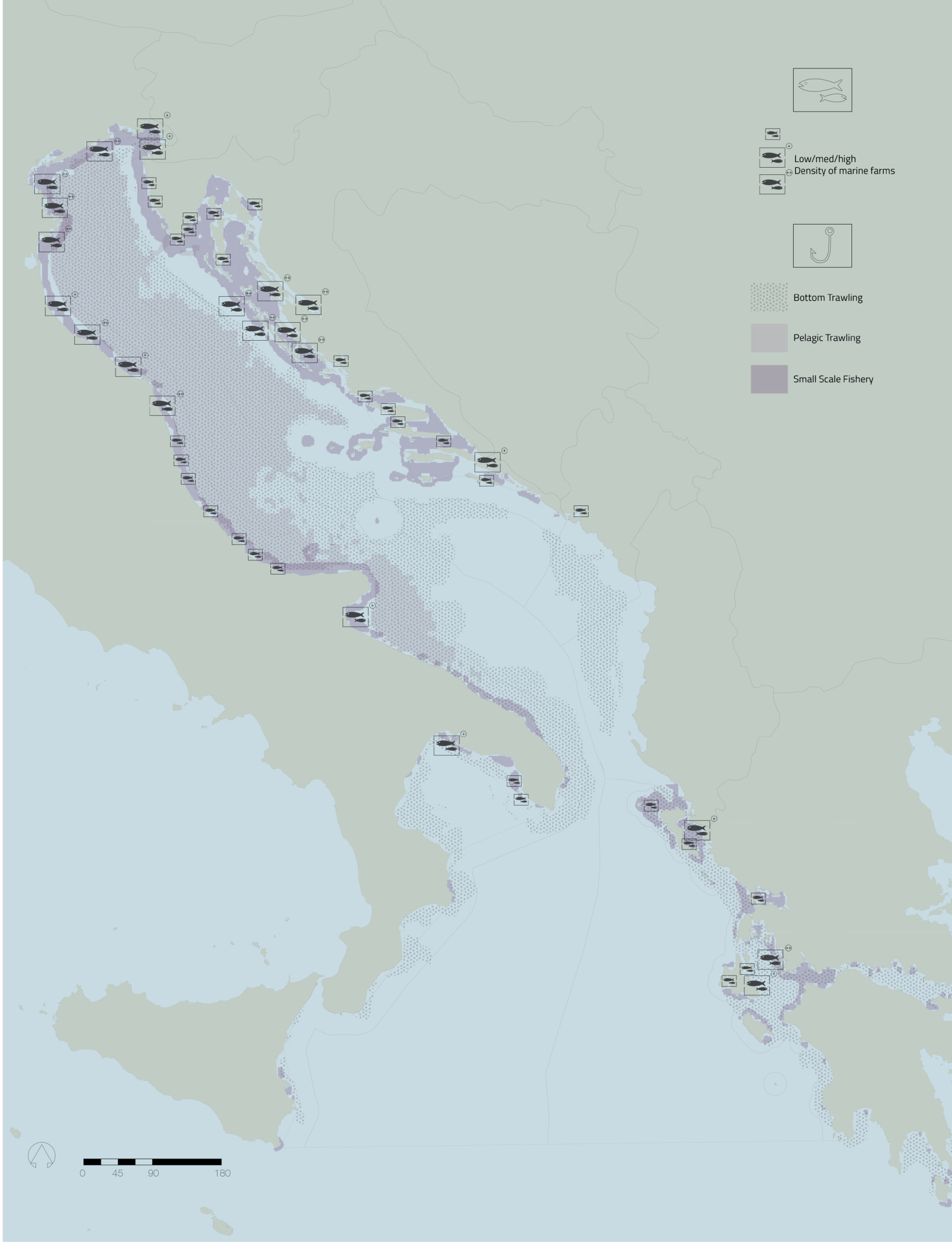
Future uses

- There is a significant potential for increasing aquaculture capacity in the Macro-Region (EUSAIR Action Plan).

-The sector is expected to be further expanded in countries where planning procedures are at advanced stages (with respect to permissions issuing and providing suitable places for the development of production units) such as Greece, Italy and Croatia.

- The importance of aquaculture is testified by EUSAIR, which places the sustainable development of the sector amongst the four main priorities of the Macro-Region's future, while its high exportable product renders the sector as one of the most crucial for the development of Blue Economy in the area.

Figure 2.4-2: Map of current and future uses - FISHERY AND AQUACULTURE

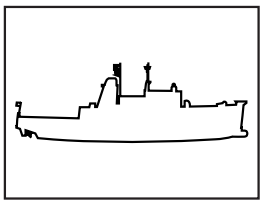

Low/med/high
Density of marine farms
Bottom Trawling
Pelagic Trawling
Small Scale Fishery
0
45
90
180

Maritime Transport and Tourism

This category includes:

- uses strictly related to maritime transport (passenger and commercial shipping routes);
- uses related to transport infrastructures (ports, harbours, marinas);
- coastal and maritime tourism (cruise shipping routes, ferry routes, seaside/beach tourism, cultural tourism).

Maritime Transport



Current uses

Passenger transport is highly subject to seasonality.

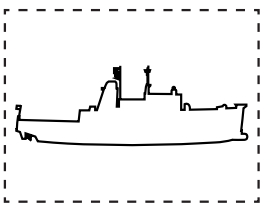
- The share of the Adriatic-Ionian Macro-Region to the total EU passenger transport is higher than the respective share for commercial transport. There is a high traffic intensity between Italy and the Balkans.

- Passenger transport is mostly concentrated at the Croatian coast, at the lanes connecting Balkan ports with Italian coast and at the intraregional lanes of Calabria.

- FA1 is one of the areas in which the average traffic density among the highest in all Mediterranean.

- 2166 local units, directly connected to water transportation, are operating at the region providing jobs to more than 10k people (Eurostat 2014).

- During the period of 2008-2013, the total transported passengers volumes slightly decreased mostly because of the economic downturn of Europe. Nevertheless, in the same period the annual passenger transportation in the region was steadily exceeding the 12% of the total passenger volumes of the EU.



Future uses

- Commercial transport generates more value and job places.

- Intensification of Short Sea Shipping is expected and promoted by EU.

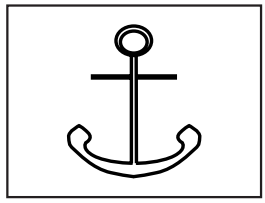
- Development of a cruising route connecting Venice-Ravenna-Bari-Sivola and Kotor.

- Container traffic is expected to grow by 350% by 2020 (NAPA forecasts).

- The future prospects of commercial transport are considered positive as the world trade seems to recover from the downturn of 2009-2012 period and maritime transport is expected to fully recover in the next years.

- The port of Trieste is the first Italian port for what concerns crude oil traffic in Italy.

Ports and Harbours

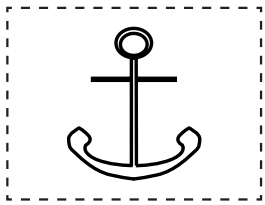


The total cargo transported by regions' ports is exceeding the 6% of the total cargo handled at European ports (thousand tonnes).

- The northern ports are mostly targeting at container market as they have already established a direct connection with the ports of Asia.

- Venice Port is the main cruising homeport in the Mediterranean.

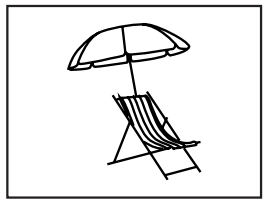
- The southern ports are presenting remarkable records at Ro-Ro activity as they fully exploit the dense lanes, which connect the Eastern Italian coast with the Balkan Peninsula.



The tendency of the shipping sector for the deployment of ever larger ships may lead to a traffic concentration at already large hubs of the area which have the adequate infrastructure to host the new mega carriers.

- All the main ports foresee an adaptation.

Coastal and maritime tourism



Current uses

- The Adriatic Ionian Macro-region includes 3 out of 5 of the most developed Mediterranean countries for maritime tourism (Italy, Croatia and Greece) and includes different models of tourism development: from low profile to niche tourism and from mass tourism to high profile tourism.

- The tourist product of the region is mostly based on the "sea and sun" pattern thus leading to seasonality issues.

- The tourist product is highly exportable as over 50% of the total nights spent at Adriatic-Ionian Macro-Region are attributed to non-residents of the hosting/ destination countries.

- Coastal and cruise tourism are recognized as key economic and development factors in the Focus Area 1

- Nautical tourism is mostly spotted on the northern part where mooring infrastructures are more developed. (Eurostat 2014).

The average passenger per NUTS III of the Adriatic-Ionian Macro-Region is exceeding the average cruise visits at EU level by 50% and concentration of visitors is observed at popular cruise tourism destinations of the project area such as Venice, Dubrovnik, Kotor, Corfu and Bari. More than 23k local units are providing accommodation services while another 118K units are providing food and beverage services. These two types of local units provide jobs to more than 577K people.

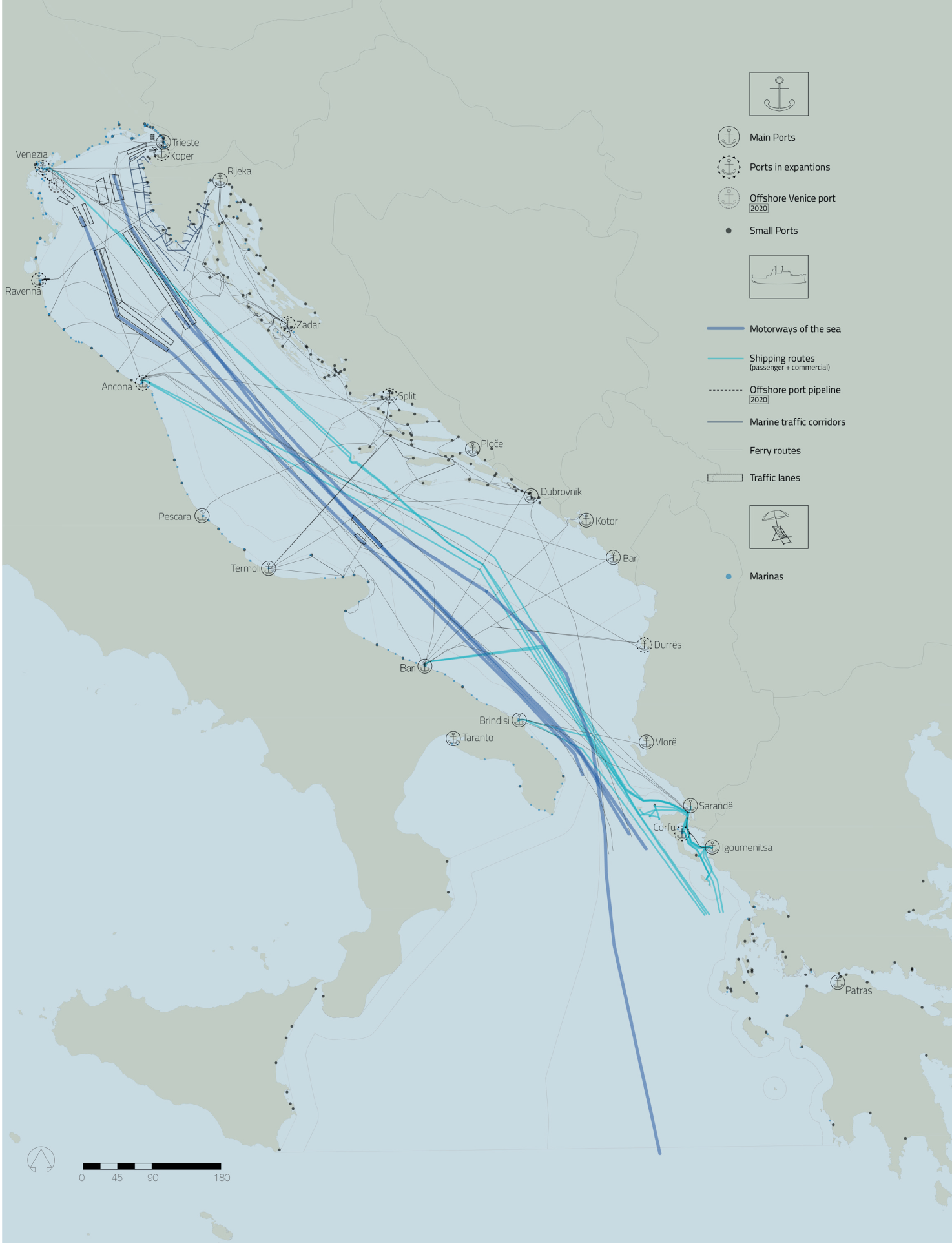
Future uses

- There are several projects for improving tourism infrastructures in Zadar (Croatia) and also several investments for improving tourism infrastructures and services in Montenegro.

- Yachting tourism is expected to increase especially at the Northern part of the Adriatic-Ionian Macro-Region where berthing capacity is higher and marinas are equipped with modernized infrastructure and services.

- Cruise traffic in the Mediterranean is expected will be stabilized mainly due to the unstable political environment of the Southern Mediterranean Sea and the increase of planned cruises in Eastern Asia and Australia.

Figure 2.4-3: Map of current and future uses - MARITIME TRANSPORT AND TOURISM


Venezia
Trieste
Koper
Rijeka
Ravenna
Zadar
Ancona
Split
Ploče
Dubrovnik
Pescara
Kotor
Termoli
Bar
Durrës
Bari
Brindisi
Taranto
Vlorë
Sarandë
Corfu
Igoumenitsa
Patras
Main Ports
Ports in expantions
Offshore Venice port
2020
Small Ports
Motorways of the sea
Shipping routes
(passenger + commercial)
Offshore port pipeline
2020
Marine traffic corridors
Ferry routes
Traffic lanes
Marinas
0
45
90
180

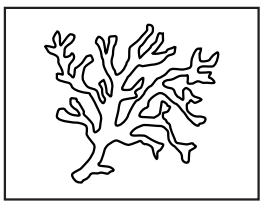
Environmental Protection

Within the analysis of current and future uses, a section is dedicated to environmental protection, here defined as the use of marine space dedicated to the preservation of the integrity of marine ecosystems.

This category includes:

- Marine Protected Areas;
- Natura 2000 sites;
- Biological Protection Sea Zones.

In ADRIPLAN the protection of the environment is considered as a cross-cutting theme, which orients the definition of both the strategy for the Macro-Region and the pilot actions in Focus Area 1 and Focus Area 2.



Current uses

- The Adriatic-Ionian Region hosts hotspots of biodiversity.

- The realization of a Marine Protected Area (MPA) includes also a zoning of the areas and the identification of uses restrictions in each zone.

- Zoning within MPAs:

Zone "A":

- No navigation
- No bathing
- No entry
- No take

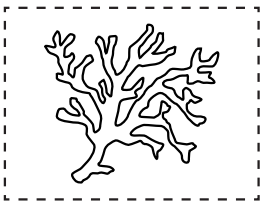
Zone "B":

- Anchoring restricted
- Limitations in fishing activities

Zone "C":

- Partial reserve – buffer area

In the Ionian Island Region three coastal lagoons and a marine coastal area in Corfù are included in the Greek Natura 2000 network.



Future uses

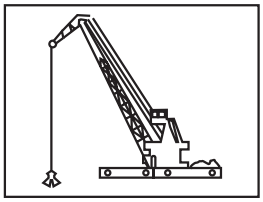
- According to EUSAIR, up to 10% of marine surface will have to be dedicated to MPAs or site-specific conservation measures by 2020.

Figure 2.4-4: Map of present and future uses - ENVIRONMENTAL PROTECTION

Sand Extraction and Military areas

The last part of the analysis of maritime uses is focused on sand extraction and on military areas, including foul areas and military practice area. With respect to the latter, it is worth considering that the two sub-categories of military areas, i.e. military practice areas and dumping areas for munitions, have different characteristics that should be considered when approaching to the spatial allocation of maritime activities. However, the lack of information about military areas and the incompatibility declared by responsible institutions with all other maritime uses do not enable to develop specific considerations from a spatial planning perspective.

Sand Extraction



Current uses

- There is a scarce availability of information with respect to the location and the classification of sand deposits.

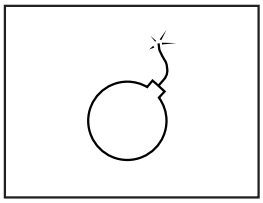
- Only small areas of offshore sand deposits in the continental platform have been exploited until now.

- Sand deposits in the Northern Adriatic Sea are classified as fine sand.

- Sand extraction activities are needed to nourish beaches on the Italian Adriatic coast.

In Italy, coastal defence is mainly managed at the local level: municipalities have competences in establishing beach nourishment activities.

Military areas



Current uses

- The localization of military areas is often not officially declared.

- Greece has declared not to have military areas in its territorial waters.

- Within military area, the development of other maritime uses is forbidden.

Figure 2.4-5: Map of current and future uses - SAND EXTRACTION AND MILITARY AREAS


Offshore sand dredged
Offshore sand deposits
Military practice areas
Danger zones
Foul areas
0
45
90
180

Supplementary Box 1: ADRIPLAN Data Portal

The ADRIPLAN Data Portal (http://data.adriplan.eu/) is the place where all the geospatial data related to the ADRIPLAN project have been collected and organised (for a more complete description of the ADRIPLAN Data Portal, see the Annex on Data Portal).

Data have been collected from various sources of information (Fig. a), starting from the project's partners, other local, regional and national administrations, and capitalizing the great work done in already available data portals (e.g. European Atlas of the Seas, EEA, SeaDataNet, EMODNET) and other past and on-going projects (e.g. SHAPE, MAREA-MEDISEH, CoCoNet, Eunetmar, etc.).

Some of the data were directly uploaded (as shapefiles or raster files) into the Data Portal by the responsible partners and then described through detailed metadata, using the collaborative functionalities of the portal. Other spatial layers have been included using standard web services (i.e. OGC-WMS) allowing the visualization of information provided by other atlases and data portals without the need of storing the data inside the ADRIPLAN Data Portal itself.

Data are usually collected trying to include the most up-to-date information, but throughout the course of the project it could happen that some datasets or layers change or are updated from original owners, portals, projects. The ADRIPLAN Data Portal allows to a continuous integration and update of the information directly by the various partners of the project, through functionalities (see Fig. b) that allows the update of spatial layers with new or modified ones and the correction or improvement of the metadata associated with the layers. This is fundamental especially when the data are used not only for informative purposes, but also for the elaboration of additional and integrated information, as in the case of the creation of the maps about the coexistence of uses (Supplementary Box 2) and the cumulative impacts (see Supplementary Box 3).

All the maps produced as final outputs of the project derive from the layers contained in the data portal and have a correspondent live and interactive map in it.

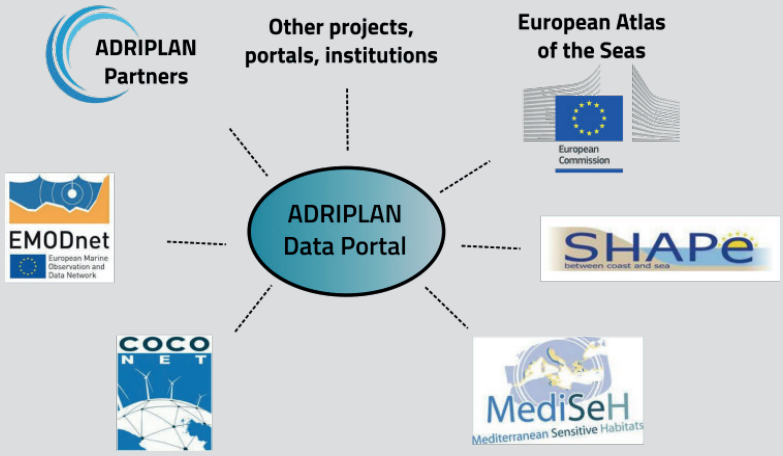


Fig. a: Main input to data collection and capitalization for the ADRIPLAN Data Portal

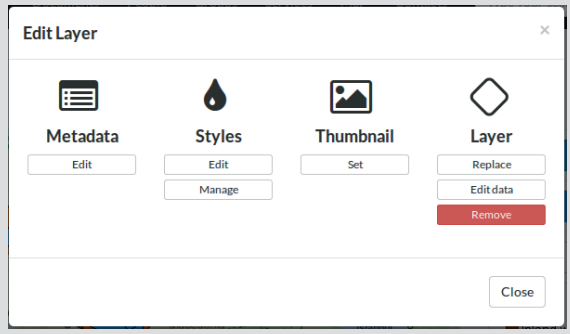


Figure b: Editing functionalities

Barriers and Bottlenecks

Many barriers and bottlenecks emerged in the phase of data collection, with respect to both present and future uses. Future Maritime Spatial Planners will have to make a significant effort in the phase of data and information acquisition.

A first barrier to be overcome is related to the diversity of management and research bodies, that act at different level (e.g. national, county/regional, local, etc.), with different roles and scopes, thus producing heterogeneous (and sometimes even contradictory) information. Before starting the process of data collection, it is strongly recommended to map relevant bodies, institutes, and stakeholders to be involved, considering *ex ante* which kind of information they could provide and how these could be used in the planning process.

A second element, crucial for the definition of transboundary planning strategies, concerns the representation of all the major stakes relevant for the definition of the plan, including those of the stakeholders that do not participate to the process of planning elaboration. In ADRIPLAN, where a number of States (including non Member States) and Regions have been involved to different extents, the need to identify a set of relevant stakeholders to be involved played a crucial role. One important barrier to be considered concerns possible difficulties in involving private and socio-economic operators, insofar as their perception of the benefits possibly arising from MSP is not always clear.

A third point concerns the availability of information. Some information are more difficult to be acquired, or they are available in non-processable formats. In some cases, information are not updated and the databases, coming from different sources, are non synchronized. In general terms, it is strongly suggested to perform a "data quality assessment", including a quantitative spatial representation of missing data.

Further considerations concern difficulties in the identification and localization of future uses. The identification of future scenario requires a comprehensive understanding of complex socio-economic, political and environmental dynamics. Furthermore, the description of most of the future projects/sectoral development trends most of the time do not include any reference to the spatial dimension, so that the localization of future uses is not straitforward.

2.4.2 Analysis of coexistence among uses

The analysis of coexistence among uses is one of the tools used to explore potential spatial conflicts of maritime uses insisting in the Adriatic-Ionian Region (AIR). The analysis consists in the spatial characterization of the current and potential spatial relations between anthropogenic uses of maritime space. The ADRIPLAN analysis adopts the methodology developed by the FP7 project "COEXIST- Interaction in European coastal waters: A roadmap to sustainable integration of aquaculture and fisheries" ("COEXIST", Stelzenmuller et al., 2013) which is focused on the analysis of spatial conflicts between coastal uses, with particular interest in fishery and aquaculture sector.

The method used in ADRIPLAN for the identification of potential overlapping coastal and maritime uses includes four consecutive steps:

1 Identification of maritime uses: the activities identified for this analysis are organized in the 5 main categories of uses: Energy; Maritime Transport and Tourism; Fishery and Aquaculture; Environmental Protection; Sand Extraction, Coastal Defence and Military). All maritime uses are mapped as to be spatially explicit in the AIR (see maps of uses, Figs 2.4-1 – 2.4-5).

2 Spatial normalization of uses on a hexagonal grid; basic unit of analysis is a hexagonal cell of 2,6 Kmq;

3 Setting of temporal and spatial attributes for each maritime use: each maritime use is classified according to four attributes that characterize possible spatial and temporal overlapping uses. Following COEXIST methodology (Shultz et al., 2010), the attributes are as follows:
   - position on water column (surface/pelagic, whole water column, bottom/ benthonic area) – vertical domain;
   - activity spatial domain (small, medium, large);
   - activity temporal domain (short, medium long/permanent);
   - mobility (fix or mobile).

4 Calculation of the "coexistence score" per each pair of maritime uses insisting on the same cell of analysis. Maritime uses, which are located in the same cell of analysis, are confronted in pairs; the "coexistence score" of each pair of maritime uses is the result of the application of three rules of calculation. The rules, from COEXIST methodology (Shultz et al., 2010), mathematically represent the level of potential spatial and temporal conflict between maritime uses. The default rule (Rule 1) states that the maximum of the spatial and the temporal scale of both activities are summed up; in cases where the activities are separated on the vertical domain, the calculated conflict is zero (Rule 2). In cases where both activities are mobile (mobility attribute), Rule 3 states that the minimum of the spatial and the time scale of both activities is summed up. From the application of the above rules and related values from the confrontation in pairs of the spatial and temporal attributes of each maritime use, the "coexistence score" of each pair ranges from 2 to 6 (Fig. 2.4-6)

3 Calculation of the "total coexistence score" per each cell of analysis, as the sum of the scores of "coexistence score" of each pairs of maritime uses insisting on the same cell of analysis. If more uses insist in one grid cell, the scores of each combination of two uses are summed up. Results are mapped for the entire AIR, using real spatial distribution of uses.

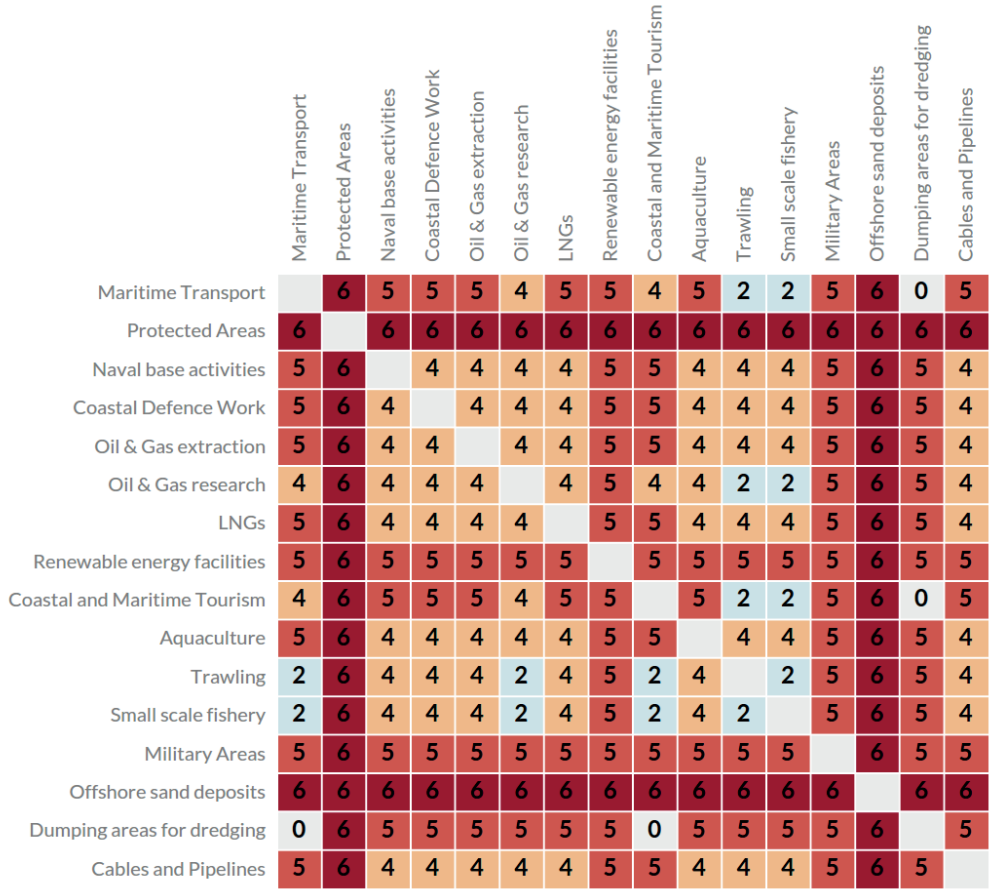


Figure 2.4-6: Coexistence scores among ADRIPLAN maritime uses

The analysis has been performed for the years 2014 and 2020, to identify possible variations, considering the 2020 scenario of maritime uses.

In order to automate the process of calculation as new data are acquired, it has been implemented through a specific tool, in ADRIPLAN data portal, as extensively explained in Supplementary Box 2.

Furthermore, in order to analyse the information recollected and produced through the coexistence analysis, a matrix of compatibility between maritime uses has been constructed (Fig .2.4-7). The matrix is an adaptation of the matrix elaborated through experts' considerations in SHAPE project, and adapted to the ADRIPLAN methodology and maritime uses considered in the project.

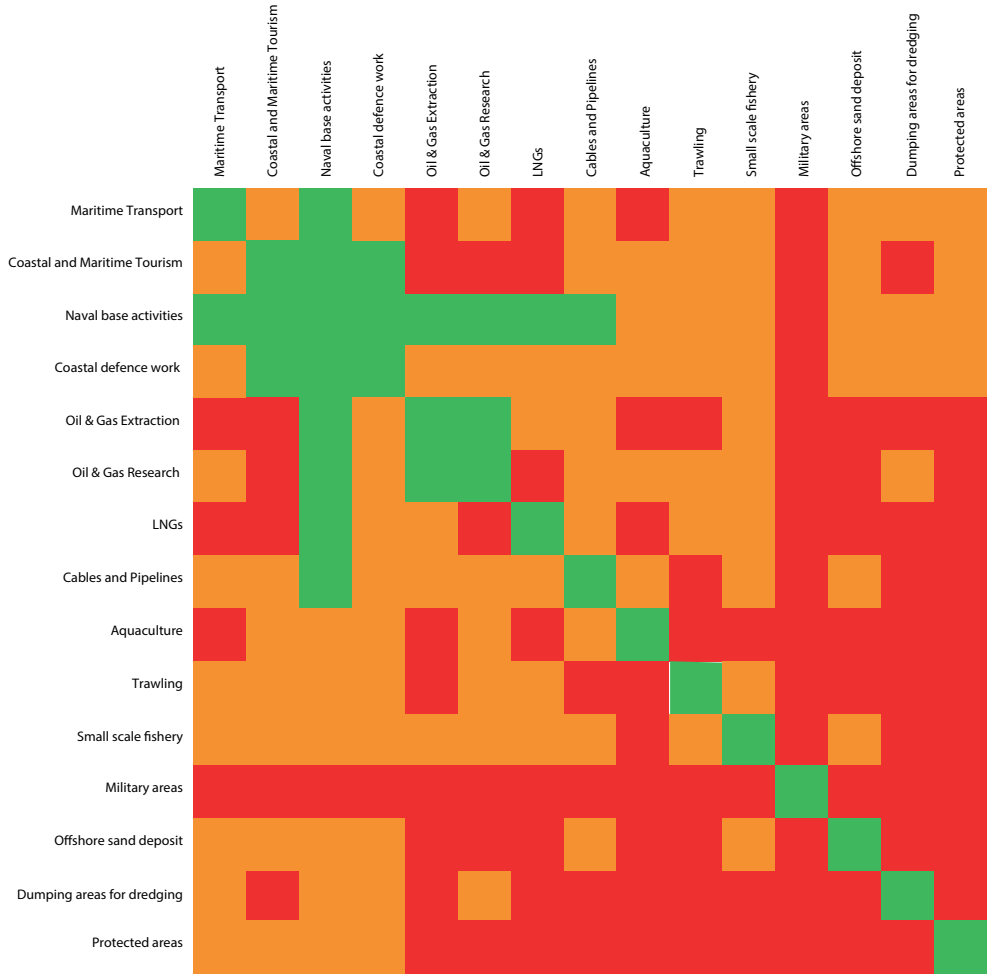


Figure 2.4-7: Matrix of compatibilities among ADRIPLAN maritime uses (elaboration from SHAPE project). The cell color indicate different levels of compatibilities. RED = Not compatible; ORANGE = Semi-compatible; GREEN= Compatible. The matrix has been constructed using qualitative information.

The matrix shows that military areas are incompatible with all the other uses, also due to severe restrictions. Furthermore, protected areas, dumping areas for dredging and offshore sand deposits are incompatible with energy and fishing and aquaculture activities and not-completely compatibles with maritime transport and coastal and maritime tourism. On the contrary, high compatibility is present between coastal and maritime tourism activities and naval base activities such as ports and marinas, and also with Coastal Defense Works.

The matrix of compatibilities in Figure 2.4-7 is discussed in the paragraph 2.4.5 about Synergies and Conflicts.

Results

The results of the "coexistence scores", from the comparison in pair of activities' attributes, are reported in Figure 2.4-8. The highest scores are related to the pairs between marine Protected Areas (in this project considered as a maritime use as shown in par. 2.4.1, Fig. 2.4-4) and all the other marine activities. In addition, the top score (=6) is attributes to the relation between offshore sand deposits, and thus the

potential dredging activity in the area, and all the others maritime activities. Maritime transport and coastal and maritime tourist activities reach high scores in relation with some activities related to energy sector, such as oil & gas extraction, LNGs, cables and pipelines, and also in correspondence of aquaculture sites and military areas.

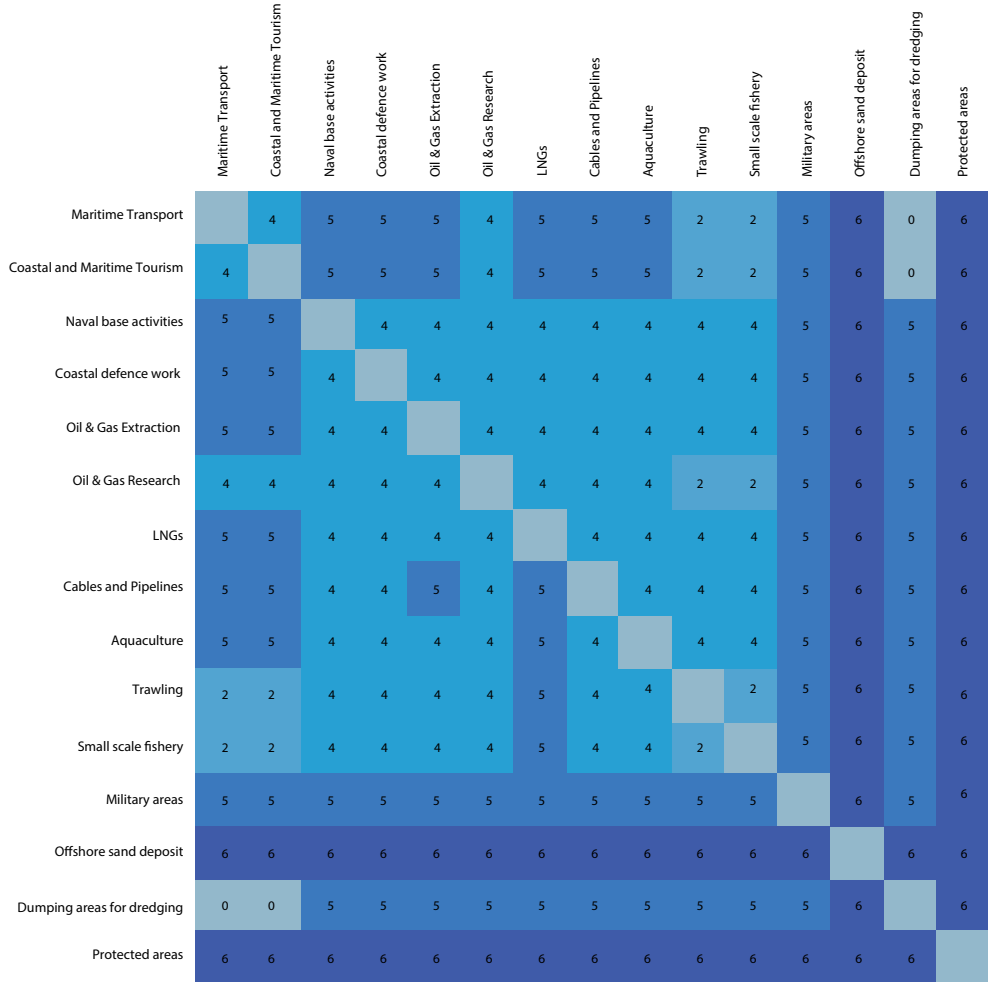


Figure 2.4-8: Matrix of coexistence between each pair of activity. The cell color indicate the density of uses (from Dark Blue= Very High to Light Blue= Very Low). The numbers reported in each matrix cell indicate the "coexistence" scores. The score is calculated per each pair of activities using the rules explained above

The coexistence analysis aims at spatially identifying areas where potential conflicts between uses are located or may apper. These areas are characterized by a higher total score of coexistence then other areas in the AIR.

As shown in the maps of maritime uses (Figures 2.4-1 – 2.4-5), there are some areas, especially in Northern Adriatic and Northern Ionian (Apulia coasts and Greek coasts), where uses are more concentrated. However, as resulting from the analysis on coexistence between uses (Figure 2.4-9), not all the activities insisting in the same area necessarily give place to spatial and temporal conflicts. The results show a distribution of total coexistence scores that is site-specific, and related to the type of uses insisting on the same cells. Moreover, as marine space is tridimensional, maritime activities acting on different vertical domains (in relation to the position on water

column), do not automatically give place to spatial overlappings or conflicts.

Figure 2.4-9 shows that there are some specific areas in the Adriatic-Ionian Region interested by a high density of uses that could generate potential overlapping or spatial conflicts. These areas are mainly located in the Northern Adriatic, and especially in the Italian side, both in territorial and international waters, and in the northern part of the Ionian Sea, in the transboudary area between Apulia Region (Italy), Albania and northern Greece.

A descriptive statistical analysis is conducted in order to understand:

- the number of cell interested by the presence of a specific couple of activities;
- the maximum score spatially generated by each couple of activities;
- the percentage of total score generated by each use;
- the number of grid cell that contain each number of uses.

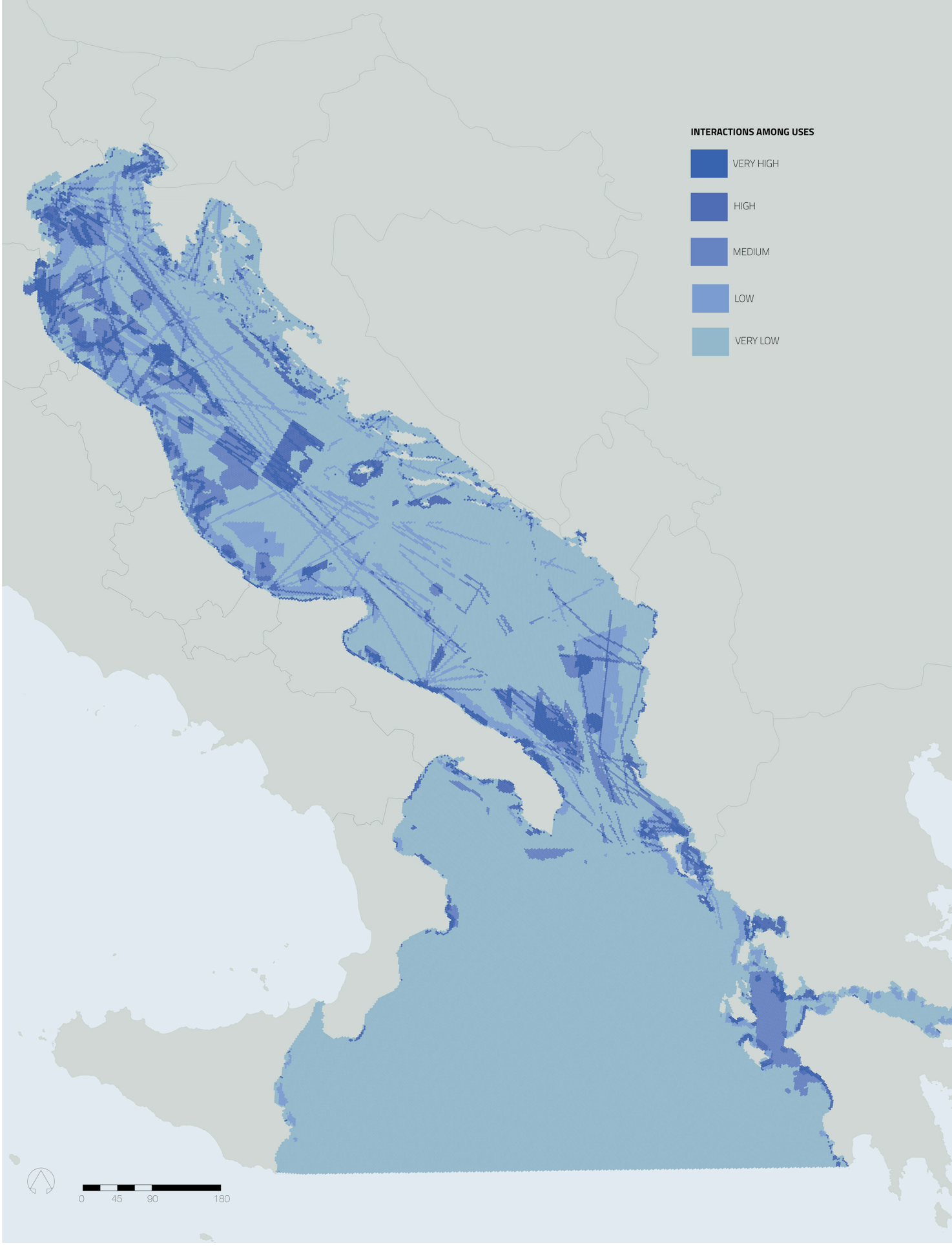
These additional analyses is performed with the aim of having a vision of which is the condition of the Adriatic-Ionian Sea, in terms of activities presence, coexistence among uses and degree of interaction among pair of activities, considering the AIR sea space as a unity. The advantage of performing descriptive statistical analysis on the entire sea space is to be in line with EUSAIR objective of looking at the AIR as a unique area. The main limitation of using this type of insights is to loose, at first, the spatiality of the information obtained. This spatiality can be easily recovered, in a second time, confronting the results with with the maps of maritime uses with GIS techniques.

As shown in the following figures (Figures 2.4-10 - 12) the statistical analysis revealed that the couple of activities Oil & Gas extraction and Trawling is the one generating the highest score in absolute terms despite this does not produce the highest score in relative terms.

It is interesting to note that the couple of activities that more intensively contribute to the total score for the AIR – calculated summing up all grid cell scores – are not the more frequent in Adriatic-Ionian sea. As a matter of fact, Coastal & Maritime tourism and Trawling, and Trawling - Small Scale Fishery are the uses which occupy the greater number of cells, followed by Energy Extraction and Research coupled with Trawling activity (Figure 2.4-10), but they contribute only for a percentage of the total score for the AIR.

As it is possible to notice from Figure 2.4-11, Trawling is the use that in percentage contributes more to the final score (26%). This is partially due to the typology of data collected. In fact, data about Trawling and Small Scale Fishery are areal data with a broad coverage on the AIR.

Figure 2.4-9: Map of the results of coexistence analysis


INTERACTIONS AMONG USES
VERY HIGH
HIGH
MEDIUM
LOW
VERY LOW
0
45
90
180

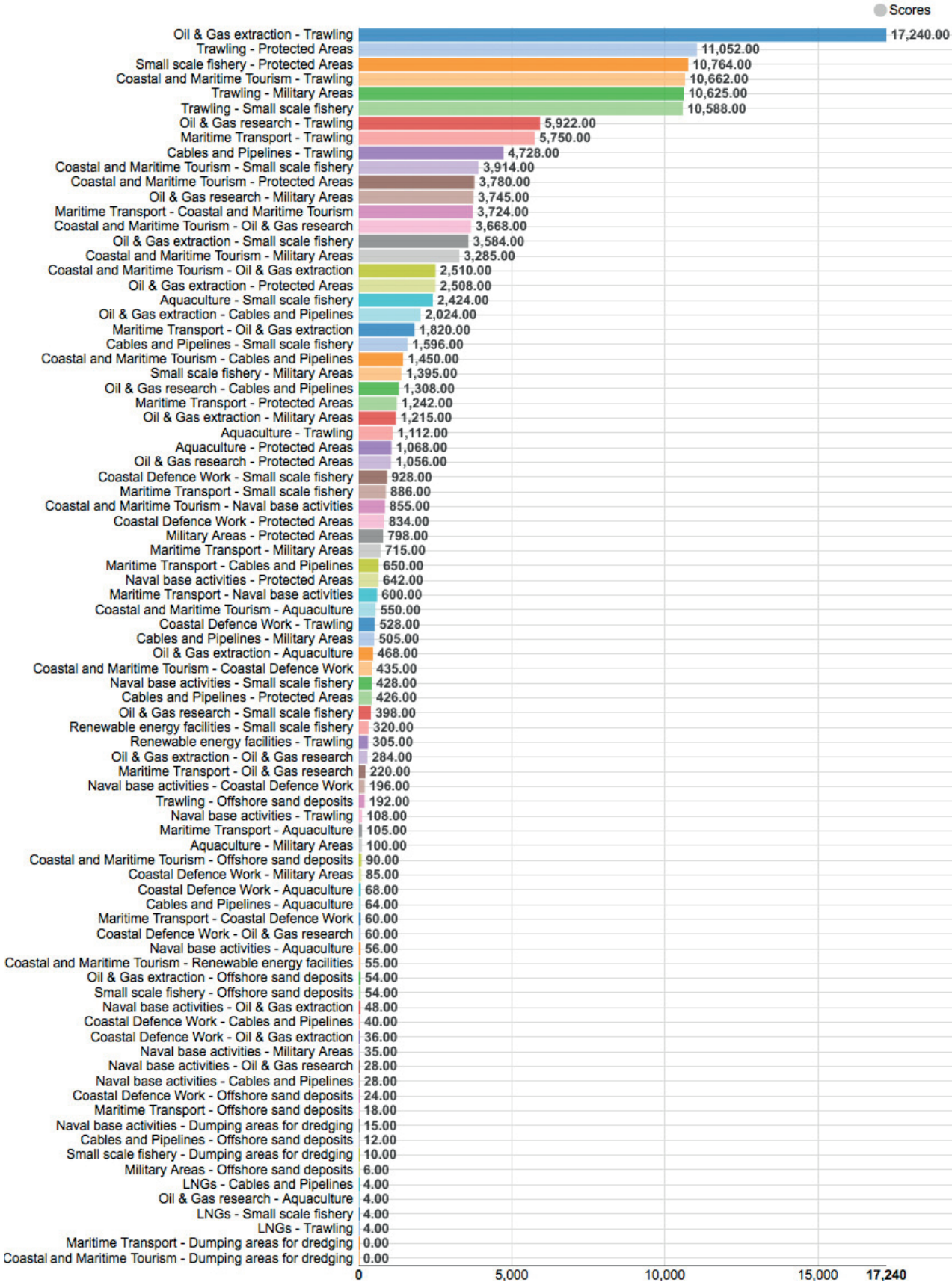


Figure 2.4-10: Total conflict score generated by each pair of activities, within the analysis of coexistence

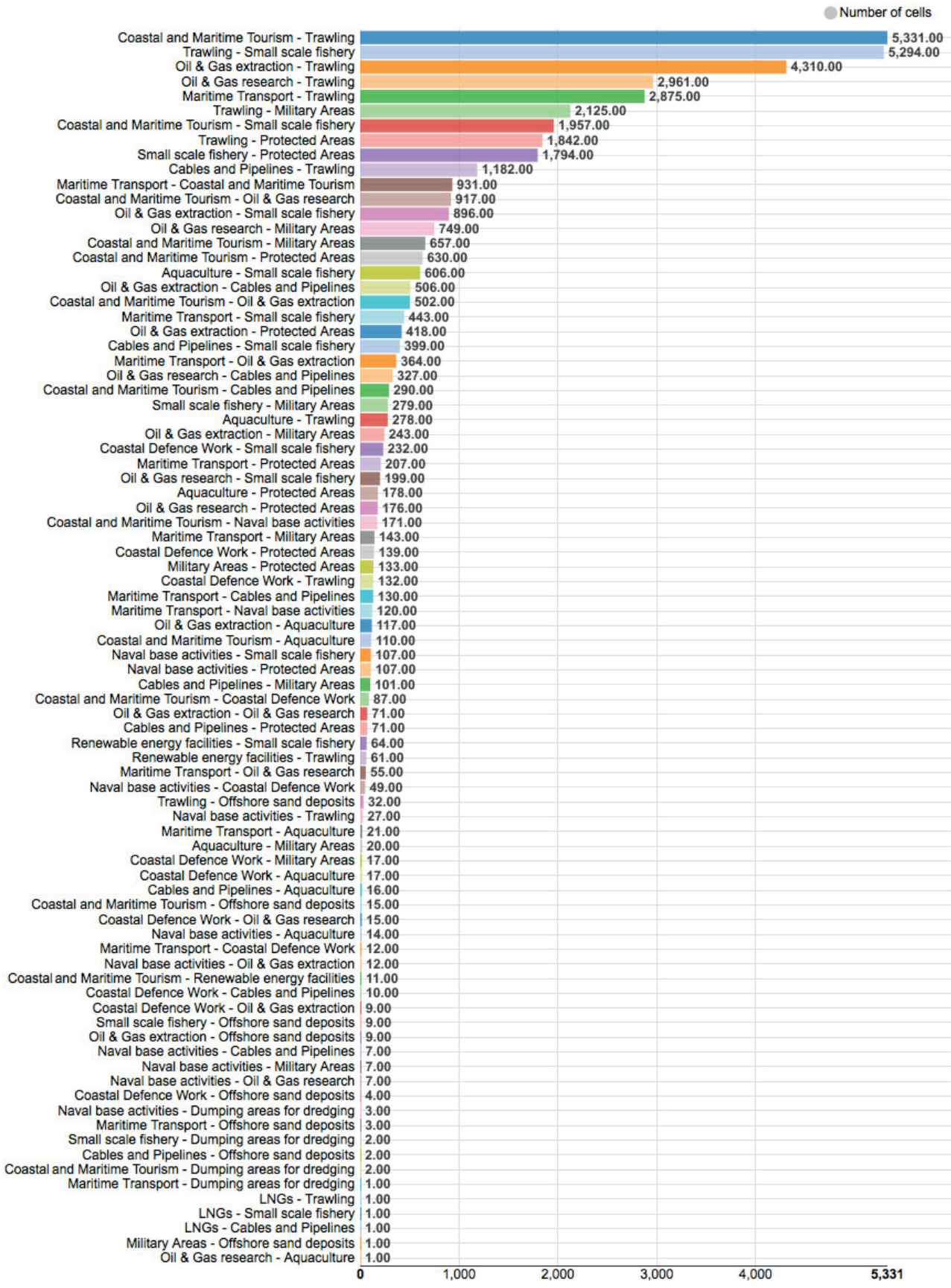


Figure 2.4-11: Number of cells occupied by each couple of activities, within the analysis of coexistence

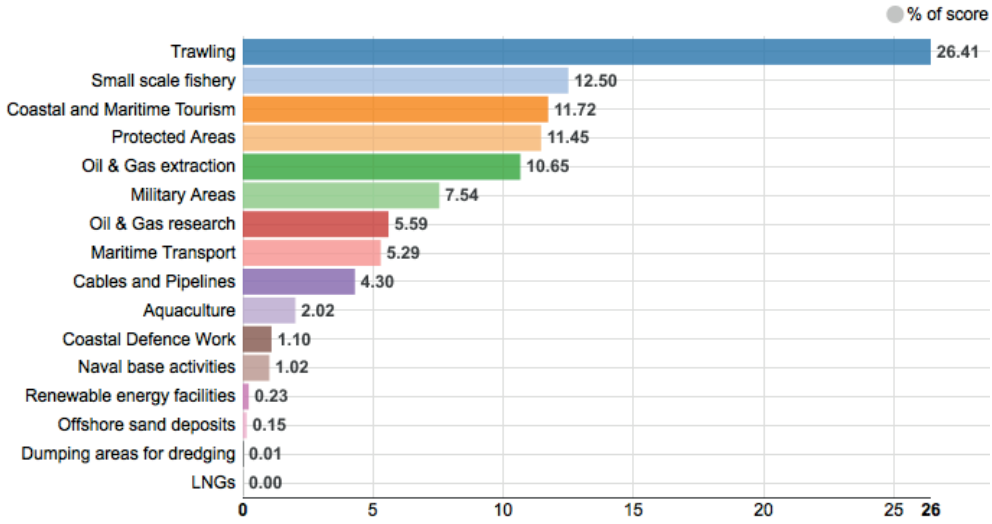


Figure 2.4-12: Rate of incidence of the single uses to the coexistence final score

Similar statistical analysis have been conduced also for the FA1 and FA2 to highlight differences and similarities between the two areas in terms of uses' incidence on the area final score and most critical interactions.

In Focus Area 1, the couple of activities that generates the highest score is Oil and Gas Extraction and Trawling as for the entire Adriatic-Ionian Region (see Figure 2.4-13). This is mainly due to the presence in North Adriatic of many extraction platforms, especially in the Italian side in front of Emilia-Romagna and Veneto Regions, as is possible to notice from the uses maps in the dedicated paragraphs. On the contrary, in Focus Area 2 the highest scores are generated by the interaction between Oil and Gas Research activities and Trawling fishery and Trawling- Military areas (see Figure 2.4-14). As a matter of fact, bottom and pelagic trawling fishery spatially interacts with Oil and Gas Research activities and Military areas that are mainly located in the Southern Adriatic and Northern Ionian sea.

Furthermore, the descriptive statistics reveals that the Trawling activity is the one influencing more the final score both in FA1 and FA2. This is probably due to the facts that data about trawling are areal and, thus, cover, with different intensity, a very large part of the sea space.

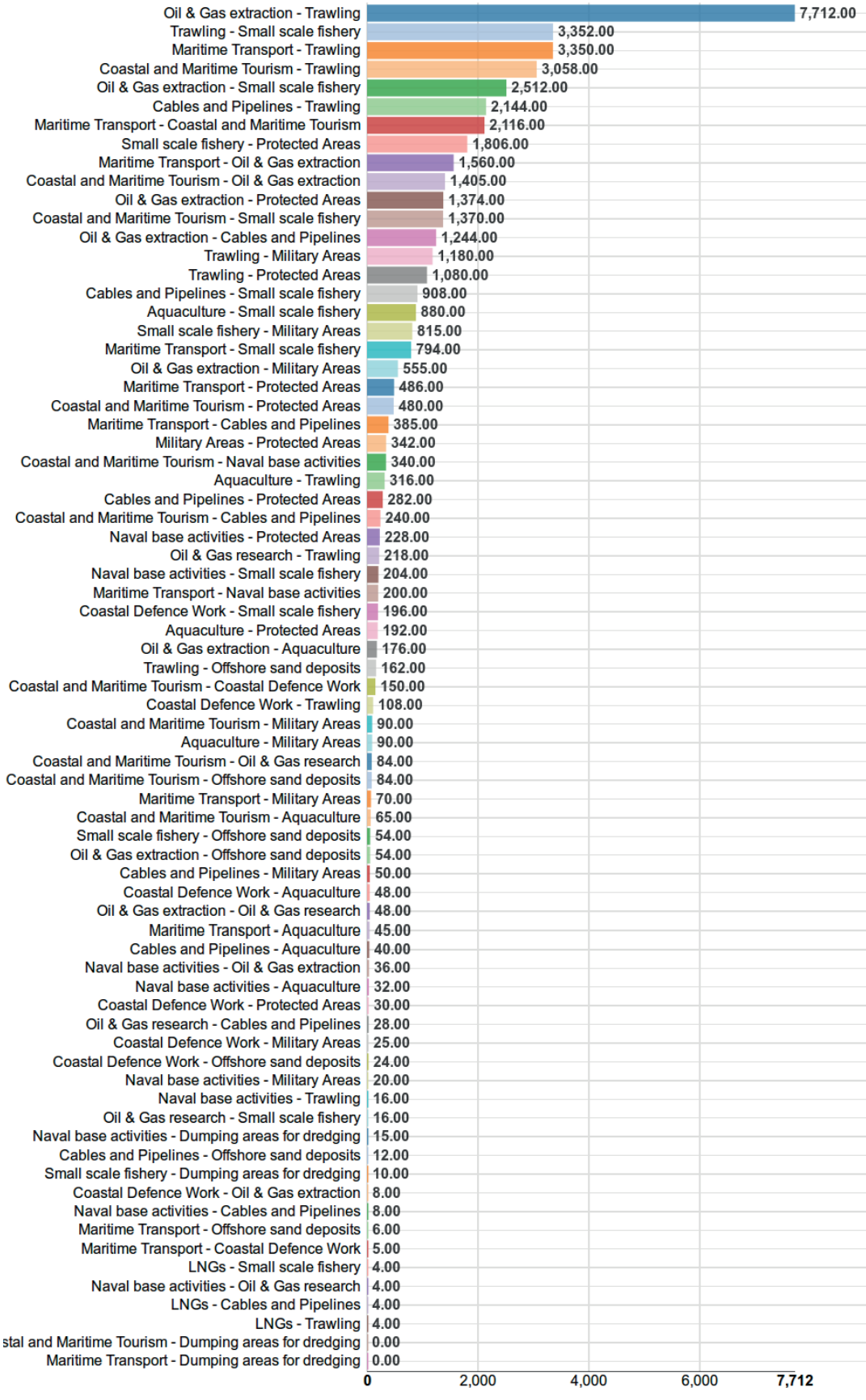


Figure 2.4-13: Total conflict score in Focus Area 1 generated by each pair of activity, within the analysis of coexistence

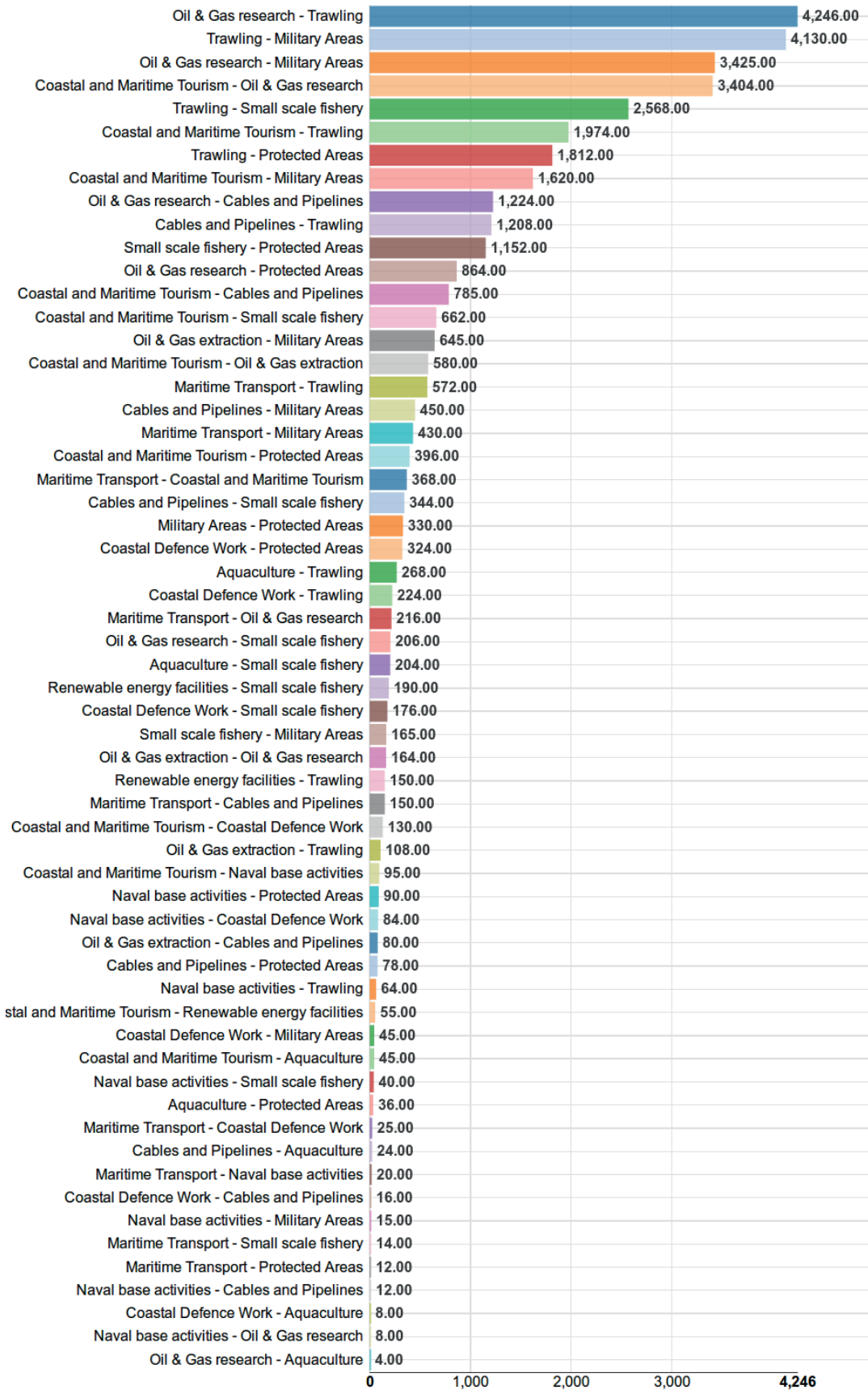


Figure 2.4-14: Total conflict score in Focus Area 2 generated by each pair of activities, within the analysis of coexistence

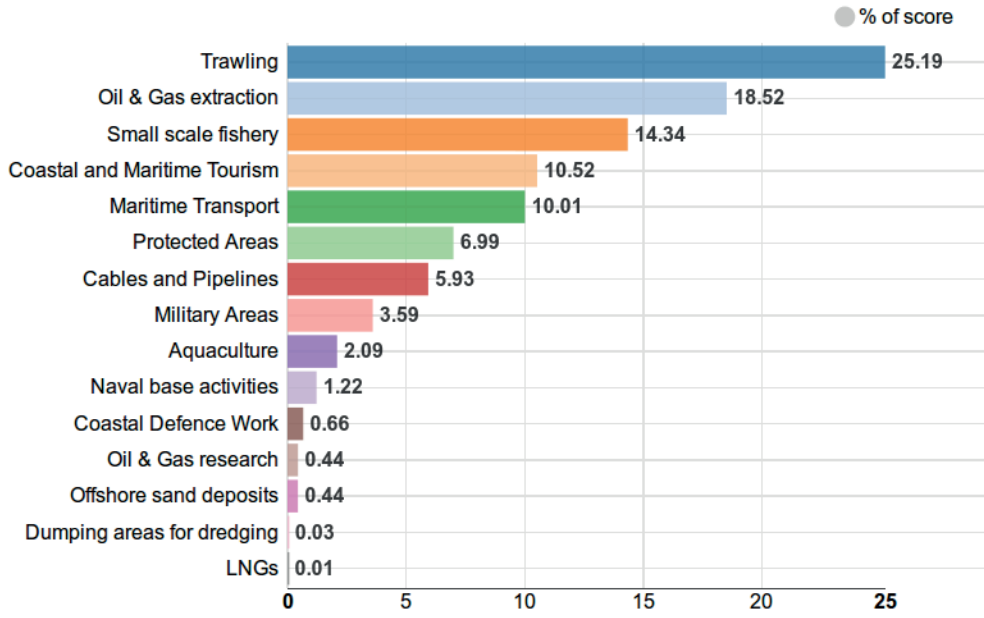


Figure 2.4-15: Rate of incidence of the single uses in the coexistence final score of Focus Area 1

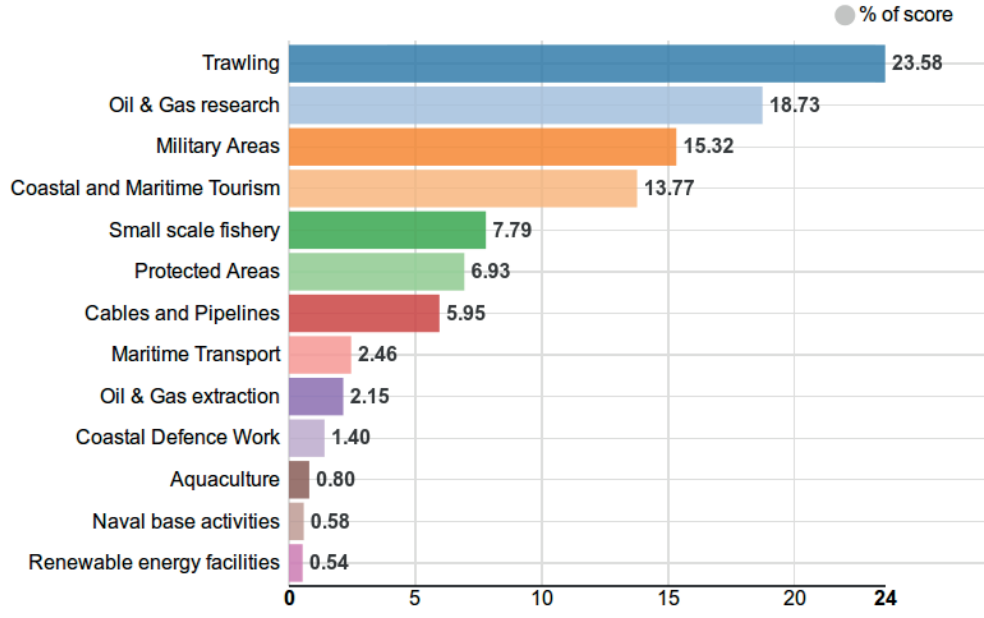


Figure 2.4-16: Rate of incidence of the single uses in the coexistence final score of Focus Area 1

Furthermore, it is essential to consider that the results obtained from the application of coexistence analysis are strongly influenced by the amount, the coverage and type of data available on maritime uses in ADRIPLAN as input data. Despite this, the analysis gives the possibility to identify areas, based on the best available knowledge, where MSP would be of great importance to manage possible spatial and temporal conflicts between uses, to support blue growth.

The analysis of potential spatial conflicts between uses, in addition with Uses Maps' critical analysis and information obtained from stakeholders' involvement activities (par. 2.3), constitutes the informative base from which Synergies and Conflicts Maps (see par. 2.4.5) have been constructed.

Supplementary Box 2: MSP tools

Together with the more general activities supporting the collection and managing of spatial information, ADRIPLAN also focused on the development of new tools supporting MSP activities. The main goals of these tools are to:

- carry out collaborative experiments and analyses;
- allow maximum transparency of data and procedures used in the analyses;
- allow temporal reproducibility of results;
- allow periodic repetition of the analyses with updated datasets;
- allow comparison between different simulations;
- allow storing and accessing the results of the analyses.

Consequently, a new "MSP Tools" application has been developed as an extension of the ADRIPLAN Data Portal (see the section ADRIPLAN Data Portal in the Annex for more details).

This application allows registered users to run experiments, simulations and analyses interacting directly with data stored inside the portal.

The "MSP tools" application is made by the following components:

1. MSP base: base functionalities common to all the analysis tools (e.g. tools for the creations of analysis grids, tools for the configuration of Case Studies);
2. Conflict score: tool to quantify the overlapping of uses, calculating the direct spatial conflict score based on COEXIST methodology;
3. Cumulative Impact: tool to calculate the Cumulative Impact on the basis of the methodology described in order to quantify the pressures generated by the uses on the environmental components.

In general, the main characteristics and functionalities of the MSP Tools are:

- Case Study concept. It allows users to configure a simulation through a graphical interface: to choose the area of analysis, the grid cell size (hexagonal grid), to define the geographical resources (layers) to be used to model the different phenomena which can be, depending on the context, uses and activities or environmental components. Each user can create more "Case Studies" and compare the results (Figure c).
- The outputs from each run on "Case Studies" are automatically saved as "geographical layers" and published through the portal. The layer created is initially accessible only for admin users but it is possible to modify the access rules to allow the access also for other registered or non-registered users.
- The raw data are also available for download as CSV files.
- For each "Case Study" a summary page is available that lists general information (e.g. cells number, total score), graphs and statistics automatically generated starting from the results of analyses (Figure d).

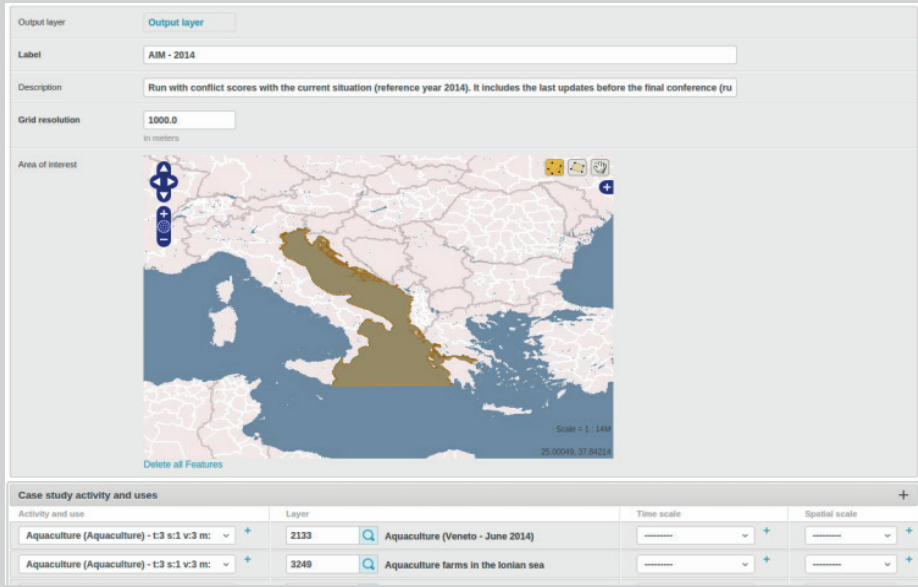


Figure c: Screenshot of the Coexist Case study configuration page: the list of activity used for the Conflict Score implementation as well as the map with the selected macroregion is shown

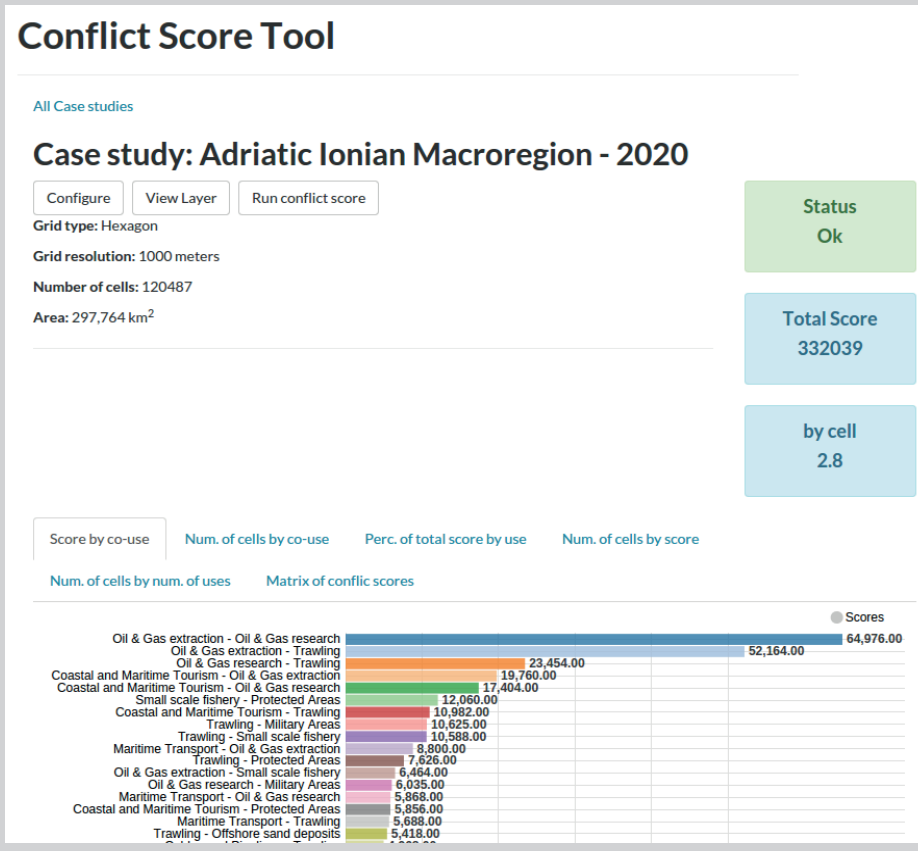


Figure d: Screenshot af the Coexist Case Study report panel: figure shows aggregate summary statistics (e.g. graphs)

Supplementary Box 3: Coexistence tool

The Coexistence tool permits to quantify the overlapping of uses, calculating the direct spatial coexistence score based on COEXIST methodology.

Configuration

The tool offers an "Admin area" where to configure "Uses" and "Case studies", and a summary page where the main indicators and statistics from the result are shown. Through the "Admin area", the user may configure each "Use" specifying 4 parameters (spatial scale, time scale, vertical scale and mobility). Then the user may create a "Case study" specifying title, description, grid resolution, area of analysis (e.g. polygon) and the association from "Uses" and "Layers". One or more layers can then be associated to a single "Use".

Run

The run is subdivided into 4 steps:

1. creation of the hexagonal grid cells (each cell is a polygon).

2. collection of statistics about presence of uses for each cell.

3. computation of the coexistence score for each cell. The score is computed if two or more uses intersect the cell and the total cell score is the sum of scores for each combination of uses (see Figure e).

Total score = score(u1,u2) + score(u1,u3) + score(u1,u4) …

4. publication of the results (layer, styles, metadata) on the ADRIPLAN Data Portal: the style is dynamically created using the Jenks natural breaks classification method.

Results

The main result is a vector layer (hexagonal grid) (see Figure f) where for each cell/polygon are reported:

- score: total coexistence score;
- n_uses: number of uses overlapping the cell;
- n_conflicts: number of combinations of uses that generate a conflict;
- uses_overlapping: a text field reporting the combinations of uses that have produced a score and the corresponding value.

More detailed informations are contained in two additional files:

- uses.csv: uses for grid cell
- couses.csv: combinations of uses for grid cell and single score contribution

The CSV files are useful to analyse the results using external applications

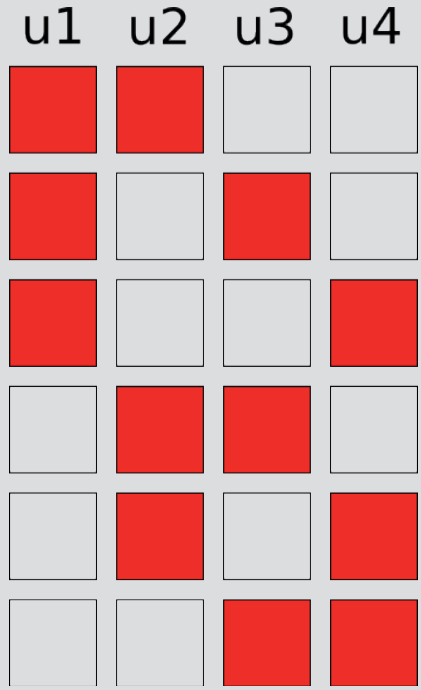


Figure e: Computation of the coexistence score for each cell.

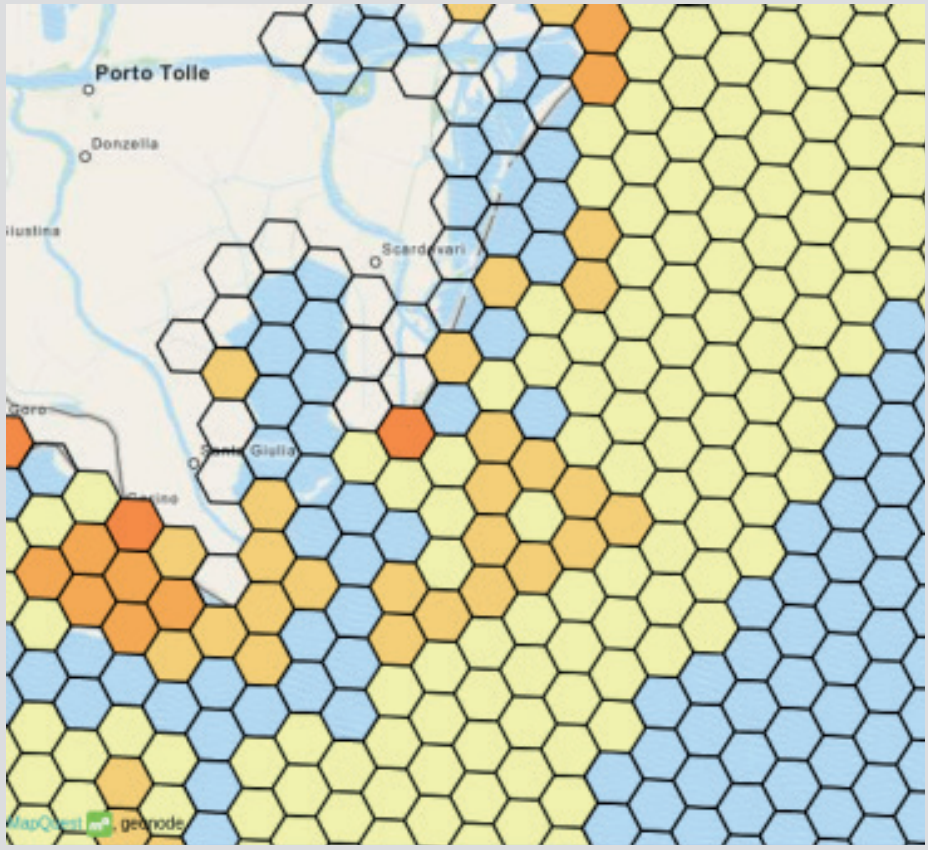


Figure f: Exagonal grid cell

Barriers and Bottlenecks

The analysis of coexistence of uses is an important step to characterize the state of interaction between uses on the sea space. Despite this, the tool and the analysis are subject to some limitations and bottlenecks.

Firstly, the method depends on the characterization of spatial and temporal interactions between uses, characterized according to attributes associated to each maritime use. The more detailed and precise the spatial information related to each activity is, the more coherent the attributes given to each use are. The association of attributes to each activity strongly influence the final results. Thus, more precise information about single uses conduces to a more realistic final result.

Secondly, there is a difficulty to automatically characterize the type of interactions between uses also considering the qualitative matrix of compatibility. A revision of the methodology might help in order to consider also qualitative and semi-quantitative information obtained through the compatibility matrix.

Thirdly, input data—in terms of type and coverage (areal data vs point data)—strongly influence the final score/result and also the statistical analysis on the obtained results. Furthermore, it has to be considered that the grid resolution affects the final results in several ways: e.g. it influences the detail of the results as well as the interaction between nearby activities and uses. An additional point is that with the actual implementation of the coexistence tool, as well as with other similar tools (e.g. Gramolini et al., 2013), is not possible to model different types of interaction (in addition to the conflict of uses), like synergies between activities.

2.4.3 Analysis of Cumulative Impacts in the Adriatic-Ionian Region

The analysis of cumulative impacts is the main methodological tool used in ADRIPLAN to evaluate the potential impact of maritime activities on the environment. Cumulative impacts are a key point for the construction of maritime spatial plans using an Ecosystem-Based Approach (EBA), as well as a critical issue for the methodological difficulties in setting the calculation (McLeod et al. 2005). The analysis of cumulative impacts aims at identifying areas in the sea where the environmental/ecological components are more exposed to anthropogenic pressures that negatively affect them. Thus, a fundamental step of the analysis is to evaluate the sensitivity of environmental components to specific threats or pressures.

The methodology has been constructed considering the best available knowledge on the subject, and adapted to the case study of the characteristics of the Adriatic-Ionian basin, as well as to the constrains of ADRIPLAN in terms of time and resources.

Cumulative impacts analyses have been applied with different methodology at different scales in several case study analyses. They all face the necessity to set the causal relation between: i) the target of the analysis, generically described as the environmental components on which cumulative impacts are calculated; ii) the cause of change, as the source of impacts on the environmental targets, which can be of different types, but primarily anthropogenic at the origin; iii) the causal link between

the cause of change and the environmental target; mainly identified as sensitivity or vulnerability of the environmental components to the drivers of change, they are identified through expert surveys or expert opinion, as to recollect and synthetizes a broad set of knowledge related to the possible combinations between cause, targets and effects. The three components of the analysis of cumulative impacts are articulated differently in literature.

Halpern et al. (2007) initially introduce a comprehensive method (see Supplementary Box 4) and related formula for calculating cumulative impacts at global scale, considering the global marine ecosystems. The rate of vulnerability of marine ecosystems to the main drivers of change is obtained by an extensive worldwide experts survey. Micheli et al 2013. adapted Halpern et al. (2007) methodology to calculate cumulative impacts in Mediterranean Sea. Differently from Halpern et al. (2007), they consider not only anthropogenic but also environmental and climate-related drivers of change, divided in four categories[2]. Korpinen et al 2012 adapted from Halpern et al. (2007) to evaluate and map cumulative impacts of maritime activities in the Baltic Sea. They considered anthropogenic pressures as human-derived stress factors causing either temporary or permanent disturbance or damage to loss of one or several components of an ecosystem (as, for example, relevant species, biotopes, biotope complexes distribution). In order to calculate cumulative impacts in the North Sea, Andersen et al. (2013) use expert judgement to combine data on the spatial distribution of anthropogenic stressors, and thus MSFD pressures deriving from them, with data on the spatial distribution of potential sensitive "ecosystem components". This combination has been used to calculate a "human impact index" which represents the scores of cumulative impacts scores in the case study area.

[2] Four categories of drivers: climatic (temperature and UV increase, and acidification), land-based (nutrient input, organic pollution, urban runoff, risk of hypoxia and coastal population density), sea-based (commercial shipping, invasive species, oil spills and oil rigs), and fishing (all fishing gears and types), Micheli et al. 2013, p. 2.

Supplementary Box 4: Methodology and formula for Cumulative Impacts assessment

Halpern et al. (2007; 2008), driven by the necessity to evaluate how the distribution and intensity of human activities overlap and impacts on marine ecosystems, developed an ecosystem-specific, multiscale spatial model to synthetize 17 global data sets of anthropogenic drivers of ecological change for 20 marine ecosystems. The determination of ecological impact of human activities on the oceans has required a specific methodology for translating human activities into ecosystem-specific impacts. In order to estimate the "sensitivity" of the 20 marine ecosystems to the 17 anthropogenic drivers of change they surveyed 135 experts from 19 countries asking them to assess the functional impact, scale and frequency of a threat to an ecosystem; the resistance and recovery time of an ecosystem to a threat; and the certainty of these estimates.

Using data and information collected, they calculated cumulative impact scores

$$Ic = \sum_{j=1}^{n} \sum_{j=1}^{m} Di * Ej * \mu i, j$$

(Ic) for each 1 km2 cell of oceans using the formula:

Di= log-transformed and normalized value (scaled between 0 and 1) of an anthropogenic driver at location I;

Ej = presence or absence of ecosystem j (either 1 or 0 respectively)

m i,j = the impact weight for the anthropogenic driver i and ecosystem j (range 0 to 4).

Accordingly to this, the impact of any combination is zero if anthropogenic driver is absent or an ecosystem is absent. Thus, the more ecosystems an area contains and the higher is the number of drivers in that area, the higher is the Ic.

Scale	Reference	Cause of change	Target of the analysis	Causal link between cause of change and target	Basic unit of analysis
World seas (global scale)	Halpern et al. 2007	Anthropogenic drivers of ecological change (17)	Marine ecosystems types (20)	Sensitivity analysis through experts survey (based on driver-by-ecosystem combination)	1 km²
Mediterranean Sea	Micheli et al. 2013	Four categories of drivers: i) climatic (temperature and UV increase, and acidification), ii) land-based (nutrient input, organic pollution, urban runoff, risk of hypoxia and coastal population density), iii) sea-based (commercial shipping, invasive species, oil spills and oil rigs), and iv) fishing (all fishing gears and types)	Marine ecosystems types (17)	Sensitivity analysis through experts survey from Halpern et al. 2007, extended with regional survey on the Mediterraenan (based on driver-by-ecosystem combination)	1 km²
Baltic Sea	Korpinen et al.2012	Anthropogenic pressures deriving from human-derived stress factors, considering MSFD 2008/56/EU	components of ecosystems (relevant species, biotopes, biotope complexes distribution	Weighting coefficient specific to any combination of pressures and ecosystem components.	5 km × 5km cells.
North Sea	Andersen et al. 2013	Human uses and land-base pollution of the sea (33)	Environmental Components (28)	Sensitivity analysis trough expert judgement (53)	1km x 1 km
Adriatic and Ionian Sea	(ADRIPLAN)	Spatial distribution of maritime and coastal uses	Environmental components: seabottom habitats from EUNIS classification, plus 4 environmental features (marine mammals, sea turtles, sea birds and nursery habitats)	Sensitivity analysis through expert judgement on triple combinations of Environmental components, pressures and maritime uses which produce them.	Hexagonal grid cells of 2,6 km²

Adriatic and Ionian Sea	(ADRIPLAN)	Spatial distribution of maritime and coastal uses	Environmental components: seabottom habitats from EUNIS classification, plus 4 environmental features (marine mammals, sea turtles, sea birds and nursery habitats)	Sensitivity analysis through expert judgement on triple combinations of Environmental components, pressures and maritime uses which produce them.	Hexagonal grid cells of 2,6 km^2

Table 2.4-2: Analysis of the basic components on which cumulative impacts analysis on marine environment are based in literature

In Adriplan, the general method and formula proposed by Halpern et al. 2007 has been adopted. Instead of considering general drivers of changes, ADRIPLAN methodology considers spatially explicit maritime uses and their related pressures on environmental components as drivers of change. This is to answer to the necessity to consider regional drivers and related data, which are available on the scale of regional sea basins (Halpern et al. 2008). As in line with Korpinen et al. (2012) and Andersen et al., (2013), pressures identified in MSFD (2008/56/EC) are considered in the calculation in the AIR case study. Differently, pressures have been associated to maritime uses as drivers of change along with the identification of sensitivity analysis through expert judgement. While evaluating sensitivity scores of environmental components to pressures, the experts were called to associate the sources of pressures from some categories of maritime uses. Each maritime use generates one or more pressures, to be selected among the ones identified by the MSFD (see Table 2.4-3), to which the Adriatic-Ionian environmental components are sensitive. Triple relations between environmental component, maritime use and related pressures are considered to define sensitivity score.

Physical loss	Smothering (*e.g. by man-made structures, disposal of dredge spoil),*
	Sealing *(e.g. by permanent constructions)*
Physical damage	Changes in siltation *(e.g. by outfalls, increased run-off, dredging/disposal of dredge spoil)*
	Abrasion *(e.g. impact on the seabed of commercial fishing, boating, anchoring)*
	Selective extraction *(e.g. exploration and exploitation of living and non-living resources on seabed and subsoil)*

Other physical disturbance	Underwater noise *(e.g. from shipping, underwater acoustic equipment)*
	Marine litter
Interference with hydrological processes	Significant changes in thermal regime *(e.g. by outfalls from power stations)*
	Significant changes in salinity regime *(e.g. by constructions impeding water movements, water abstraction)*
Contamination by hazardous substances	Introduction of synthetic compounds *(e.g. priority substances under Directive 2000/60/EC which are relevant for the marine environment such as pesticides, antifoulants, pharmaceuticals, resulting, for example, from losses from diffuse sources, pollution by ships, atmospheric deposition and biologically active substances)*
	Introduction of non-synthetic substances and compounds (*e.g. heavy metals, hydrocarbons, resulting, for example, from pollution by ships and oil, gas and mineral exploration and exploitation, atmospheric deposition, riverine inputs)*
	Introduction of radio-nuclides
Systematic and/or intentional release of substances	Introduction of other substances, whether solid, liquid or gas, in marine waters, resulting from their systematic and/or intentional release into the marine environment, as permitted in accordance with other Community legislation and/or international conventions.
Nutrient and organic matter enrichment	Inputs of fertilisers and other nitrogen and phosphorus-rich substances (*e.g. From point and diffuse sources, including agriculture, aquaculture, atmospheric deposition)*
	Inputs of organic matter (*e.g. sewers, mariculture, riverine inputs)*
Biological disturbance	Introduction of microbial pathogens
	Introduction of non-indigenous species and translocations
	Selective extraction of species, including incidental non-target catches (*e.g. by commercial and recreational fishing)*

Table 2.4-3: List of pressures according to MSFD 2008/56/EU

Category of Maritime Uses per sector	cod	Specific uses per each category
A. ENERGY:		
A1 Oil & Gas exploitation and research	A11	Oil and Gas Extraction
	A12	Oil and Gas Research
A2 LNG	A2	LNGs
A3 renewable energy	A3	Renewable Energy facilities
A4 Cables and Pipelines	A4	Cables and Pipelines
B. MARITIME TRANSPORT AND TOURISM		
B1 Maritime transport	B1	Maritime Transport
B2 Coastal and maritime tourism	B2	Coastal and Maritime Tourism
B3 Naval based activities	B3	Naval Base Activities
C. FISHERY AND AQUACULTURE		
C1 Aquaculture	C1	Aquaculture
C2 Fishery (trawling, pelagic, small scale fishery)	C21	Bottom and Pelagic Trawling (fishery)
	C22	Small scale Fishery
D. ENVIRONMENTAL PROTECTION		
D1 Protected areas (MPAs, Natura 2000, Biologic protection zones)	D1	Protected Areas
E. OTHER		
E1 sand extraction	E11	Off-shore sand deposit
	E12	Dumping area for dredging
E2 coastal defence	E2	Coastal Defence Work
E3 military areas	E3	Military areas

Table 2.4-4: Maritime Uses (MU) as sources of pressures considered in the cumulative impacts analysis

In order to compute the cumulative impacts index per each cell, a value of sensitivity of each environmental component to the pressures generated by each maritime use considered in ADRIPLAN has been defined. The sensitivity score could be considered as a weighting coefficient used to transform a pressure into a potential impact. The coefficient is specific to any combination of MU-P-E. The evaluation of the sensitivity score has been performed through expert judgment. An expert survey has been launched involving scientists and experts from the AIR. The questionnaire has been delivered to a list of regional experts during the months of October and November 2014. According to Halpern et al. (2007), Korpinen et al. (2012) and Andersen et al. (2013), the sensitivity of each environmental component to each pressure generated by a maritime use is subdivided into "sensitivity criteria". Experts have been asked to:

- Rate the spatial scale at which the pressure causes impacts;
- Rate the functional level at which impact takes place (from species to community level);
- Indicate the recovery time of the environmental component to the pressure impact.

Experts were asked to report the buffer area at which the effects from sources take place, in terms of linear distance from the source. They were also asked to indicate the level of confidence of their answer. A description of the criteria for sensitivity analysis is reported in Table 2.4-5.

Sensitivity Criteria	Explanation	Possible answer choices
Pressure	Pressures generated by marine human activities, and listed in the Marine Strategy Framework Directive (MSFD), that affect the environmental components.	"No pressure" or one of the pressure listed and defined in Table 2.
Pressure distance	Distance from the source at which the pressure generated by a specific activity produces effects (linear distance).	No impact, 1km, 5 km, 10 km, 20 km, > 50 km
Impact extent	Level at which the activity cause harm or hit the environmental component.	No impact; Individual level; Whole population; Community level
Impact level	Degree to which the environmental component is affected by the pressure.	No impact; Minor disturbance; Medium disturbance; Devastating/Lethal
Recovery time	Time typically taken for the environmental component to recover after it has been affected by the activity/pressure.	No impact; < 1 years; 1-10 years; 10 – 100 years; > 100 years
Confidence	Level of confidence on respondent's judgment	None; Low; Medium; High; Very High

Table 2.4-5: Criteria used to calculate the sensitivity score of environmental components to pressures deriving from maritime uses in ADRIPLAN

The Questionnaire has been constructed starting from the Environmental Components (E) (Table 2.4-6), and associating to them the Maritime Uses (MU) (Table 2.4-4) with the related Pressures (P) (Table 2.4-3), which might harm E separately.

ENVIRONMENTAL COMPONENTS (The Environmental Components numbered with H are the ones from EUNIS Marine Habitat classification (2007) which are mapped within Adriatic Sea, while the additional categories have been choosen by the ADRIPLAN experts)	
Seabed habitats	A3- Infralittoral rock and other hard substrata
	A4.7 - Circalittoral rock and other hard substrata
	A4.26 - Mediterranean coralligenous communities
	A4.27 - Fauna communities on deep moderate energy
	A5.13 - Infralittoral coarse sediment
	A5.14 - Circalittoral coarse sediment
	A5.23 - Infralittoral fine sands
	A5.25 - Circalittoral fine sands
	A5.26- Circalittoral muddy sand
	A5.35 - Circalittoral sandy mud
	A5.36- Circalittoral fine mud
	A5.38- Mediterranean biocenosis of muddy detritic bottoms
	A5.39 - Mediterranean biocenosis of coastal terrigenous muds
	A5.46 - Mediterranean biocenosis of coastal detritic bottoms
	A5.47 - Mediterranean biocenosis of shelf-edge detritic bottoms
	A5.51 - Maerl beds
	A5.535- Posidonia beds
	A5.531 - Cymodocea beds
	A6.2 - Deep-sea mixed substrata
	A6.3 - Deep-sea sand
	A6.4 - Deep-sea muddy sand
	A6.51- Meditteranean communities of bathyal muds
	A6.511 - Facies of sandy muds with Thenea muricata
	A6.52 - Communities of abyssal muds

Special features	Nursery habitats
	Marine mammals
	Marine Birds
	Turtles

Table 2.4-6: Environmental components mapped in Adriplan project and considered for cumulative impacts estimation

Each respondent has associated two P to a MU, as the P which the E are more sensitive to. The two P indicated by each respondent are not the only two emerging from the HA, but the two they believe to which the environmental component is more sensitive. In the final computation of Cumulative Impacts all the combination of E-HA-P reported by experts has been taken into consideration.

Ej, with j = 1, ..., 28 (24 Habitats from EUNIS Classification, and 4 environmental components suggested by ADRIPLAN experts)

MUi, with i = 1, ..., 17 (17 Maritime Uses mapped within ADRIPLAN Data Portal)

Pk, with k = 1, ..., 18 (18 Pressures from MSFD 2008)

Then, per each P, the following characteristics have been associated by experts:

- Buffer area (B);
- Impact extent (e)
- Impact level (I);
- Recovery time (r)

Finally, each expert has assessed the confidence of his/her answer through a level of confidence (C).

A sensitivity score "S" has been calculated for each answer given by experts, equally weighting the three sensitivity criteria:

- Impact extent= e
- Impact level = I
- Recovery time = r

The final sensitivity score per each triple combination of E-MU-P is as follows

$$S= (1/3e + 1/3I + 1/3r)/3$$

S is a function of E, MU and related P. the results of the questionnaire will correspond to a matrix of S as follows:

	MU1	MU2	…	MU17
	P1,…, P18	P1…, P18	…	P1, …, P18
E1	S1,1,1 …, S1, 1,18	S1,2,1, …, S1,2, 18	…	S1,17,1, …, S1,17, 18
E2	…	…	…	…
…	…	…	…	…
E28	S28,1,1, …, S28,1, 18	S28,2,1, …, S28,2, 18	…	S28,17,1, …, S28,17, 18

Finally, a single value of sensitivity has been associated with each evaluated combination E-MU-P according to the buffer indicated by experts.

Buffer areas have been associated to each MU and related pressure, as the distance at which the effects of pressures harm environmental components.

In order to apply a precautionary approach, if experts expressed different options in relation to the same combination E-MU-P-B, the buffer has been selected as follows:

1) if the opinions converge on one option, this option has been adopted;

2) if the opinions are in discord, the larger buffer indicated for each combination has been used, according to precautionary approach.

The buffer area has been associated to each combination of E-MU-P as follows:

	HA1	HA2	…	HA17
	P1,…, P18	P1…, P18	…	P1, …, P18
E1	B(S1,1,1), …, B(S1, 1,18)	B(S1,2,1), …, B(S1,2, 18)	…	B(S1,17,1), …, B(S1,17, 18)
E2	…	…	…	…
…	…	…	…	…
E28	B(S28,1,1), …, B(S28,1, 18)	B(S28,2,1), …, B(S28,2, 18)	…	B(S28,17,1), …, B(S28,17, 18)

Final Cumulative impact score has been calculated as:

$$\sum_{j=1}^{n}\sum_{k=1}^{m} p(Ej)\, i(Pk) s(Ej, Pk)$$

Where:

E= environmental components

P= pressures emerging from human activities

S= sensitivity score

p(E) = presence/absence of environmental component in a specific location (mapped in ADRIPLAN data portal), expressed respectively as 1-0.

i(P)= the presence/absence of a pressure in a specific location, according to the Buffer area associated to MU

The impact score is consequently higher in those locations where several environmental components occur together with human activities that generate pressures interesting them, and to which the environmental components are sensitive according to expert judgment. The final score of cumulative impacts of each grid cell of analysis is the result of the sum of the contribution of impact of each triple relations between E-MU-P which insists on the same grid cell.

The "confidence" value present in the questionnaire was not considered in the final sensitivity score computation. Confidence values have been discussed to map the current available knowledge in the Adriatic-Ionian Region concerning the potential vulnerability of the environment the current anthropic threats emerging from maritime activities and sectoral development.

Main goals and results of methodological application

Final aim of the cumulative impacts analysis is to identify areas in Adriatic-Ionian basin where the potential environmental impacts of human activities are more concentrated**.** The identification of such areas is not necessarily correlated with current impacts on the environment as is not supported by empirical data on the state of the environment. The applied methodology suggests the presence of areas where environmental components are more sensitive to the pressures generated by the human activities located in the same areas.

The analysis and interpretation of cumulative impact is an essential instrument for the application of an EBA to MSP. As a matter of fact, the tool aims at identifying:

- pressures (and related Maritime Uses) to which the Adriatic-Ionian environmental components (E) are more sensitive;
- maritime activities which produce the pressures impacting specific environmental components;
- spatial localization of areas which are more vulnerable to the current maritime uses distribution;
- the level of knowledge about Adriatic-Ionian environmental components sensitivity (confidence), and possible gaps.

The analysis of cumulative impacts results, in conjunction with the other project tools and analysis, is essential to support the definition of strategies and planning measures and optimize the reallocation of maritime uses within maritime spatial planning.

With respect to the sensitivity analysis, a panel of 90 experts from the AIR has been composed. Out of the 20% of responses, 298 triple relations between E-MU-P have

been received, to populate 253 E-MU-P relations in total. Sensitivity scores obtained through experts' judgment are organized in a matrix showing the potential intensity of impacts of maritime activities (in columns) on the E (in rows). The matrix is obtained calculating the mean value of the impact on each E related to the pressures produced by each single use, and reports a synthetic overview of sensitivity of each E on Maritime Uses. White cells indicate relations to which no judgment has been expressed by experts. Out of 28 components, 4 seabed habitats are not covered by any answer (A5.46, A5.47; A6.2, A6.3). Two of them cover deep sea bed habitats (A6.2 Deep-sea mixed substrata; A6.3 Deep-sea sand), whose impacts are not well studied.

The matrix shows that Maritime transport generates very high impact on five environmental components, and the same is for Bottom Trawling. Moreover, Posidonia Beds is the E impacted by the large number of activities, such as Aquaculture, Coastal & maritime Tourism, Coastal Defense works, Maritime transport, Small Scale Fishery, Bottom Trawling.

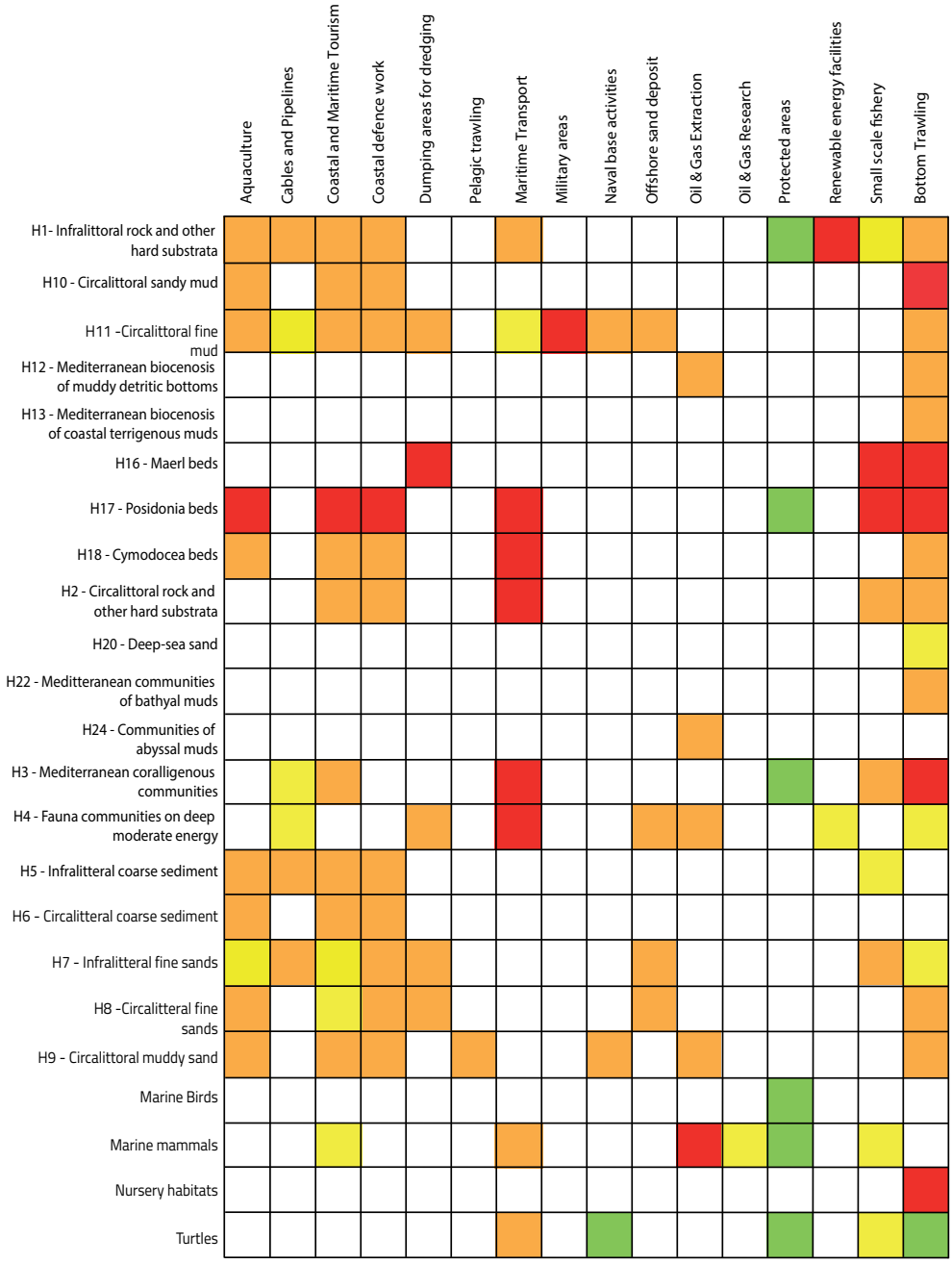


Figure 2.4-17: Intensity of the impacts of the maritime activities on the environmental components considered in the project. Cell's color indicates the intensity of the impacts in relation to the sensitivity scores reported by experts: RED= very high; ORANGE= High; YELLOW= Medium; GREEN= Low

Furthermore, a large number of activities are potentially responsible of producing "high" impacts on the Adriatic-Ionian environmental components.

Second, the results obtained through experts' questionnaire have been spatially elaborated through the ADRIPLAN data portal tool (see Supplementary BOX 2). Final output of data processing has been the Cumulative Impact Map (Figure 2.4-18).

The spatial presentation of the cumulative impacts shows that the highest potential impacts on the Adriatic-Ionian sea takes place in three main areas: (i) Northern Adriatic and Croatian coastline; (ii) the Italian coastline of Abruzzo, Molise and Apulia Regions; and (iii) the territorial waters of Greece (Ionian side). The reasons of the high score in these areas are multiple and different. Considering the Maps of uses shown in paragraph 4.1, and the maps of the environmental components used in the project (see Figures 2.4-19a-d) it is possible to notice that the Northern Adriatic is characterized by a high concentration of uses that are responsible of the pressures to which the E in the area are sensitive. The high number of activities in correspondence to the presence of sensitive E in the same areas, is probably responsible of the final score in this area. The situation is different in Abruzzo, Molise and Apulia regions coastline. Here, the presence of coralligenous communities (Figure 2.4-19b), in correspondence with Bottom Trawling activity (see Fishing and Aquaculture Map), generates very high scores. Moreover, the presence of several environmental components highly sensitive to the MU can intensify the results. As a matter of fact, trawling activity produces pressures, such as physical damages, that negatively impacts Mediterranean Coralligenous communities. Moreover, in Greek coastline the high value of cumulative impacts is likely due to the presence of sensitive E, such as: Coralligenous communities and Posidonia Oceania (Figure 2.4-19b) and whales, turtles and dolphins (Figure 2.4-19c), all condensed in the same areas. In Ionian Sea the cumulative impact analysis do not consider Habitats, because of the lack of data.

Another aspect to be reported with respect to the cumulative impact final score is the difference between the results in the open sea and the coastal areas. In coastal areas of the entire basin the multitude of pressures generated by uses create high intensity of cumulative impacts on the marine environment. The cumulative impacts are clearly higher in the costal than the pelagic area in Northern Ionian and South-Middle Adriatic while in the Northern Adriatic cumulative impacts in the pelagic zone are more or less as high as in the coastal areas. Furthermore, the map shows a small area in front of Marche Region with medium high values of cumulative impacts.

Finally, the study present an assessment of Adriatic-Ionian areas more exposed to potential environmental impacts of maritime activities. This instrument, being strongly dependent on data availability, such as spatial location of maritime uses, environmental components and especially to the number of information obtained from experts, should be considered as a support tool for the elaboration of the planning proposal to be taken into consideration in relation to Uses Maps, analysis of coexistence and additional information obtained from stakeholders' involvement activities and reading of sectoral documents.

Figure 2.4-18: Map of the cumulative impacts for the Adriatic and Ionian Region

Supplementary Box 5: Cumulative Impact tool

The Cumulative Impact tool permits to identify areas in the marine space where the environmental components are more exposed to anthropogenic pressures.

Configuration

The tool offers an "Admin area" where to configure the "Environmental components", the "Pressures", the "Sensitivities" and the "Case studies". The tool allows managing directly the questionnaire responses and performs the automatic calculation of the sensitivities. The "Case Study" is similar to the coexistence tool; additionally, the user may set one or more layers for each "Environmental Component".

Run

The run is subdivided into 5 steps:

1. creation of the hexagonal grid cells (each cell is a polygon);
2. collection of statistics about presence of "Uses" for each cell and, if the use doesn't intersect the cell, computation of the distance (Figure g);
3. collection of statistics about presence of "Environmental components" for each cell;
4. computation of the Cumulative Impact score for each cell (according to the Halpern formula - see below).. ;
5. publication of the results (layer, styles, metadata) on the ADRIPLAN Data Portal: the style is dynamically created using the Jenks natural breaks classification method.

The *i(P)* function decreases linearly with the distance between the grid cell and the Maritime Use (MU). The function has values between 0 and 1.

- 1: when the MU intersects the grid cell
- 0: when the distance from the MU is greater then or equal to the buffer *(buffer(MU,E,P))*

The buffer value is specific for each triple MU, E, P and is an output of the questionnaires for the evaluation of Adriatic Ionian environmental component sensitivity.

Here, the *i(P)* formula more in details:

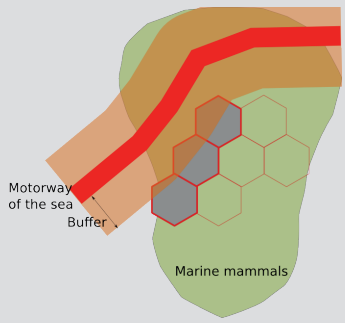


Figure g: Simplified schema of interactions between uses and environmental components in the Cumulative Impact tools.

Barriers and Bottlenecks

The cumulative impacts analysis is a significant analysis that aim to highlight the marine areas mostly impacted by maritime human activities. In addition, the tool enables to identify, through the expert opinion and the analysis of literature, the main environmental pressures emerging from each maritime activity and to localize them in the marine space. Despite this, the results obtained from this kind of analysis are very sensitive to the number of information and data available. In fact, the results are dependent to the number and typology of geographical information collected about maritime uses and environmental components (layers). In ADRIPLAN, the identification of the experts to be involved has considered carefully the necessity to cover geographically the expertises on different characteristics and environmental components of the Adriatic and Ionian Macroregion with the research interests of the experts.

As already discussed in the section 2.4.2 (Analysis of coexistence among uses), the presence of several data sources without shared practices on collect, manage and sharing activities/uses, environmental and geospatial information (e.g. the countries and the public administrations involved in the ADRIPLAN project) can lead to a spatial heterogeneity of the input data. The heterogeneity can be both in terms of "presence/absence" (missing data) and quality. Thus, the methodology should be integrated with information about the spatial distribution of missing data and a quality assessment on the input data in order to improve the interpretation of the final results.

Furthermore, it has to be considered that the grid resolution affects the final results in several ways: e.g. it influences the detail of the results as well as the interaction between nearby activities and uses.

Thus, these aspects should be investigated in order to choosing the optimal grid resolution.

For this reason the outputs must be used carefully, mainly as an indication rather than an evidence. Considering what emerged from the ADRIPLAN process, the available knowledge about the impacts of maritime uses on the Adriatic-Ionian environmental components and of the sensitivity of the marine environment to the current pressures presents some weaknesses. Thus, in order to have reliable and usable results, it must be improved. In addition, some considerations about the integration of coastal and maritime pressures and impacts must be done. The difficulty to consider the impacts of inland activities on the marine side is mainly related to the lack of synthetic data (industrial pollutants, eutrophication, marine litter, …) and of the transport dynamics knowledge. Furthermore, the knowledge of transport dynamics is essential to properly consider pressure distance on the computation of the Cumulative Impact Index final score (currently, the spatial relation between uses and environmental components is modeled using an inverse-distance function – i(P)). To improve the tool and make it more respondent to the real marine characteristics, some elaboration must be done considering sea circulation and currents and, thus, pressure distribution.

Finally, the linear non-threshold nature of the formula adopted for computation is often too simplistic. For instance, marine ecosystems may show threshold responses to intense and cumulative pressures reveling effects with mitigation potential and non linear relations of uses to environmental components.

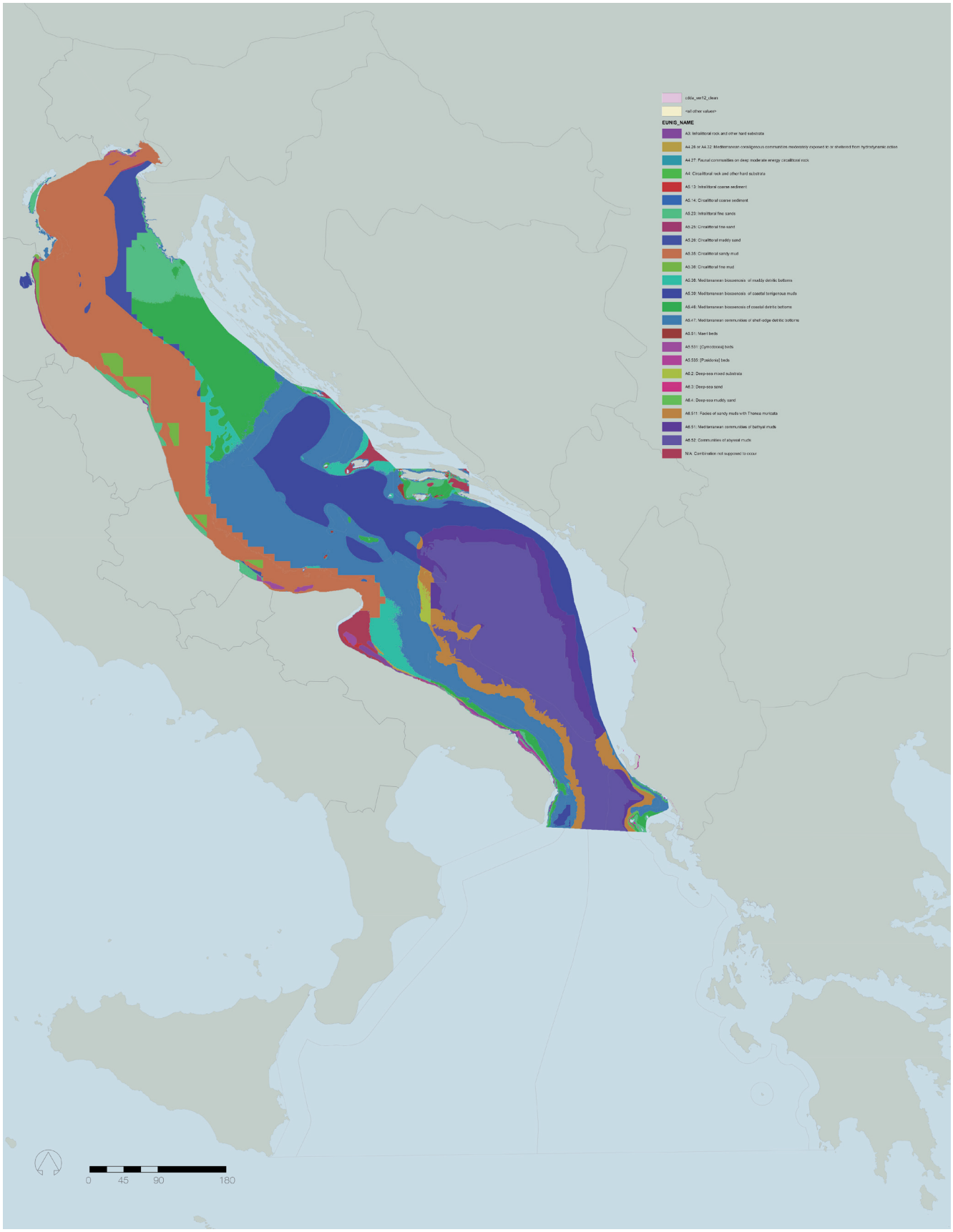


Figure 2.4-19a: Predictive seabed habitat for the Adriatic (Source: EMODnet)

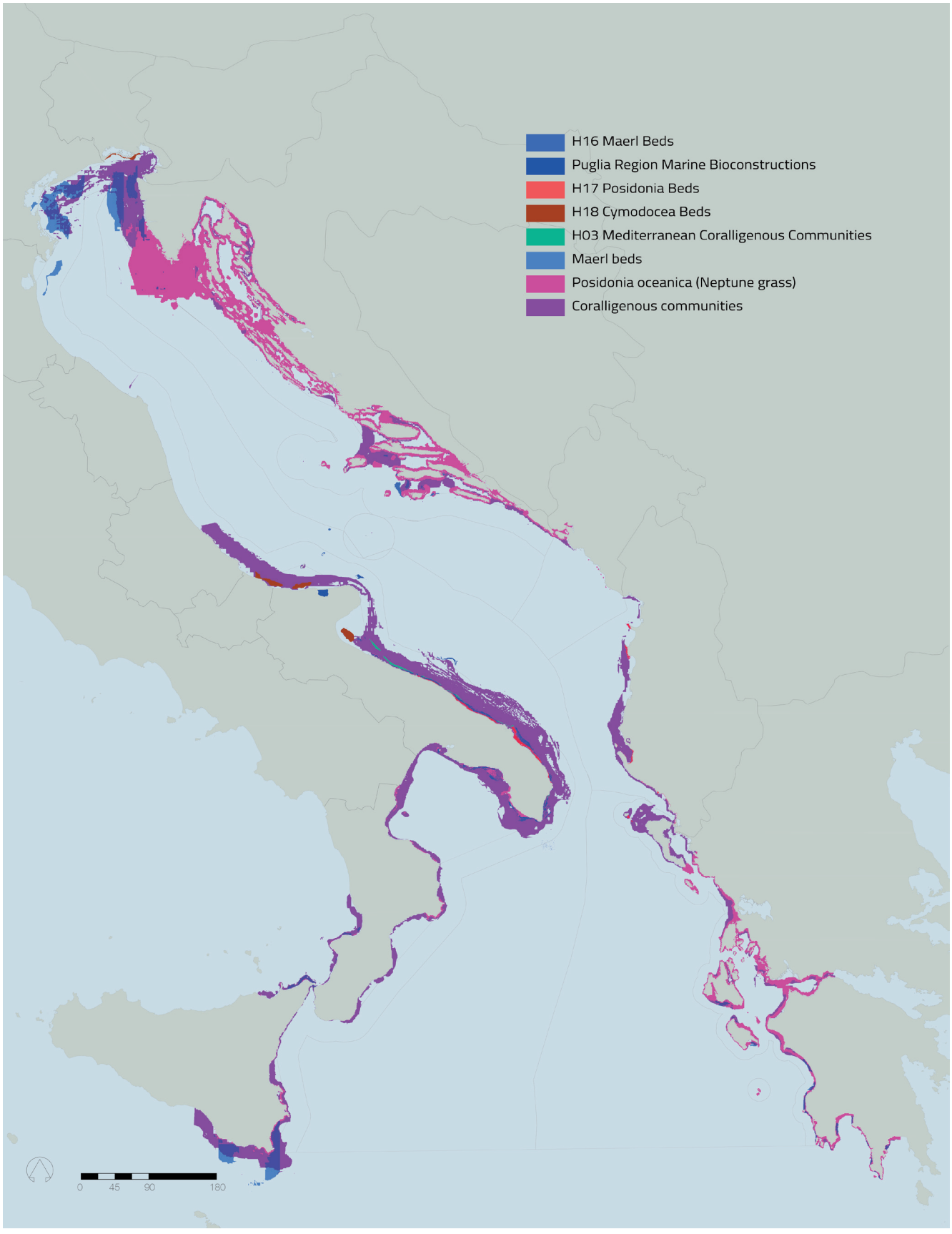


Figure 2.4-19b: Sensitive habitats considered in the project: Posidonia Oceanica, Coralligenous communities, Maerl Beds

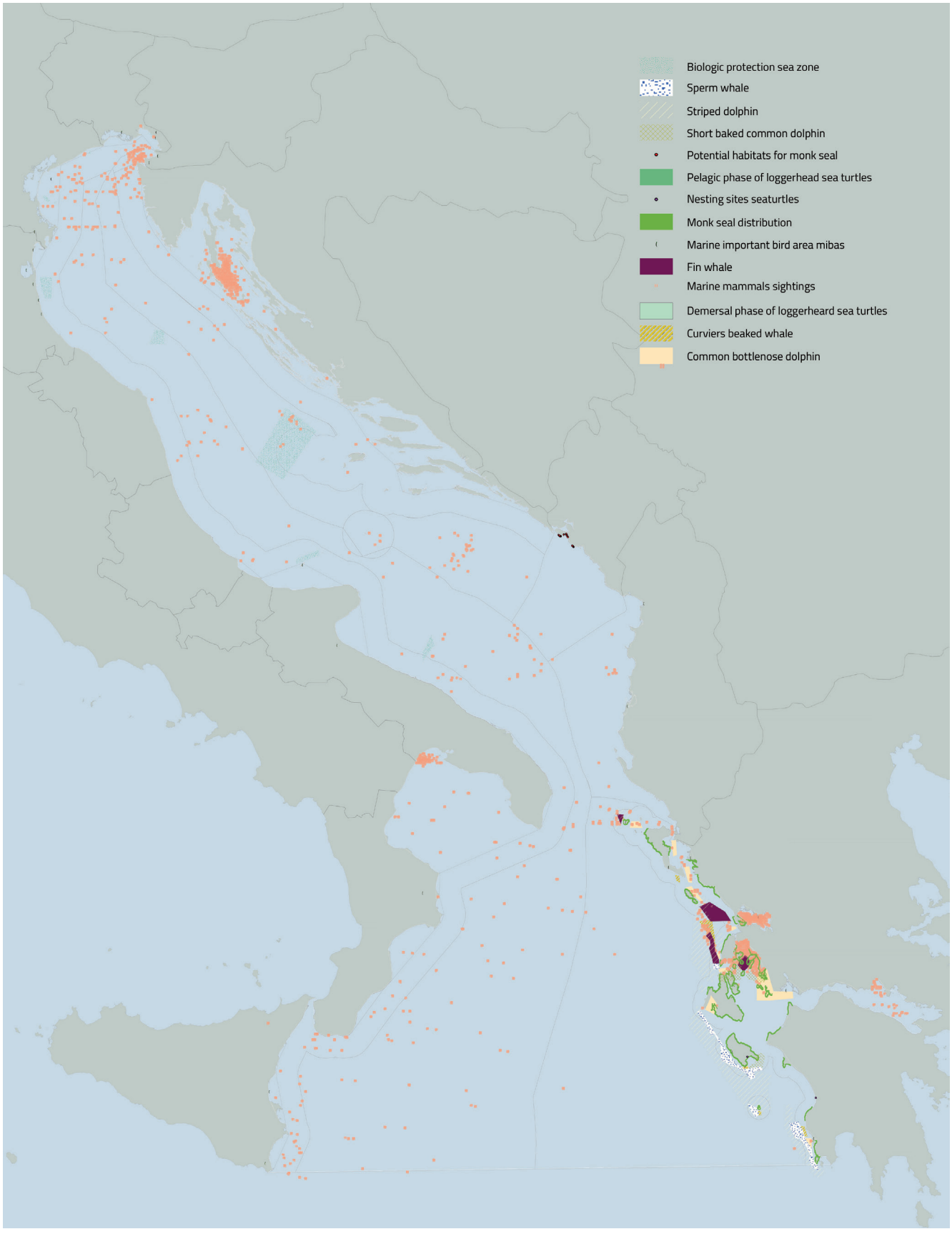


Figure 2.4-19c: Adriatic and Ionian Marine mammals and Turtles pelagic and demersal phases

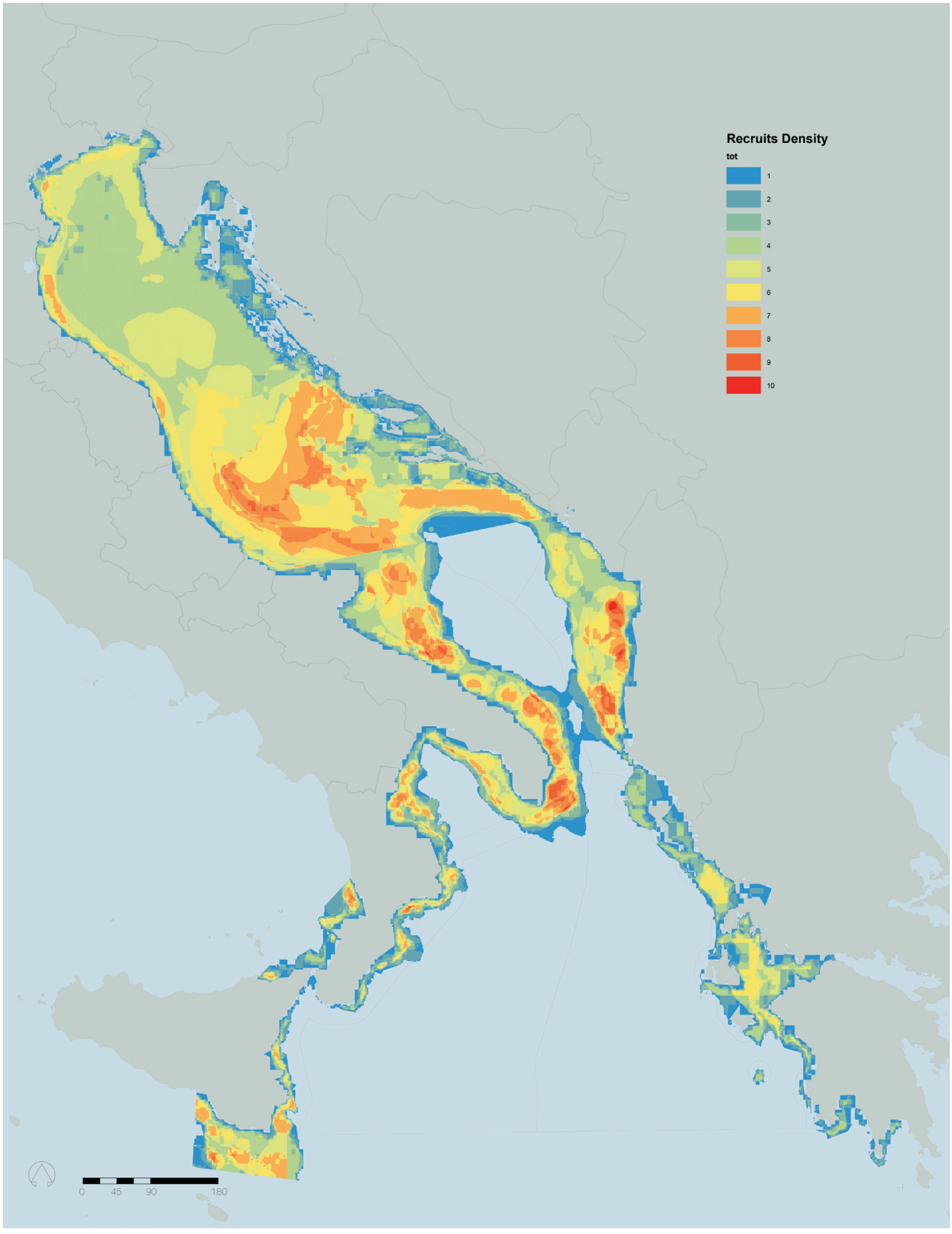


Figure 2.4-19d: Density of recruits areas of the most important Adriatic-Ionian fishing species

2.4.4 Socio-Economic analysis

The main target of the present task is to identify the socio-economic coastal and maritime dynamics for the macroregion and the two focus areas. Ideally, for the quantification of the value of each use, it would be important that data concerning the added value or employment of each sector was available. The lack of comprehensive data covering different sectors and areas, have stressed the need for an alternative method for the incorporation of socio-economic data into the maritime spatial planning process. The proposed methodological framework is based on the need to fully exploit even the minimal amount of data that could be acquired during the data collection phase and establish a solid base for the assessment of uses' dynamics. The aim was to create a framework that could be applicable regardless of the nature of available data. In order for this method to be efficient in terms of time and cost, a combination of quantitative and qualitative data is selected to develop a series of indicators, which lead to the benchmarking of maritime uses.

The framework is based on a matrix in which the project's identified maritime uses[3] are scored. The matrix assesses each maritime use in terms of three criteria highlighting their socio-economic contribution. More specifically, uses are analysed in terms of value, intensity and flows.

Uses' contribution and therefore the socioeconomic value is a key element defining the importance of each use for local societies (EU/EUNETMAR, 2014). The uses' value could be expressed through indicators such as Gross Value Added, employment, cultural value and revenues. During data collection, a large effort was made to create a large database in order to measure socio-economic dynamics. Despite the amount of gathered data this could not be directly inserted into the socio-economic method because the data referred to incomparable physical units. Additionally, sectoral GVA was available for some uses while for others it was impossible to be estimated. Even the use of Input-Output tables for the indirect estimation of sectors' multipliers could not lead to directly interpretable results as countries of AIR such as Croatia and Albania have not published any recent data. Moreover, Blue Growth (EU/EUNETMAR, 2014) strategy estimations for GVA and employment of maritime activities could not be used without risky assumptions as these (EU/EUNETMAR, 2014) are referring to different spatial scales than the scale of the two focus areas and the macroregion as defined by the ADRIPLAN project. Thus, the challenge of value estimation was to develop a cross-uses assessment scheme based on observed quantities but also be free of measurement units.

Therefore, a composite indicator was developed in order to quantify the value of each use. Two crucial aspects arise here. The first concerns the index to be used in order to quantify the relative activity of each use. While in MSPs that are implemented in national waters the evaluation could be based in the national level of activity against the activity level of the area under research, this could not be valid for both AIR and the focus areas as these are situated around international waters. To overcome this difficulty the benchmark should be based in a broader spatial unit for each activity. Therefore, the total activity of EU is selected as a benchmark. Additionally, in order for the evaluation to be applicable in smaller spatial scales, the total activity of each focus area along with the total activity observed in EU are disaggregated in NUTS III level. This method leads to the direct comparison of activities at the lower scale for

[3] Coastal Tourism, Commercial Transport, Passenger Transport, Marine Tourism, Fisheries, Aquaculture, Oil & Gas Research and Extraction, Renewable Energy, Sand Extraction, Cables, pipelines, transmission lines, Dredging disposal areas, MPA, Cultural and historic conservation areas and Military Zones.

which data is usually available from Eurostat or National Statistics. The results of the comparison correspond to different relative levels of activity and respective scores (Table 2.4-7).

Scoring procedure										
%	1-20	21-40	41-60	61-80	81-100	101-120	121-140	141-160	161-180	181+
Score	1	2	3	4	5	6	7	8	9	10

Table 2.4-7: Levels of each maritime activity and their respective scores

As from the table 2.4-7, there are ten different levels of activity corresponding to ten different scores for each use. The lowest score attained to each use is 1 and the highest 10 (when no activity is observed in the area the value score of this particular use is zero). Thus, when the activity levels of one specific use in the area under analysis (e.g. total freight handled at ports per NUTS III level) correspond to 50% of the observed average activity at EU NUTS III regions then a score of 3 is assigned to the use.

The second aspect is that this kind of analysis, as described above, is able to quantify the specialization of AIR for a certain use against a larger geographic unit such as the EU but cannot fully depict the contribution of each use to local society and economy as it does not take into account the value of each activity. To overcome this weakness a weighting factor of the economic potential of each use is employed such as per employee sales amount, total employment, total earnings etc. Taking into account the available data at the EU level, the total GVA of output and the total employees are selected for each maritime use as the value weighting factor. The weights are then adjusted to a relative index in order to develop a ranking of uses. Therefore, the activity with the highest value of output at EU level is positioned as the first in rank and is assigned with a value of 1. Additionally, the comparison of all the uses with the top ranked use provides an estimation of the weights for all uses. For example, if the GVA of a use corresponds to a 60% of the use with the highest value, then a weight of 0,6 is assigned to it. Taking this into account, the highest possible score for an active use is 10, while the lowest could just exceed zero.

Intensity quantifies the level of use in a spatial and temporal context. Intensive uses are more probable to add pressure on social and natural environment (European Environmental Agency, 1999; 2013). Here, indices of intensity are seasonality, capital intensity and spatial integration. These are quantified as follows:

- The score for seasonality ranges between 0 and 1. The quartiles of this range reflect the seasons of the year thus, leading to four different potential scores for each use. Therefore, a use that is highly active only during the summer period is scored with 0,25 while a use that shows significant activity through the whole of the year gets a score of 1.
- Intensity can also be expressed as the spatial integration of uses. Uses that occupy both the marine and coastal space are more intense than take place only in one (COEXIST, 2013). Therefore, a use is taking the value 1 if it is located at both marine and coastal areas and 0 if else.
- Capital intensity refers to the level of fixed capital entered into the production of each activity. Capital-intensive uses are more possible to cause environmental and social pressures on local communities. Additionally, this type of uses attracts a

larger amount of investments (Antweiler et al. 2001; EU, 2004; Cole et al. 2005). The score of each use is defined by a dummy variable which takes the value 1 for capital-intensive activities and 0 if otherwise.

Summarizing, the maximum score for intensity is 3 and the minimum 0,25. The uses here are not weighted, as the scores are directly interpretable.

Finally, flows express the economic activity (inputs, outputs) of each maritime use in terms of its connectivity to external processes creating and/or exporting socio-economic potential. This criterion is depicting the potential of each sector to mobilize sources (capital and human) in the context of attaining a better competitive position in the global market (Slaughter, 1997; Lall, 2002). Relevant indicators on this aspect include private and public investments and the orientation to export activities (ITC, 2014). Flows can be quantified through the export orientation of each use. Export oriented uses are inducing capital, commodities and labour flows thus strengthening mobility of the area (Grimwade, 2003). Three scores are attributed to this indicator corresponding to the export level of each use. Uses which are highly export oriented are valued with the score of 2, uses with a medium level the score 1 and uses with a low level with a score of 0.

Therefore, the maximum sum score of each use, taking into account the partial scores of the three criteria, is 15 (10 for value, 3 for intensity and 2 for flows).

Total Scores – Maritime Socioeconomic Index

The criteria' ratio 10-3-2 reveals the contribution of each criterion to the total score. The assigned scores to the three criteria denote that a greater importance has been given to the value criterion as it is a crucial indicator under a socioeconomic context. The last column of the matrix includes a quotient of the total score of each use to the maximum possible score. This quotient, which is expressed as a percentage, is depicting the overall socioeconomic contribution of each use at the blue economy of the three areas of analysis and thus is forming a Maritime Socioeconomic Index (MSI). The calculation of MSI is presented below:

$$MSI = {Total\ SUM}/{Max\ SUM}$$

The benefits of using the MSI are:

1. It is free of units.
2. The measuring scale is not affected by the weights assigned to each criterion.
3. The measuring scale is not affected by the number of indicators.
4. Uses' score is interpretable and comparable to other uses' scores.

The selected indicators, the scoring procedure and the range of possible scores for each criterion and indicator are summarized in a matrix (Table 2.4-8). Finally, it should be stressed that the Average (bottom row of the matrix) under each criterion and indicator provides a comparison of the socio-economic significance of uses. The use of the average value (and not the sum) renders the comparison between the areas under analysis possible (AIR, FA1, FA2). However, the comparison should be adapted carefully, taking into account the possible differences of the socioeconomic environment of the areas under comparison.

Uses	Value			Intensity				Flows		Sum	Maritime Socioeconomic Index
	Level of Activity	Weight	*Sum*	Seasonality	Spatial integration	Capital intensity	*Sum*	Export oriented	*Sum*		
Evaluation	0-10	0-1	0-10	0-1	0/1	0/1	0-3	0/1/2	0-2	0-15	0-100%
Use1											
Use2											
.....											
Average											

Table 2.4-8: Proposed matrix with scores for each criterion and indicator

Longitudinal Socio-Economic Analysis

An extended version of the matrix described above will provide a clearer image of the development prospects of the uses under analysis. Here, the use of time series would provide the socio-economic change of maritime uses including annual observations in past periods. Due to lack of data, this (second) matrix could not be applied for this analysis. However, the method proposed for its implementation can be used by future MSP initiatives.

Results

The scoring matrix has been applied in three different areas, as defined by the project, in order to evaluate the socioeconomic interactions of the uses that are developed in each area. The first matrix has considered the whole Adriatic and Ionian Region, the second has focused on Focus Area 1 and the third on Focus Area 2. In Table 2.4-9 the value indicators are presented. Taking into account the data availability issue, the indicators proposed in Table 2.4-9 provide the best possible insights to the current activity level. The data selected for the analysis refers to the most recent year available for each use. Nevertheless, there is no available data for other maritime uses, such as sand extraction, military uses etc.

Maritime use	Indicator	Year
Commercial Transport	1) Total Container Handled at Ports (TEU) 2) Total Dry Bulk Cargo (Thousand Tonnes) 3) Total Liquid Bulk Cargo (Thousand Tonnes) 4) Total Ro-Ro Cargo (Thousand Tonnes)	2012
Passenger Transport	Total Passengers (Thousand Pax)	2012
Coastal Tourism	Total Accommodation Establishments (No. of Units)	2011
Maritime Tourism	Total Cruise Passengers (Pax)	2013
Fisheries	Total Fishing Fleet (No. of Vessels)	2014
Aquaculture	Total Production (Tonnes)	2011 (FA1), 2009 (FA2), N/A (AIR) N/A for Albania and Montenegro
Oil & Gas	Total Oil Production (Million Tonnes) Total Gas Production (TOE)	2013 N/A for Albania

Table 2.4-9: Indicators used for value estimation (Eurostat, 2013; Eurostat, 2014; Italian Ministry of Economic Development, 2014; MedCruise, 2014; Croatian Ministry of Agriculture, 2014; STECF, 2013a; 2013b; EU, 2014; Oxford Economics, 2014; Ecorys, 2013; JRC, 2014)

A substantial parameter of the value scoring procedure is the number of NUTS III regions situated in each region thus forming the comparison basis of the relative activity level for each use. The number of regions of each area are: 56 for the Adriatic-Ionian Region, 16 for FA1, 12 for FA2 and 382 for the EU (Eurostat, 2014; Albanian Institute of Statistics, 2014; Statistical Office of Montenegro, 2014). Despite the fact that EU countries have a well established regional system which divides countries in different classes of regions, this is not the case for other countries, like Albania and Montenegro. To overcome this difficulty, the average population of EU countries NUTS III was taken as a proxy in order to divide the Albanian territory in NUTS-III types of regions. The final number of NUTS-III regions that occurred after this transformation for Albania is 6[4]. The value weighting of each use is presented in Table 2.4-10. The leading sector in a European level is coastal tourism as it returns 129 billion euro as a gross added value and employs over 2,5 million people. The lowest weight is assigned to the sector of aquaculture, as it possesses the lowest share of GVA and employment among the maritime sectors in Europe.

[4] Bosnia and Herzegovina is not included in the analysis due to little development of maritime uses and a significant lack of data.

Use	GVA (000€)	Employment	Weight
Commercial Transport	33.000.000	371.700	0,20
Passenger Transport	10.640.000	159.300	0,07
Coastal Tourism	129.000.000	2.507.000	1
Marine Tourism	6.400.000	100.000	0,04
Fisheries	3.400.000	105.700	0,03
Aquaculture	1.500.000	27.460	0,01
Oil & Gas	50.010.000	73.200	0,21

Table 2.4-10: Weights for each maritime use (STECF, 2013a; 2013b; EU, 2014; Oxford Economics, 2014; Ecorys, 2013; JRC, 2014; Eurostat, 2013)

For intensity, the score of seasonality for each use is primarily based on quantified data. However, when this was not possible, sector analyses and strategic documents have been taken into account. Finally, capital intensity of sectors is measured according to the international standards given by sectoral analyses, strategic documents and experts' opinions since the estimation of the exact contribution of the capital factor to the production of each use at the local level is not feasible. More precisely, the identification of the capital intensity at the AIR level could only be achieved through sectoral surveys, which could provide a measure of the elasticity of output with respect to capital. Regardless of the lack of respective surveys at the AIR level, several sectoral analyses and strategic documents provide a clear view of the capital intensity of each use at the EU level. Taking into account that the production technology of the sectors does not significantly differ between the Adriatic and EU space, the capital intensity of each sector for AIR could be evaluated taking into account the European standards. The data used for the quantification of intensity indicators and the sources for the qualitative evaluation for each focus area are analysed below.

Finally, flows are also quantified for sectors where data is available while in case of lack of data, estimations about the export orientation of each sector are based on sectoral analyses, strategic documents and experts' judgment.

Results for the Macroregion

The final scores of each use are estimated and presented in the Matrix prepared for the Macro Region.

	Value			Intensity				Flows		Sum	Maritime Socioeconomic Index
	Level of Activity	Weighting	Sum	Seasonality	Spatial integration	Capital intensity	Sum	Export oriented	Sum		
Commercial Transport	2,8	0,20	0,55	1,0	1,0	1,0	3,0	1,0	1,0	**4,6**	**30,3%**
Passenger Transport	9,0	0,07	0,63	0,75	1,0	1,0	2,8	1,0	1,0	**4,4**	**29,2%**
Coastal Tourism	10,0	1,00	10,0	0,50	0,0	1,0	1,5	2,0	2,0	**13,5**	**90,0%**
Marine Tourism	8,0	0,04	0,32	0,50	1,0	1,0	2,5	2,0	2,0	**4,8**	**32,1%**
Fisheries	8,0	0,03	0,27	1,0	1,0	0,0	2,0	2,0	2,0	**4,3**	**28,5%**
Aquaculture				1,0	0,0	1,0	2,0	2,0	2,0	**4,0**	**26,7%**
Renewable Energy				0,0	0,0	0,0	0,0	0,0	0,0	**0,0**	**0,0%**
Oil & Gas	2,0	0,21	0,4	1,0	0,0	1,0	2,0	0,0	0,0	**2,4**	**16,1%**
MPA											
Sand extraction				1,0	1,0	1,0	3,0	0,0	0,0	**3,0**	**20,0%**
Dredging disposal areas				1,0	0,0	1,0	2,0	0,0	0,0	**2,0**	**13,3%**
Cultural and historic conservation areas											
Cables, pipelines, transmission lines				1,0	1,0	1,0	3,0	0,0	0,0	**3,0**	**20,0%**
Military zones											
Average	6,63	0,26	2,03	0,80	0,55	0,82	2,16	0,91	0,91	**4,18**	**27,8%**

Table 2.4-11a: Socio-economic Matrix for the Adriatic-Ionian Region (AIR)

As can be seen from the figures, the use of the highest importance for AIR is coastal tourism. Adriatic and Ionian coasts and islands are popular tourist destinations. A concentration of tourists could be spotted in Veneto Region, the Dalmatian coasts, the Greek island of Corfu and Messina region. In terms of value, coastal tourism has the highest weighting score as it is the leading maritime sector in Europe in terms of GVA and employment. Additionally, in terms of intensity, coastal tourism acquires a score of 3 as it is highly active only during half of the year and it is only developed at the coastal part of AIR. Furthermore, it is a capital intensive form of activity as the vast majority of tourism activity of the region is based on mass tourism (Bramwell, 2004; Hazendonk et al. 2008). Finally, in terms of flows, coastal tourism acquires 2 points as its product is highly exportable with over 50% of the total nights spent at AIR attributed to non-residents of the hosting/destination countries (Eurostat, 2014).

The second most important sector is maritime tourism. The use, which was quantified through the number of cruise passengers, acquires a relatively high evaluation

score in all of the criteria. Cruise tourism is a key sector of the blue economy of AIR as it is exceeding the 150% of European average. The sector is also characterized by seasonality, which is similar to coastal tourism. Additionally, as a part of maritime transport, cruise tourism is capital intensive and its' activities cover both maritime and coastal space. Moreover, cruise tourism is a highly export oriented sector. Taking these into account, the use acquires a sum of 5 for intensity and a score of 4 for flows (European Cruise Council, 2012; Medcruise, 2014).

Popular cruise destinations of AIR like Venice, Dubrovnik, Kotor, Corfu and Bari attract a large number of visitors annually. This development creates a series of benefits for the local economies but also strong pressures on the environment. Ports like Venice and Bari are dealing with congestion problems as the cruise ships are competing for space with the ships, which serve passengers lanes and cargo transportation. Additionally, ports like Corfu, Kotor and Dubrovnik do not have the necessary infrastructure to adequately correspond to the large berthing demands of the large cruise-ships, which are getting larger due to the recent technological shipping developments. This fact puts extra pressure on local ports.

The next sector in terms of significance is commercial transport followed by passenger transport. The most active regions in cargo transport are situated in the Northern Adriatic where NAPA ports play a key role especially in container transport, Taranto port in Southern Italy, and the ports of Trieste, Bari, Ravenna, Ancona, Patras and Igoumenitsa where Ro-Ro transport is highly developed. Commercial transport is active for the whole year and is also developed both in sea and in land (port facilities). Furthermore, it is a highly capital intensive sector and acquires a total score of 3. Moreover, commercial transport is the main means of exports for AIR thus getting a score of 2 for flows (Rodrigue et al. 2013; EU/EUNETMAR, 2014).

Additionally, in passenger transport, activity concentrations are found in the lanes connecting the Balkans and Italy and in the intraregional lanes of Calabria. Passenger transport is characterized by higher seasonality than commercial transport as passenger flows are remarkably decreasing during winter and, therefore, the sector acquires a score of 0,75 for seasonality. Moreover, passenger transport is scored similarly to commercial transport in terms of capital intensity and spatial integration (Rodrigue et al. 2013; EU/EUNETMAR, 2014; Eurostat, 2014). Finally, the export orientation of the sector in AIR could be characterized as moderate since about 13% of the total traffic is international (Eurostat, 2014).

The two uses acquire similar scores despite the fact that AIR figures against the relative ones for the EU are higher for passenger than commercial transport. This is the result of the weighting factor which is higher for commercial transport since, in general, it is generating more value and jobs. The similar scores of the two uses and their competitive nature, especially for berth allocation at the port level, provide hints that conflicts may arise in regions where the two uses are overdeveloped (Venice, Trieste, Bari, Igoumenitsa).

The dynamics of transport sector are followed by these of the fishing sector. The fishing fleet per NUTS III region of AIR is exceeding the European average by 55%, thus providing hints for a specialization of AIR in the sector. The significance of the sector for AIR is not only economic but also social and cultural since many regions of AIR are strongly devoted to fishing either for living or as a way of life. Fishing is an activity that can be observed during the whole year while it captures both coastal and maritime space. Additionally, despite the fact that the sector is moving towards to a more capital intensive scheme, the output is mostly based on the labour factor since the fishing fleet is mainly composed by small and medium-sized vessels (EU Fleet

Register, 2014). Additionally, fish is a product that is highly exportable especially in countries like Croatia, Albania and Greece (Adriamed, 2002).

In terms of hydrocarbons research and exploitation, the activity of oil and gas extraction in the AIR at NUTS III level is reaching 5% of the European average for oil and 51% for gas. Despite the relatively low specialization of AIR, the increased potential of oil and gas exploitation in GVA production constitutes the sector as highly significant for the blue economy of the region. Further development of the sector with the new tenders from Croatia and Greece will surely strengthen the contribution of the sector to total incomes and employment but may also strengthen its environmental pressures on the region and intensify conflicts especially with the fishing sector. The sector is capital intensive and the exploitation of hydrocarbons is observed during the whole year. Nevertheless, it should be noted that, the total intensity score of the use is lower than the highest possible due to the fact that exploitation is taking place only in maritime areas. Finally, it should be stressed that gas and oil are extracted at local drilling spots mostly for local consumption and not exports (Italian Ministry of Economic Development, 2014).

Unfortunately, the rest of maritime uses analyzed in the matrix are only measured in terms of the intensity and flow criteria due to data unavailability. The most notable uses are aquaculture, cables and transmission lines and sand extraction. The significance of the aquaculture sector is mostly acquired by its highly exportable products (EU/EUNETMAR, 2014) while the significance of the other sectors is stemming by their high intensity. Sand extraction is concentrated at the western part of North Adriatic while cables and pipelines are mainly spotted in the sea area between Greece, Albania and Italy. Lower than sand extraction is the score assigned to the use of dredging disposal areas. The use acquires a low intensity score as it is observed only at the sea and a low flow score as it is not an export oriented activity. Finally, the lowest score is calculated for the use of renewable energy since, despite the relevant planned projects, up to date there is no activity observed in the area.

Results for Focus Area 1

As in the case of the Macro–region, coastal tourism is also the most significant use in FA1.

	Value			Intensity				Flows		Sum	Maritime Socioeconomic Index
	Level of Activity	Weighting	Sum	Seasonality	Spatial integration	Capital intensity	Sum	Export oriented	Sum		
Commercial Transport	4,3	0,20	0,9	1,0	1,0	1,0	3,0	2,0	2,0	**5,9**	**39,0%**
Passenger Transport	4,0	0,07	0,3	0,75	1,0	1,0	2,8	0,0	0,0	**3,0**	**20,2%**
Coastal Tourism	10,0	1,00	10,0	0,50	0	1,0	1,5	2,0	2,0	**13,5**	**90,0%**
Marine Tourism	9,0	0,04	0,4	0,50	1,0	1,0	2,5	2,0	2,0	**4,9**	**32,4%**
Fisheries	10,0	0,03	0,3	1,0	1,0	0,0	2,0	2,0	2,0	**4,3**	**29,0%**
Aquaculture	9,0	0,01	0,1	1,0	0,0	1,0	2,0	2,0	2,0	**4,1**	**27,3%**
Renewable Energy				0,0	0,0	0,0	0,0	0,0	0,0	**0,0**	**0,0%**
Oil & Gas	3,5	0,21	0,7	1,0	0,0	1,0	2,0	0,0	0,0	**2,7**	**18,2%**
MPA											
Sand extraction				1,0	1,0	1,0	3,0	0,0	0,0	**3,0**	**20,0%**
Dredging disposal areas				1,0	0,0	1,0	2,0	0,0	0,0	**2,0**	**13,3%**
Cultural and historic conservation areas											
Cables, pipelines, transmission lines				1,0	1,0	1,0	3,0	0,0	0,0	**3,0**	**20,0%**
Military zones											
Average	7,11	0,22	1,81	0,80	0,55	0,82	2,16	0,91	0,91	**4,22**	**28,1%**

Table 2.4-11b: Socio-economic Matrix for Focus Area 1 (FA1)

Here, it should be mentioned that the region of Venice shows the highest tourist accommodation capacity in Europe. FA1 is also strongly specialized in commercial transport (second highest score in the matrix). NAPA ports and Porto Levante which is the only port of LNG transportation in the region are highly active in commercial transport. The region is served by deep-sea vessels but also by regional and feeder services.

Similar results are identified for maritime tourism. The region is active in cruise tourism as the level of activity is exceeding the European average activity by 71% while Venice, Ancona and Ravenna are the most attractive ports for cruise tourists. Possible conflicts among different types of maritime transport can be found in all of the NAPA ports and in the port of Ancona. Considering that in many ports, such as Venice, Trieste and Koper, coastal tourism is also highly developed, a conflict between the two uses may also arise. The intense use of the sea by large ships causes negative impacts on water quality, thus worsening the competitive advantage of the

regions against Mediterranean competitors, which are also relying on the 'sea and sun' tourism model.

FA1 is also highly active in the fisheries sector. The MSI score of 29% on the matrix constitutes fishing as one of the most significant sectors of the region. It should be noted that, together with coastal tourism, fishing is the only use that is exceeding the European average by over 100%. The fleet of the region is showing a great concentration at the Croatian regions. A lower score is assigned to the aquaculture sector. Despite the fact that the sector is highly active in the region, aquaculture acquires a low MSI score FA1 (27,3%). This is mostly because of the low value weight that has been estimated for the sector at the EU level. The majority of aquaculture production is observed at the Italian regions of FA1. Relatively low -when compared to the Macro-region- is the significance of passenger transportation for FA1. The activity is attributed a low score, in terms of value and flows, as the activity of passenger shipping use in FA1 accounts only for 65% of the European average and the international lanes are very weak in terms of traffic volume. The ports of Zadar and Ancona are the most active in passenger transportation in the region.

In terms of hydrocarbons exploitation, FA1 shows high levels of activity in gas extraction as the regional extracted gas at the NUTS III level corresponds to the 139% of the European average. Gas extraction activity is concentrated at the Italian coast of FA1. The extraction of hydrocarbons is expected to get more intense with the concession of oil extraction permits at the east side of FA1.

Results for Focus Area 2

Coastal tourism is also the leading sector in FA2 as it is extracted from the results for Focus Area 2 Matrix.

	Value			Intensity				Flows		Sum	Maritime Socioeconomic Index
	Level of Activity	Weighting	Sum	Seasonality	Spatial integration	Capital intensity	Sum	Export oriented	Sum		
Commercial Transport	1,5	0,20	0,30	1,0	1,0	1,0	3,0	1,0	1,0	**4,3**	**28,7%**
Passenger Transport	6,0	0,07	0,42	0,75	1,0	1,0	2,8	2,0	2,0	**5,2**	**34,5%**
Coastal Tourism	9,0	1,00	9,00	0,50	0,0	1,0	1,5	2,0	2,0	**12,5**	**83,3%**
Marine Tourism	7,0	0,04	0,28	0,50	1,0	1,0	2,5	2,0	2,0	**4,8**	**31,9%**
Fisheries	4,0	0,03	0,14	1,0	1,0	0,0	2,0	2,0	2,0	**4,1**	**27,6%**
Aquaculture	5,0	0,01	0,05	1,0	0,0	1,0	2,0	2,0	2,0	**4,1**	**27,0%**
Renewable Energy				0,0	0,0	0,0	0,0	0,0	0,0	**0,0**	**0,0%**
Oil & Gas	3,0	0,21	0,6	1,0	0,0	1,0	2,0	0,0	0,0	**2,6**	**17,5%**
MPA											
Sand extraction				0,0	0,0	0,0	0,0	0,0	0,0	**0,0**	**0,0%**
Dredging disposal areas				1,0	0,0	1,0	2,0	0,0	0,0	**2,0**	**13,3%**
Cultural and historic conservation areas											
Cables, pipelines, transmission lines				1,0	1,0	1,0	3,0	0,0	0,0	**3,0**	**20,0%**
Military zones											
Average	5,07	0,22	1,55	0,70	0,45	0,73	1,89	1,0	1,0	**3,87**	**25,8%**

Table 2.4-12: Socio-economic Matrix for Focus Area 2 (FA2)

However, the total score of the use is considerably lower that the respective score of the sector in the case of AIR and FA1. Coastal tourism concentrations are spotted in the island of Corfu and in Puglia region. FA2 is also highly specialized in passenger transport as it is the sector with the second highest score. International traffic in the region accounts for over 50% of the total passenger traffic of regions' ports (Eurostat, 2014). The sea connections between the Balkan Peninsula and the Italian coast render the region amongst the most active in Europe. Relatively high is the score of maritime tourism since in FA2 there are two large cruise ports, Bari and Corfu. These two ports constitute possible nodes of conflicts as they are active both in transport and tourism. The fourth sector in terms of significance is commercial transport with a MSI score of (28,7%) although, it should be noted that, this score is lower than the score of maritime transport in AIR and FA1. FA2 is highly specialized in Ro-Ro transport as the ports of the area serve as nodes for the commercial interconnections between the Balkans and Italy.

Moreover, in terms of the fisheries sector, the region possesses a fishing fleet that corresponds to 77% of the European average fleet per NUTS III region. The relative

importance of fisheries in the area is lower than this in AIR and FA1 level while aquaculture acquires the lowest score. Additionally, the level of aquaculture production in the region is similar to the European average but the importance of the sector in socioeconomic terms is rather low. The highest aquaculture production is observed in the case of the Greek region of Thesprotia where a notable number of units are established in its coastal space. Remarkable activity can also be observed for oil and gas extraction. The defined Italian sea zones for extraction of hydrocarbons provide the region with significant volumes of oil and gas production. For sand extraction the score is 0 due to the lack of relevant activities.

Conclusions

The three scoring matrices revealed the importance of each use and their interactions in socio-economic terms for the areas under analysis. Table 2.4-13 summarizes the ranking of each use in AIR, FA1 and FA2 according to their score. As can be seen from the table, despite the fact that the ranking of uses in each area presents similar characteristics it also has notable differences. More specifically, coastal tourism is the leading use in terms of socioeconomic importance in all of the focus areas. Nevertheless, differences among regions are spotted in the ranking of the second and third more important uses (marine tourism for AIR, commercial transport for FA1 and passenger transport for FA2).

Use	Rank		
	AIR	FA1	FA2
Coastal Tourism	1	1	1
Marine Tourism	2	3	3
Commercial Transport	3	2	4
Passenger Transport	4	6	2
Fisheries	5	4	5
Aquaculture	6	5	6
Sand extraction	7	7	10
Cables, pipelines, transmission lines	7	7	7
Oil & Gas	8	8	8
Dredging disposal areas	9	9	9
Renewable Energy	10	10	10

Table 2.4-13: Ranking of maritime uses for all areas

Additionally, one striking difference in the ranking of uses among the focus areas is the relatively low score of passenger transport in FA1. While in AIR and FA2 passenger transport is amongst the most valuable uses, in FA1 the score of the use is very low. As it was mentioned before, the low score is the result of the relatively low activity of the region against the European average and the small number of international lanes of FA1. Therefore, tourism and transport seem to be the most important uses of the three focus areas. Finally, the fishing sector and the activities of hydrocarbons'

research and exploitation seem also to possess a key role in the socioeconomic profile of the region.

An important challenge that the method used in this chapter has dealt with is that the matrices analysed here, may be used in cases with data limitations. These limitations may refer either to the lack of quantified data or the failure to unify data across sectors. The application of the proposed methodology proved to be quite effective as cross-sectoral analysis was possible without the use of pure economic data or data concerning local employment to each sector. Nevertheless, improvements of the scoring matrices may be applied in the future. These improvements mainly concern the weighting procedure of uses or the selection of alternative indicators for the quantification of each criterion and the development of the Maritime Socioeconomic Index.

Barriers and Bottlenecks

The task of evaluating the socioeconomic impact of the uses developed in AIR faced a range of limitations which primarily had to do with data availability and the great extension of AIR. More analytically, there was a serious lack of data for a number of uses regarding their generated value and employment. This phenomenon was more intense for data referring to local or regional level. Focused surveys for data gathering could not be conducted due to the large extent of the focus areas, the limited timeframe of the project and the large number of uses developed in AIR. Additionally, for the cases that data was available, its unification for the development of indicators for cross-use evaluation was difficult due to the fact that the majority of available data referred to incomparable physical units expressing the production output of each use. Additionally, data unification was also hindered by the fact that the national statistics authorities of EU and Non-EU countries of AIR have been using different systems for data gathering and presentation.

Moreover, difficulties have arisen in attributing the generated value of the sea activities to particular regions. Furthermore, the evaluation matrix did not encompass the value of natural resources as there were not any existing estimations for the Adriatic-Ionian Region. Finally, possible sources for economic data like the Studies to support the development of sea basin cooperation in the Mediterranean, Adriatic and Ionian, and Black Sea (EU/EUNETMAR, 2014) and the Input-Output tables of the AIR countries could not be fully exploited. This was because, in the first case, the value estimations are referring to different spatial scales than these defined by the ADRIPLAN and, in the second case, several countries of AIR have not published any recent data.

2.4.5 Critical interpretation of process results

The last phase of the preliminary phase of planning elaboration consisted in the identification relevant planning issues to be potentially addressed by planning strategies and measures. In order to properly define MSP issues: (i) an analysis of conflicts and synergies among maritime uses was performed, also considering the results of the previously performed analyses (coexist, compatibility, etc.); (ii) relevant existing and potential interactions between maritime uses and relevant environmental components were identified, also looking at socio-economic interactions and dynamics among maritime uses and at the results of the analysis of cumulative impacts; (iii) major relevant management issues were selected. All these information were synthetically reported five maps shown below.

For what concerns interactions among current and future maritime uses, these were identified on the base of indications provided within the planning process by technical and institutional partners, as well as by stakeholders. Furthermore, thanks to the analysis of coexistence (par. 2.4.2) it was possible to identify areas where the marine space was more intensively used, i.e. where more interactions among uses take place. A support to the characterization of interactions (i.e. general indications about their conflictive/non conflictive nature) was provided by the compatibility matrix described in par. 2.4.2.

Also in this case, as in par. 2.4.1, the analysis was performed starting from categories of uses, and it was then enlarged considering interactions with other uses. A peculiar attention was paid to specific and spatially explicit interactions. On the base of the maps of uses shown in par. 2.4.1, interactions among uses have been identified and, when possible, localized.

Similarly, also conflicts between maritime uses and marine environmental components have been identified and localized thanks to the contribution of different stakeholders involved in the process of planning elaboration. The indications concerning interactions among uses and environmental components have been developed considering the pressures generated by different uses on selected environmental components (see par. 2.4.3).

Finally, major management issues were identified through a critical review of selected strategic and planning documents and thanks to indications provided by public and private stakeholders involved.

Apart from the general and specific information about interactions among uses and between uses and relevant environmental components, some indications about future sectoral development were collected in this phase.

Energy

A number of reflections emerged with respect to the energy sector. On the one hand, this sector is held as crucial in a blue growth perspective, as indicated at the Community level. On the other hand, some major concerns were formulated with respect to existing use-environment conflicts, as well as to future conflicts that may be generated by the development of new energy infrastructures in the area. With respect to the compatibility among maritime uses, some general information were provided by the compatibility matrix.

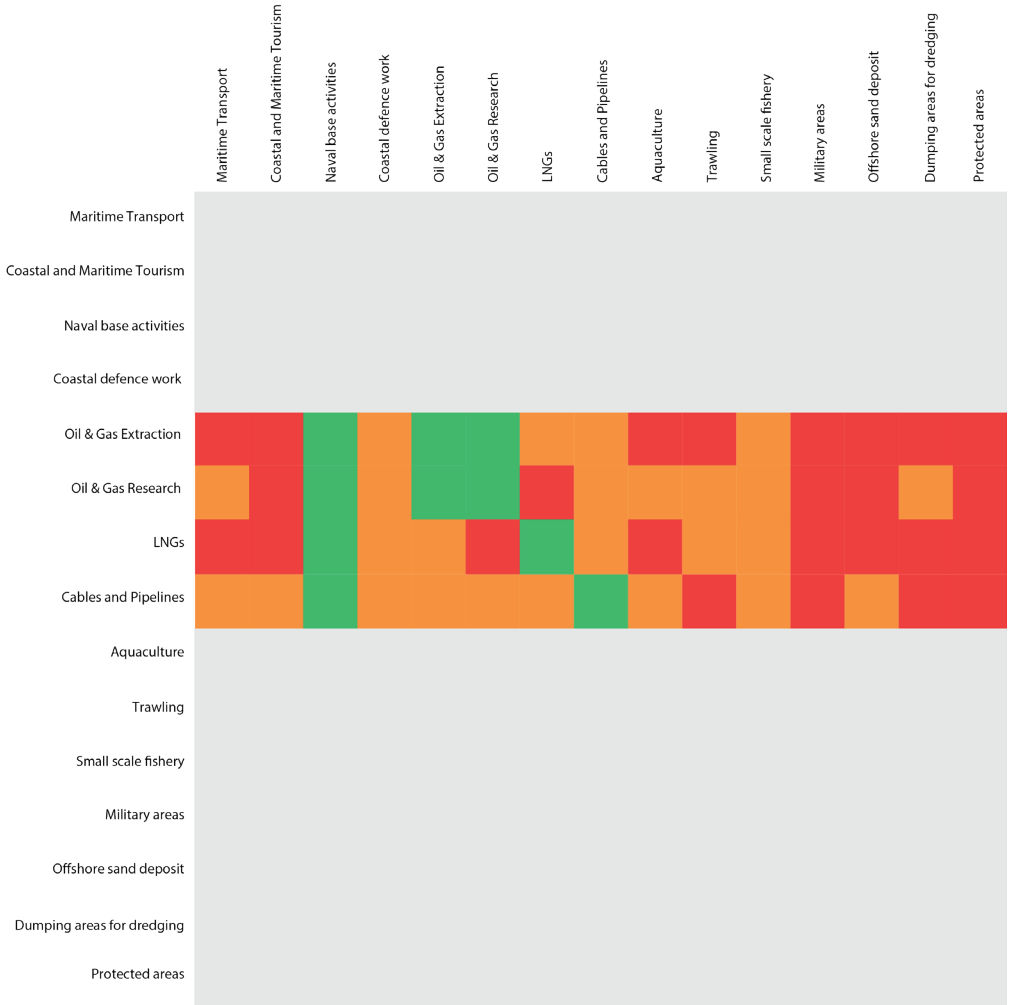


Figure 2.4-20: Compatibility matrix - ENERGY (Source: SHAPE project [modified])

The main interactions identified are shown in the maps below, and are synthetically described in the boxes reported in the following pages.

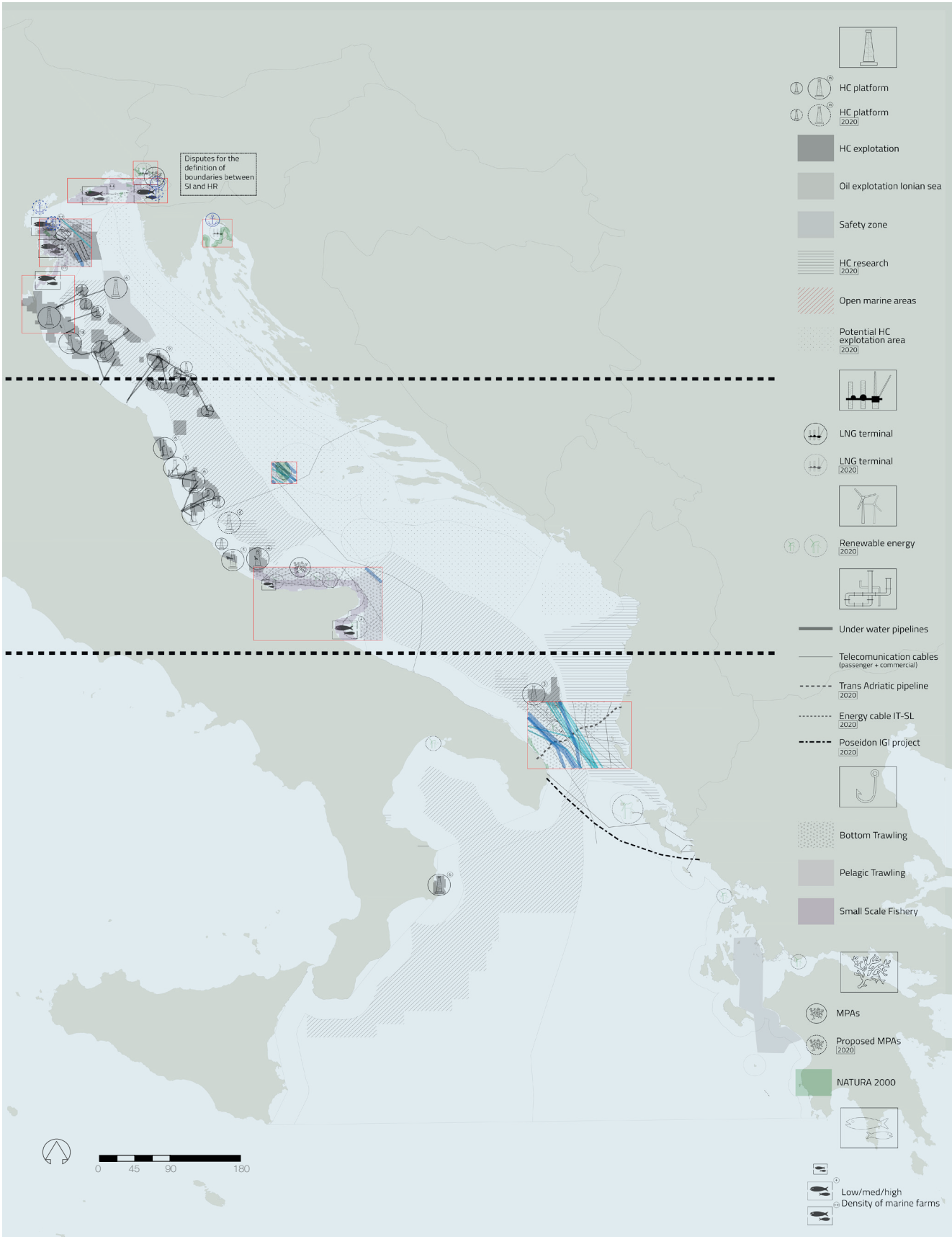


Figure 2.4-21a: Map of synergies and conflicts - ENERGY

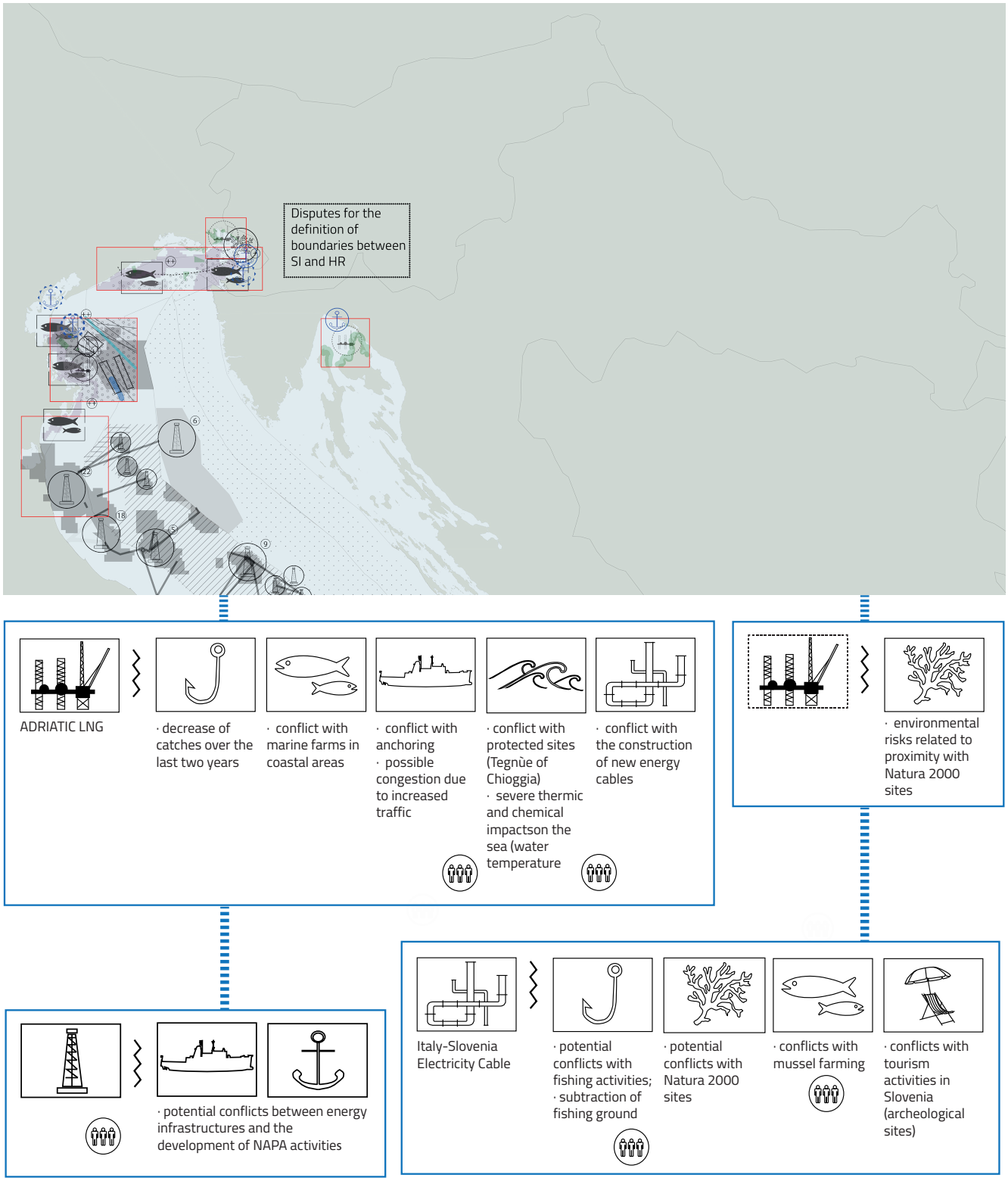


Figure 2.4-21b: Map of synergies and conflicts (zoom 1) – ENERGY

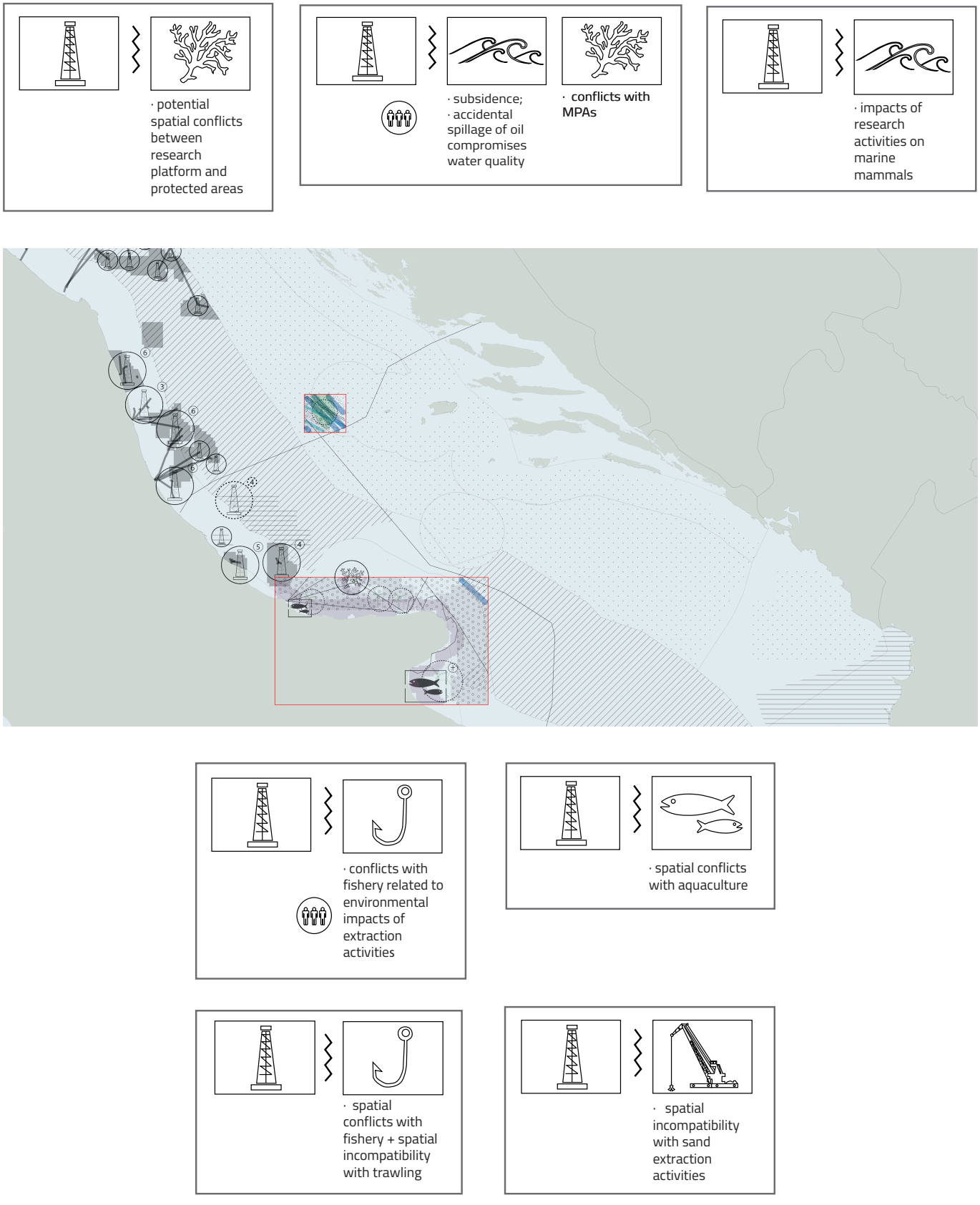


Figure 2.4-21c: Map of synergies and conflicts (zoom 2) – ENERGY

Figure 2.4-21d: Map of synergies and conflicts (zoom 3) – ENERGY (pag.147)

· potential synergies with aqauculture activities;
· subtraction of fishing ground

· potential synergies between OWFs and networks of MPAs

· potential conflicts with OWF infrastructures

· potential conflict related to sea floor integrity

· potential synergies with marine protection in no-go zone areas

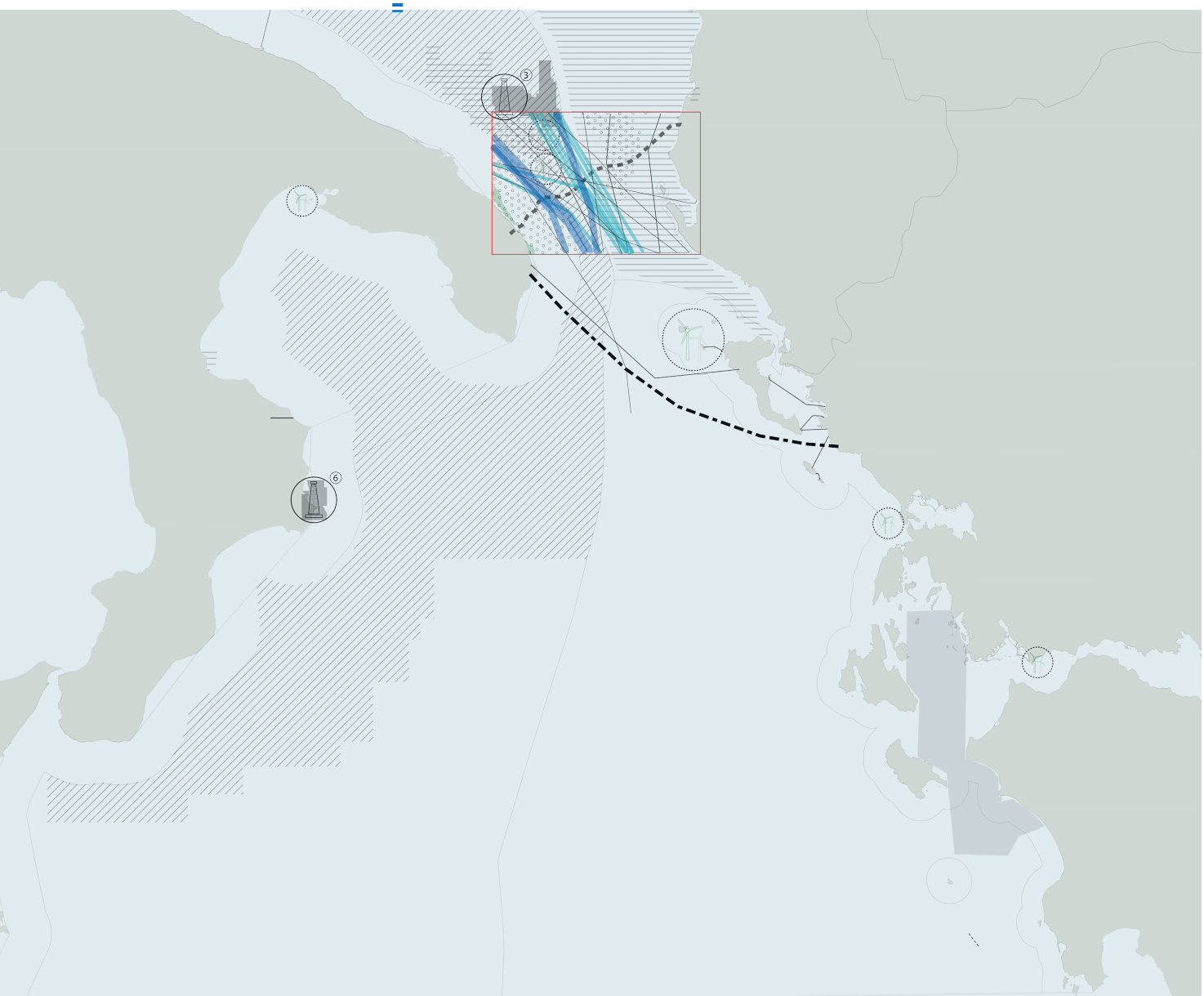
· favorable conditions for turtles in an area with no ships

TAP

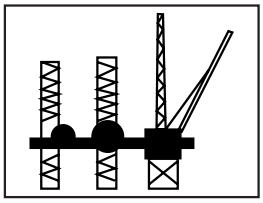
· potential conflicts with fishing activities;
· subtraction of fishing ground

· spill risk

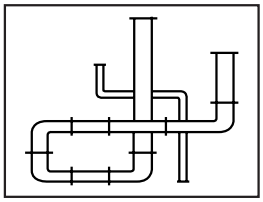
· potential conflicts with MPAs and Natura 2000 sites



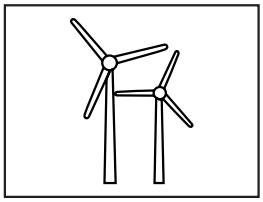
Finally, the following indications were collected.



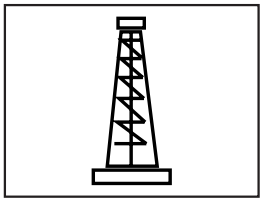
For what concerns LNG terminals, the need to establish special management areas to avoid conflicts between LNG facilities and cables & pipelines emerged. It was also highlighted that the area surrounding Monfalcone is already characterized by a high intensity of uses, so that it was suggested to identify alternative locations for the onshore LNG. In general terms, stakeholders suggested that LNG activities should be harmonised with broader development vision/ strategic goals, and that they should meet all security, health, environmental requirements.



For what concerns cables and pipelines, strategic EU document establish the need to improve cross-border electricity interconnections, in line with the high-level goal related to the promotion of an integrated energy market (EUSAIR Action Plan 2014). On the base of existing and potential conflicts with other uses, however, stakeholders suggested that peculiar attention should be paid in localizing new infrastructures, in order to avoid spatial conflicts with other uses. Furthermore, it was suggested to carefully consider impacts that may be generated in the construction phase.



With respect to renewable energy, the need to promote offshore energy facilities in the Adriatic-Ionian Macro-Region was indicated. The promotion of offshore renewable energy is considered crucial for meeting EU and national targets. Peculiar attention was paid to the location of offshore wind farms in Greek and Italian waters, especially at the FA2 level.



Finally, some indications were provided with respect to the development of new hydrocarbon extraction activities. All national strategies foresee an intensification of research and exploitation activities in their national waters. It was suggested to carefully consider environmental and safety problems that may emerge. In particular, where the location of research and exploitation platform has not yet been established (e.g. in Croatia, Albania and Montenegro) it is recommended to avoid placing them in correspondence with sensitive environmental areas and in areas where more nursery and spawning areas overlap.

Fishery and Aquaculture

Fishery is a key sector for the AIR, as already highlighted in par. 2.4.1 and 2.4.4. In the analysis of conflicts and synergies, major concerns related to the competition for marine space between fishery and other uses emerged. The subtraction of fishing ground was indeed indicated as a major threat for the development of fishing activities, to be considered also in light of the foreseen intensification of uses in the area. During the planning process, emphasis was also paid to negative impacts that some uses are generating on fishing stocks. For what concerns aquaculture, a high potential for sectoral development is foreseen for the Adriatic-Ionian Macro-Region. In this field, Maritime Spatial Planning can contribute to the identification of suitable location for new aquaculture sites. Considering interactions with other uses, the compatibility matrix shown below has provided some general indications.

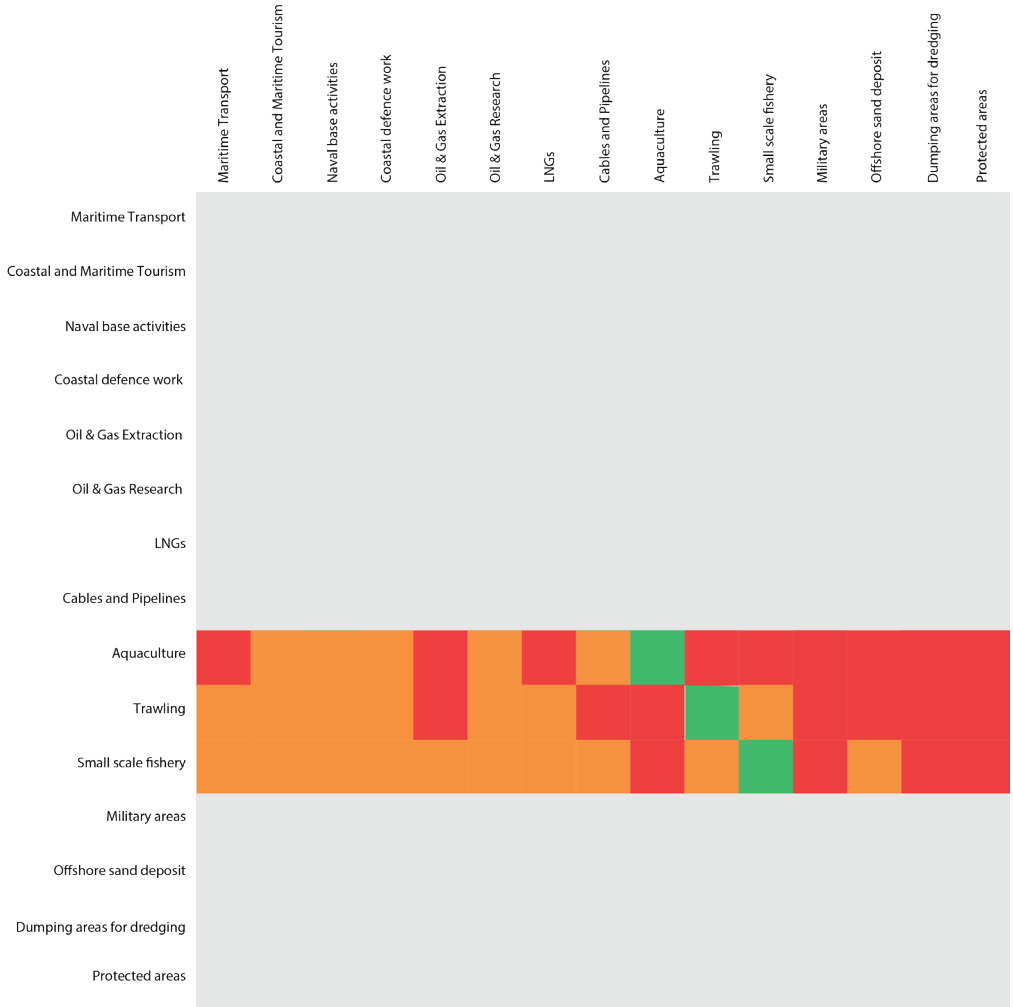


Figure 2.4-22: Compatibility matrix – FISHERY and AQUACULTURE (Source: SHAPE [modified])

The main interactions identified are shown in the maps below, and described in the following boxes.

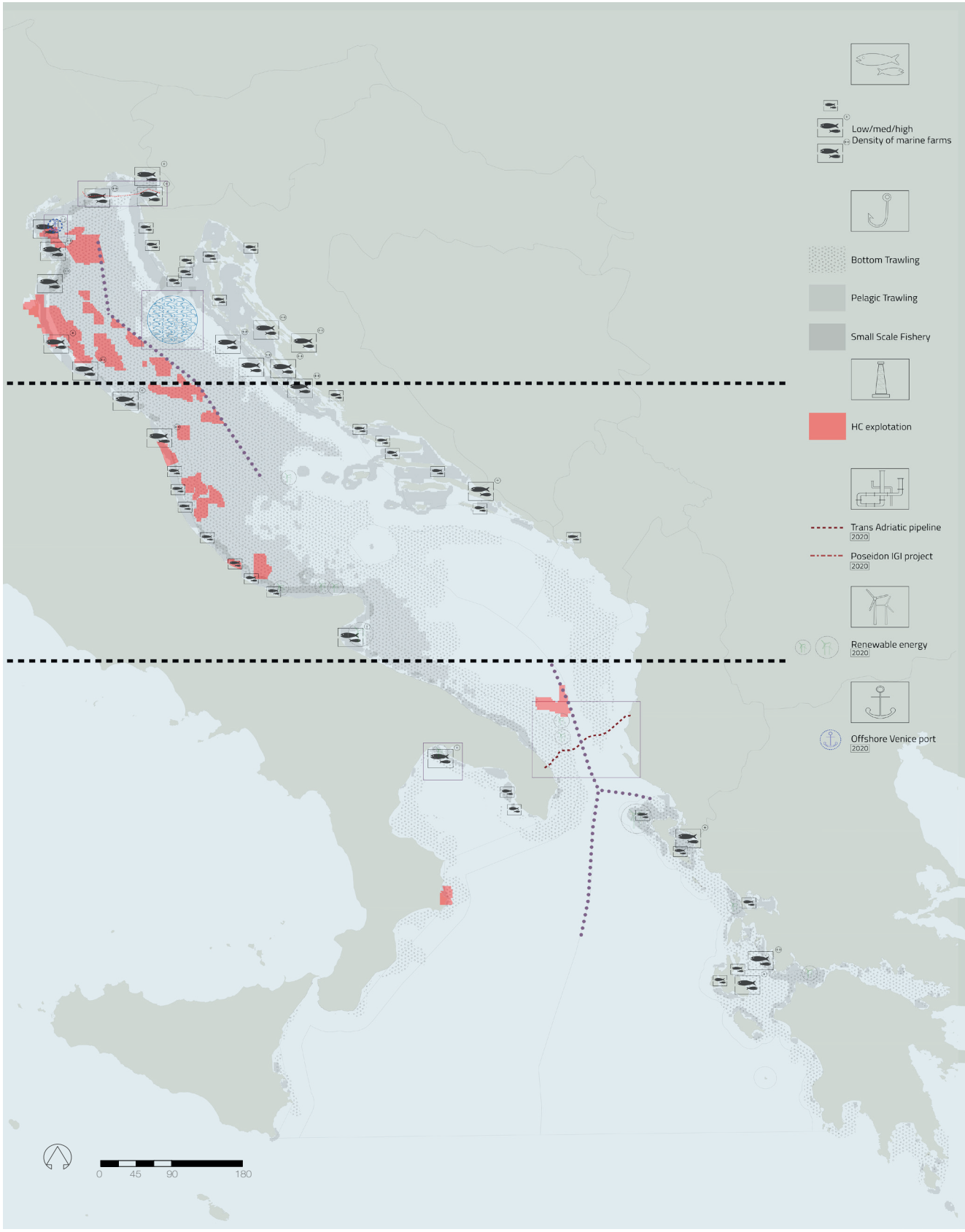


Figure 2.4-23a: Map of synergies and conflicts – FISHERY AND AQUACULTURE

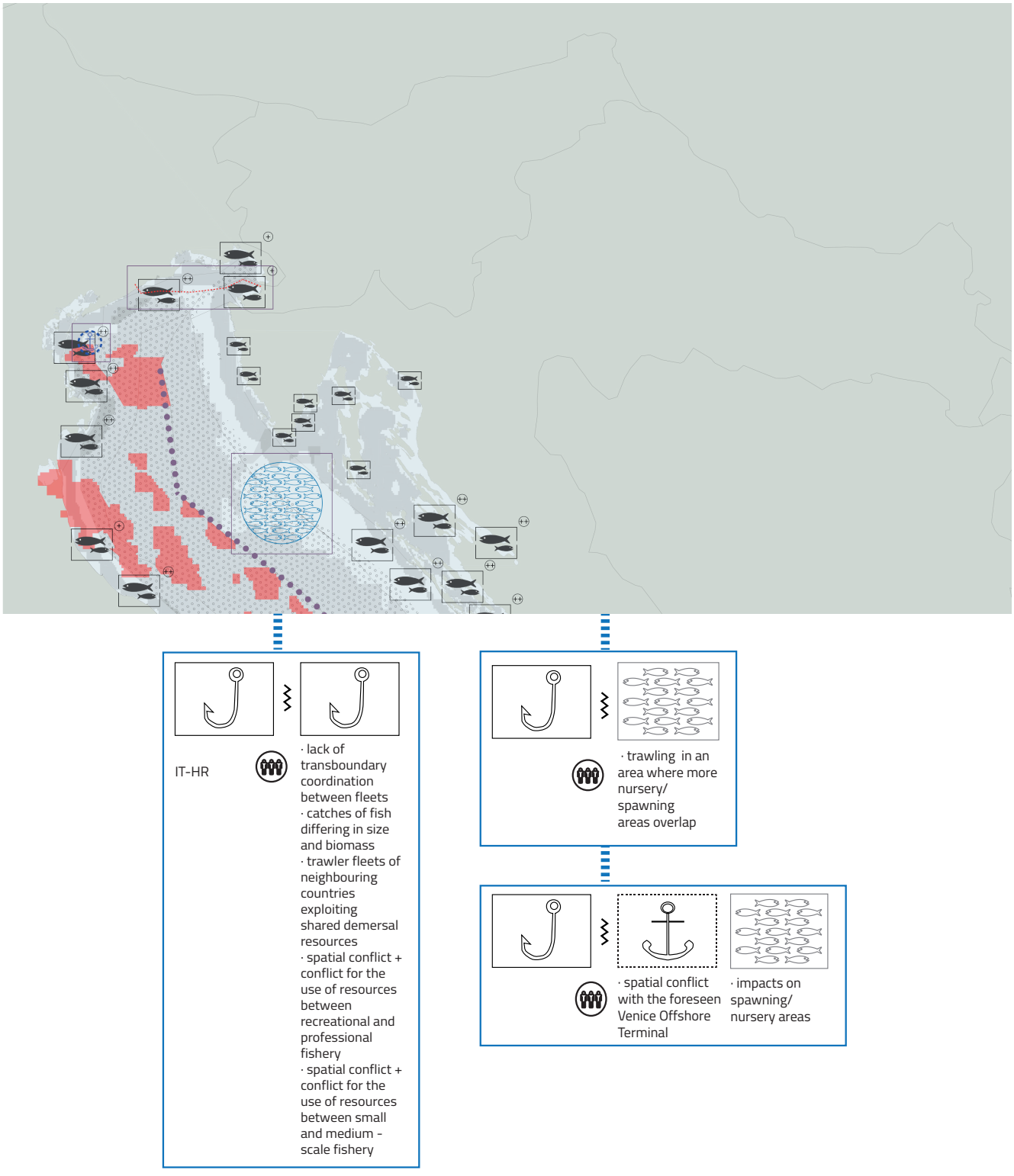
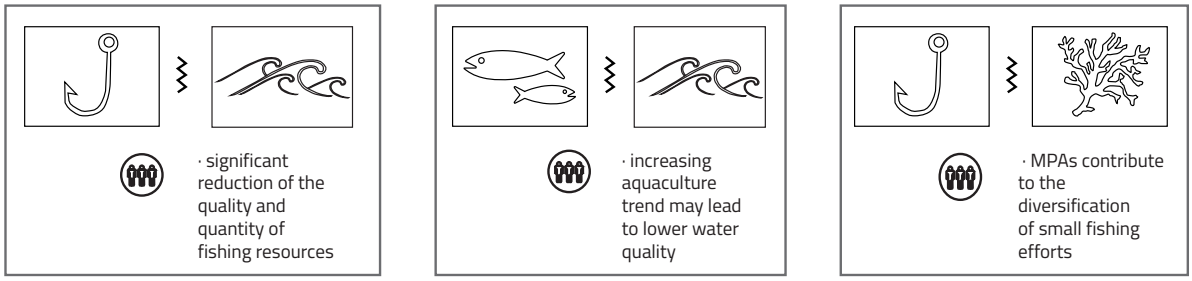
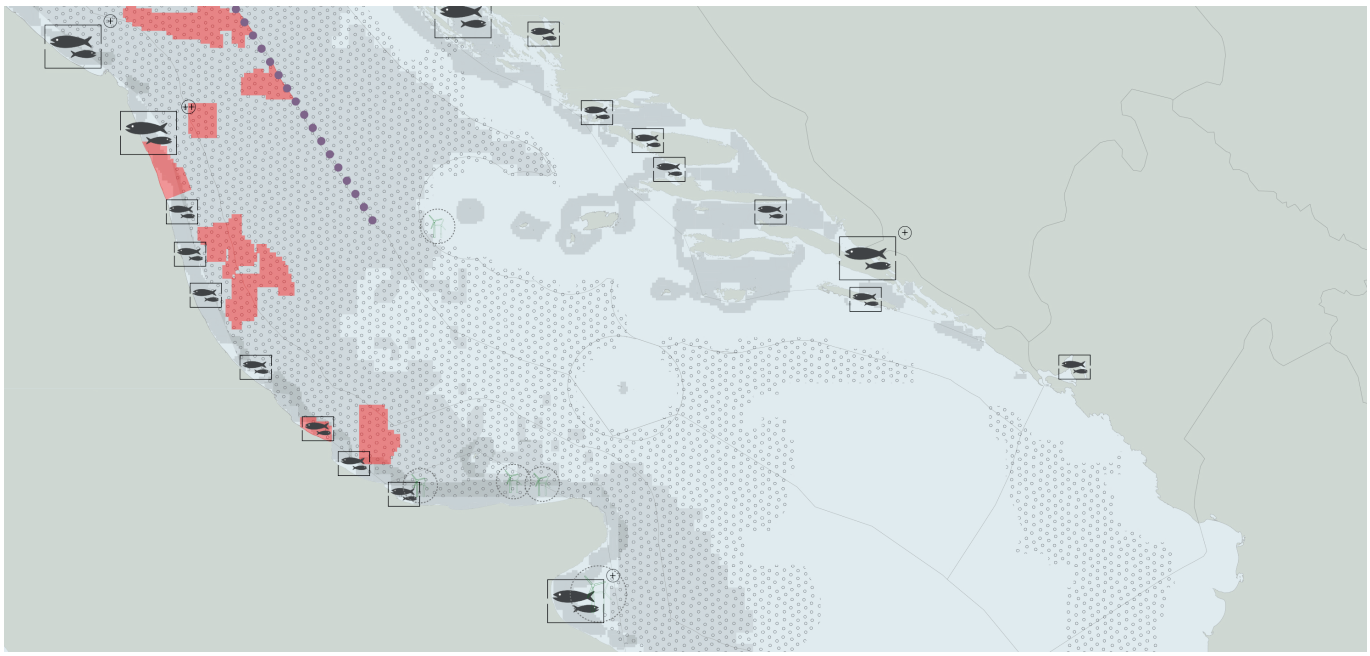


Figure 2.4-23b: Map of synergies and conflicts (zoom 1) – FISHERY AND AQUACULTURE





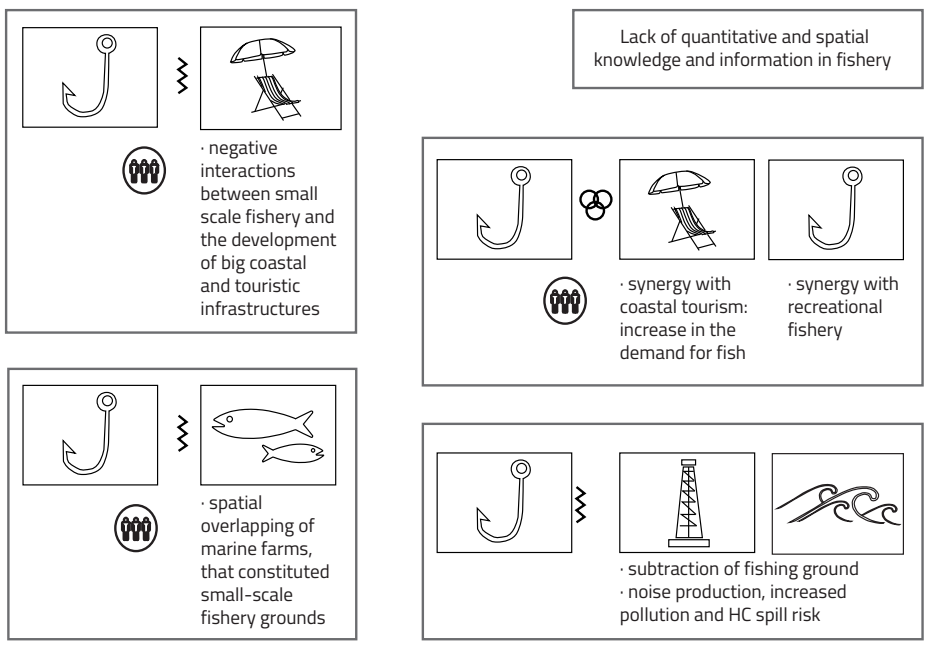


Figure 2.4-23c: Map of synergies and conflicts (zoom 2) – FISHERY AND AQUACULTURE

Figure 2.4-23d: Map of synergies and conflicts (zoom 3) – FISHERY AND AQUACULTURE (pag. 153)

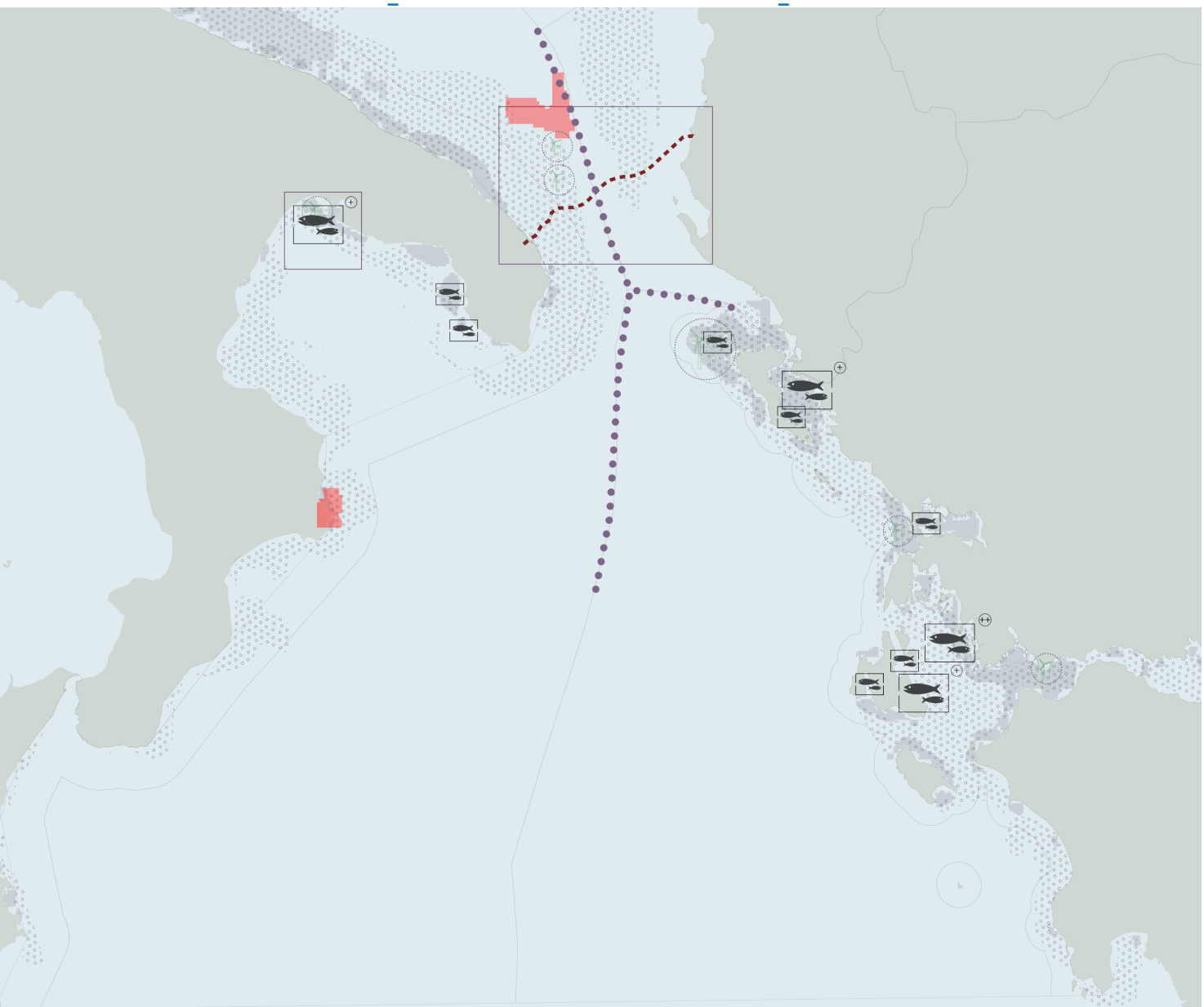
· cages for aquaculture in polluted sites

· conflict for the use of space between trawling and pipelines

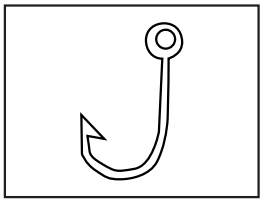
· potential synergies with offshore wind farms

IT-GR-AL

· lack of transboundary coordination between fleets
· catches of fish differing in size and biomass
· trawler fleets of neighbouring countries exploiting shared demersal resources
· spatial conflict + conflict for the use of resources between recreational and professional fishery
· spatial conflict + conflict for the use of resources between small and medium - scale fishery



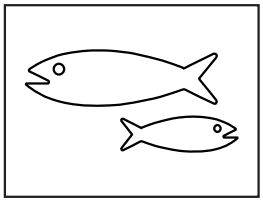
Finally, the following indications were collected.



In general terms, strategic sectoral indications about the development of the fishing sector in the EU have been established by the Common Fishery Policy (CFP). Stakeholders highlighted the necessity to support fishery operators to adapt methods and gears to the obligations of the CFP. Within the ADRIPLAN planning process, most of the indications resulting from the analysis of conflicts and synergies among uses and from dialogue with projects partners and stakeholders referred to the need to increase cross-border coordination and to promote sustainable fishery initiatives. Operational legislative framework and mechanisms need to be established at a transnational scale in order to ensure effective cross-border management of commonly shared fishery resources. Furthermore, it is suggested to promote agreements with respect to data sharing. Stakeholders suggested the need to foster educational activities related to the dissemination of good practices and to the exchange of experiences, also in order to facilitate the definition of common control and survey processes. These should be aimed at tailoring EU prescriptions on regional specificities, filling the gaps in the southern Mediterranean area. Some stakeholders indicated the need to promote a bottom-up approach in fisheries management, by engaging more actively fishermen in decision making and by enhancing collaboration with organizations like Fishery Local Action Groups (FLAGs). It is also suggested that, following the experience of the Northern Adriatic Fishing District, other two districts could be created to enhance coordination in the fishery sector within the entire Adriatic-Ionian Macro-Region. Further indications were provided with respect to the potential role of technological progress, which is expected to ensure more efficient methods of fishing.

For what concerns interactions with environmental components, it is strongly recommended: (i) to consider carrying capacity evaluation in the definition of MSP strategies; (ii) to consider nursery/spawning areas in their spatial-temporal dimension, thus defining priority protection zones for relevant species and proposing temporal zoning measures to reduce impacts on sensitive areas; (iii) to take into consideration important fishery habitats such as Posidonia meadows and coralligenous outcrops while developing spatial management plans. It was also suggested to promote synergies with MPAs, which can be used as examples to test and improve sustainable management actions.

Finally, with respect to use-use interactions, peculiar attention should be paid to possible negative interactions deriving from the intensification of hydrocarbon research and exploitation activities. In particular, it was indicated that hydrocarbon search surveys using acoustic technologies should be avoided close to EFHs and important fishing areas of vulnerable fish stocks.



A high interest for the development of aquaculture activities was expressed by all participating countries. European and national trends show an increase in the demand for the development of aquaculture activities, and consequently an increasing demand for maritime space to be dedicated to this activity. In particular, it was indicated that an improvement of sustainable aquaculture – including offshore aquaculture units - through proper spatial planning for the development of new sites constitutes a key target for the Ionian Sea (JMD 4281/2014). At a management level, it was sug-

gested to identify spatial, legal and regulatory constraints, and to consider European ecological, environmental and socio-economic constraints, as well as environmental sustainability and operability criteria and indicators, when identifying sites for aquaculture development. Interactions with existing maritime uses should be carefully considered in order to minimize potential conflicts. Considering possible negative interactions between farms and protected areas, for example, it was suggested not to plan and manage future facilities in proximity to protected areas. Also in this case, the need for cross-border cooperation was indicated. In particular, involved stakeholders suggested to develop common policy agreements between Albania, Greece and Italy a) in trading aquaculture products and b) in networking between the countries.

Maritime Transport and Tourism

Maritime Transport is one of the most relevant maritime activities currently existing in the maritime space, whose development has been recognized as strategic for the entire Macro-Region.

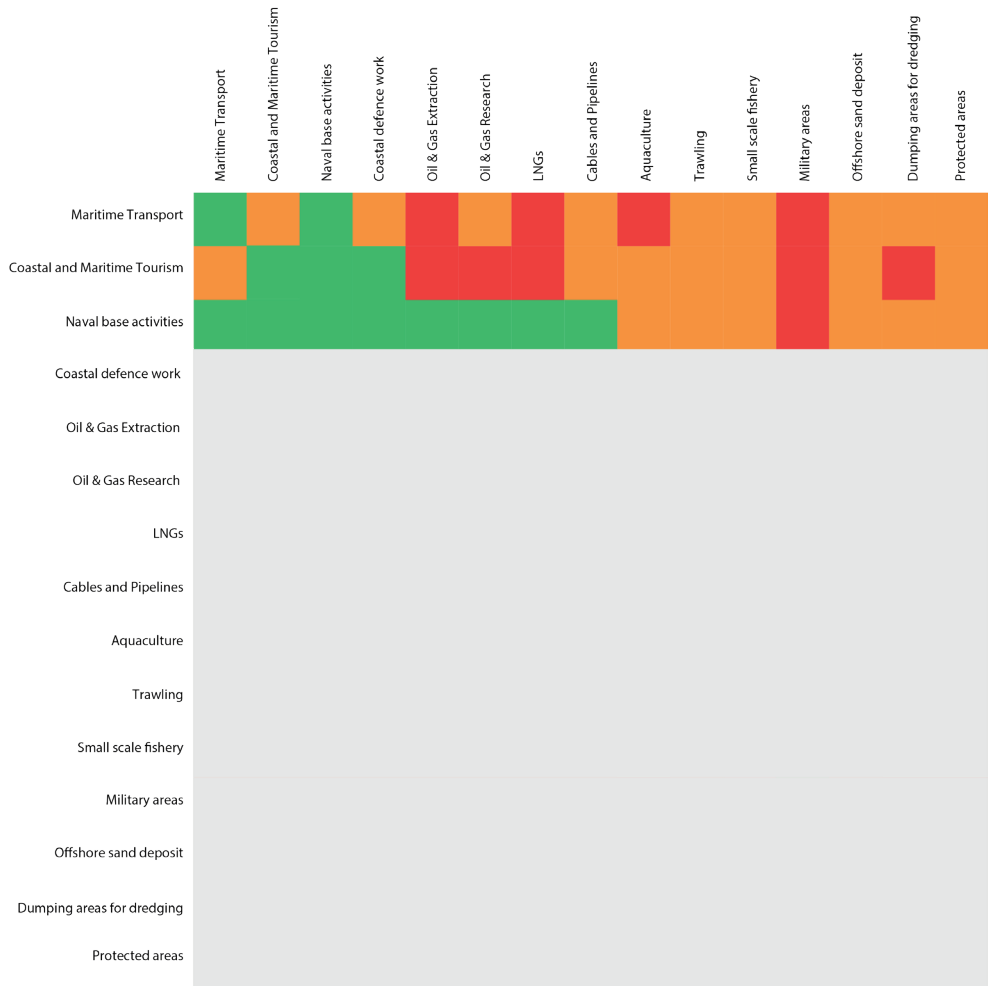


Figure 2.4-24: Compatibility matrix – MARITIME TRANSPORT AND TOURISM (Source: SHAPE [modified])

The main interactions identified are shown in the maps below, and are synthetically described in the boxes reported in the following pages.

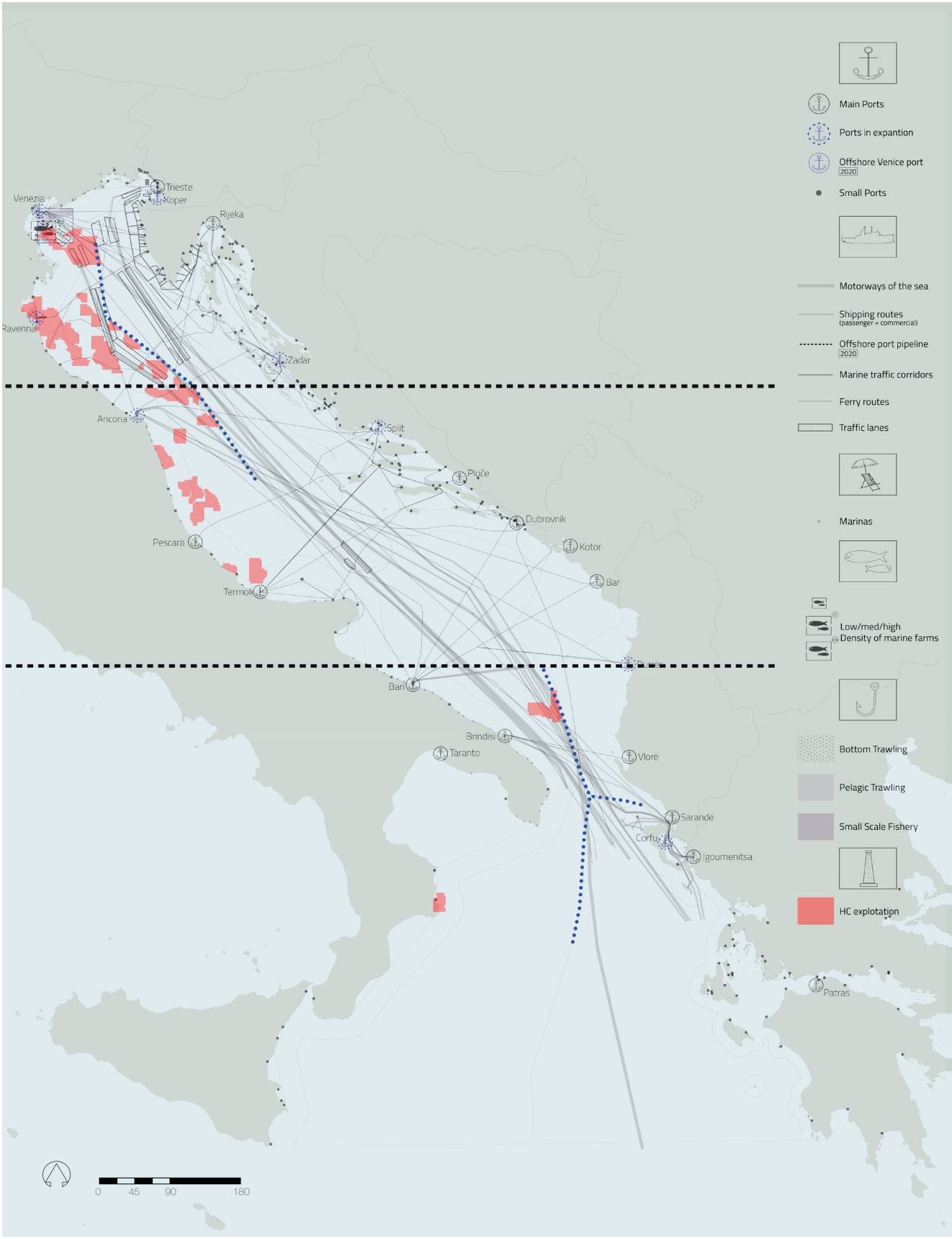


Figure 2.4-25a: Map of synergies and conflicts – MARITIME TRANSPORT AND TOURISM

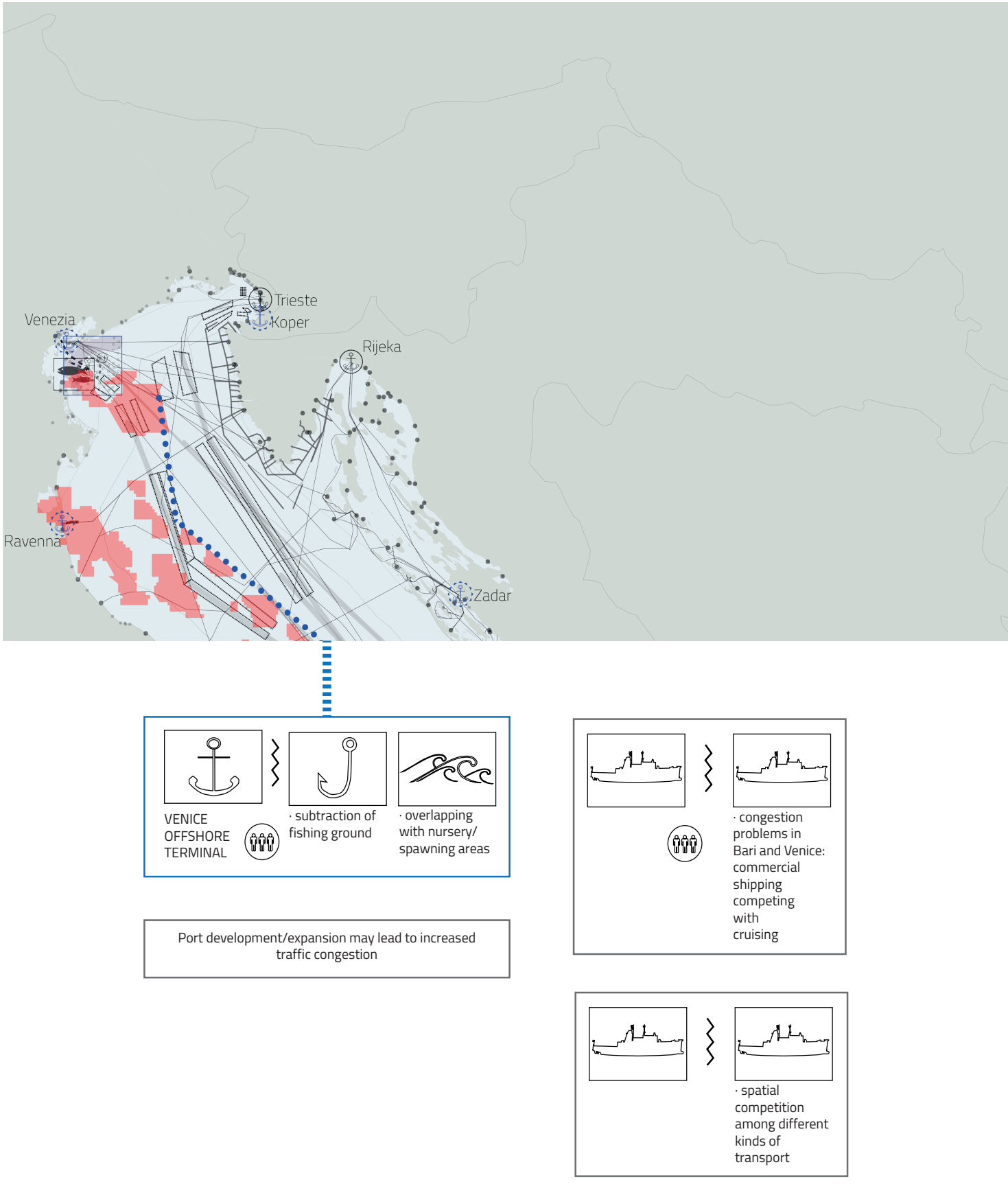
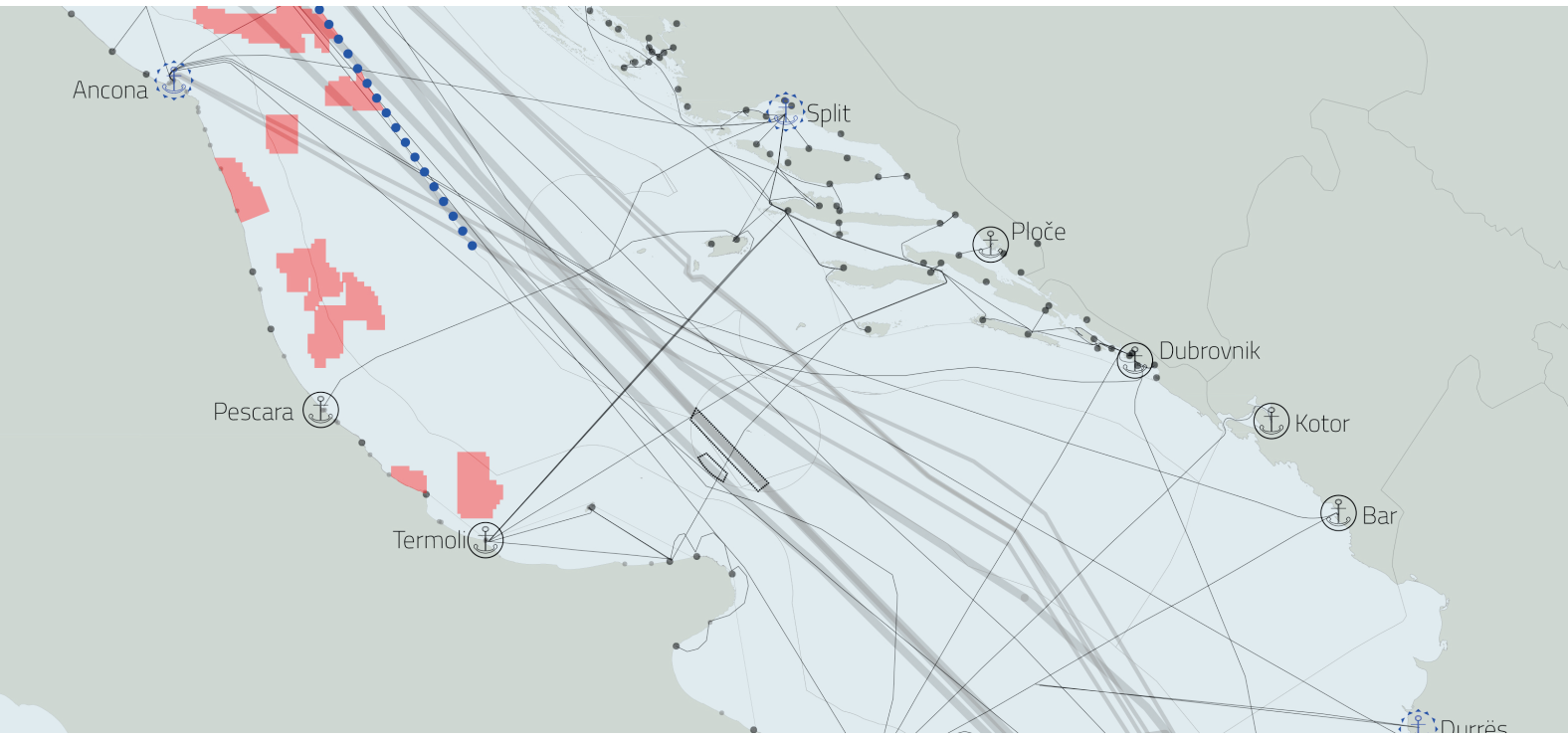


Figure 2.4-25b: Map of synergies and conflicts (zoom 1) – MARITIME TRANSPORT AND TOURISM

· increasing hydrocarbon exploitation activities increase spatial conflicts with maritime transport and tourism

· increasing hydrocarbon exploitation activities increase spatial conflicts with maritime transport and tourism



· ballast waters, pollution and noise

Management conflict: lack of transboundary coordination between fleets

Port development/expansion may lead to increased traffic congestion

Figure 2.4-25c: Map of synergies and conflicts (zoom 2) – MARITIME TRANSPORT AND TOURISM

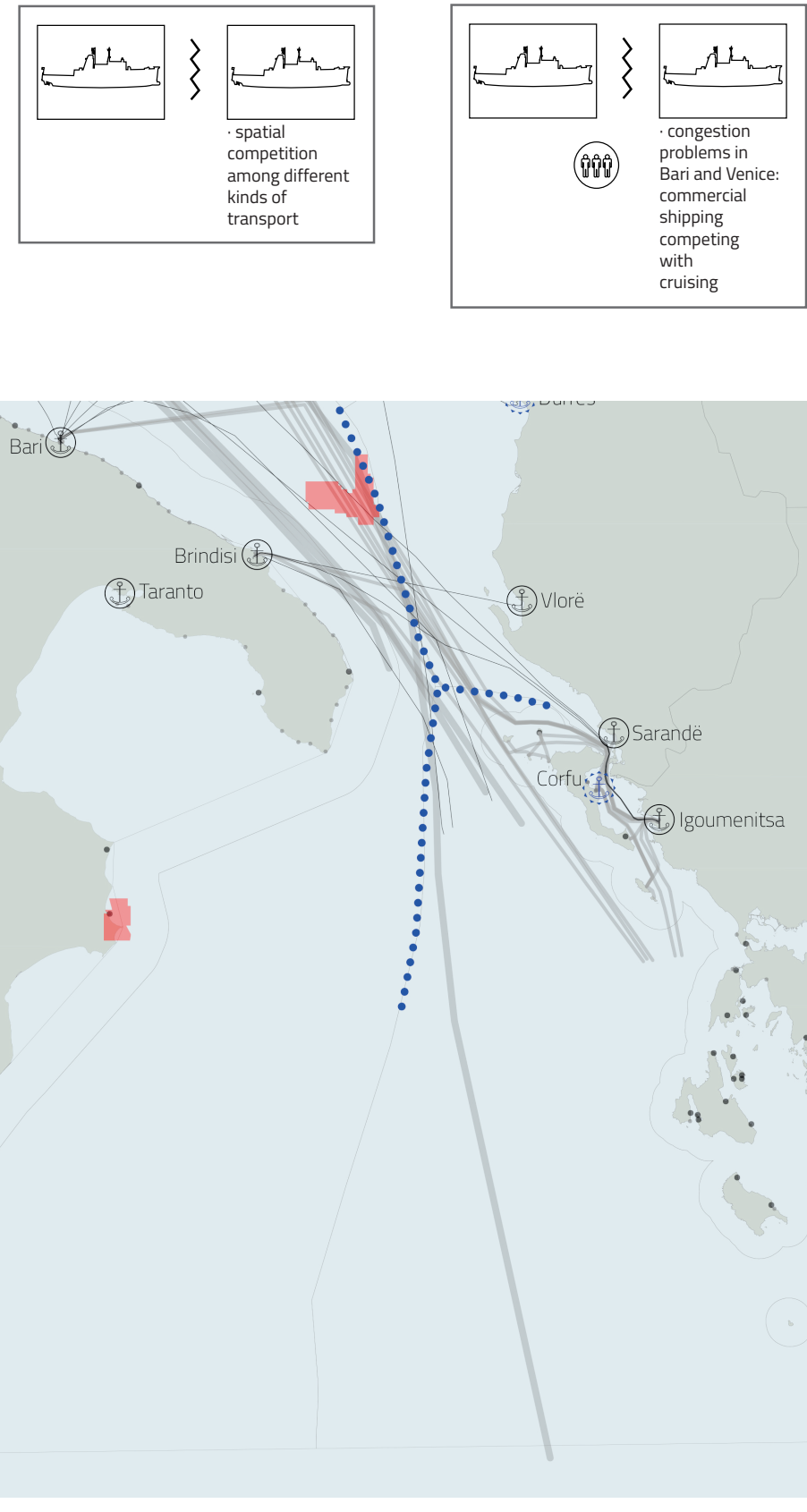
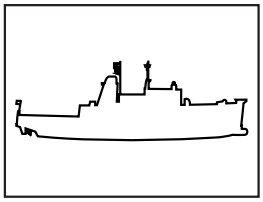
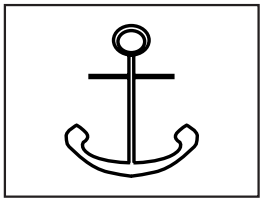


Figure 2.4-25d: Map of synergies and conflicts (zoom 3) – MARITIME TRANSPORT AND TOURISM

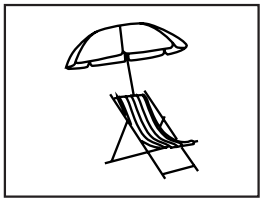
Finally, the following indications were collected.



For what concerns maritime transport, a significant growth of the sector is expected for the reference year 2020. The EUSAIR Action Plan foresees a +100% increase of container traffic and a +20% of activities related to ro-ro traffic, short sea shipping, yachting and cruising. Within ADRIPLAN, the need to regulate shipping in proximity of hydrocarbon research and exploitation blocks emerged, and the possibility to develop planning measures that also take into consideration restrictions and safety zones according to the different types of traffic. Another emerging issues is related to the lack of coordination between fleets from different countries, that interest both the northern and the southern part of the AIR. This can lead to management disputes, also exacerbating existing conflicts for the use of resources. Another major issue concerns the need to reduce traffic congestion and optimizing timing, also considering the role of seasonality in maritime tourism. Among the sectoral priorities, the importance of improving eco-friendly quality and environmental sustainability of maritime transport and services was stressed.



For what concerns naval base activities, a major challenge consists in enhancing cooperation among ports. Considering the development and the expansion of port activities, peculiar attention should be paid to the potential impacts of new infrastructures on environmental components and on fishery resources. Fishery category associations demand for the definition of compensatory measures and the spatial identification of compensation areas where infrasctucturing activities affect nursery and spawning areas. The development/enlargement of port infrastructures will also require the rearrangement of traffic routes (e.g. aroun the Venice Offshore Terminal). In line with EU provisions and with the indications provided by the EUSAIR strategies, it was also strongly suggested to promote the enhancement of intermodality, e.g. in the Port of Trieste.



For what concerns coastal tourism, the main indications provided concerned the need to enhance the regulation coastal tourism activities in proximity of coastal marine protected areas; the necessity to increase transboundary and interregional cooperation to promote sustainable tourism management and the need to regulate cruise traffic in the Mediterranean.

Environmental Protection

Environmental protection is a cross-cutting theme both at Focus Areas and Macro-Regional level strongly promoted by Europe Union in different strategic documents. The protection of the environment and the identification of specific sites in marine and coastal areas may tighten inter-sectoral and intra-sectoral conflicts because of the needed restrictions. As suggested by the compatibility matrix, there is a high level of incompatibility between maritime sector and environmental protection.

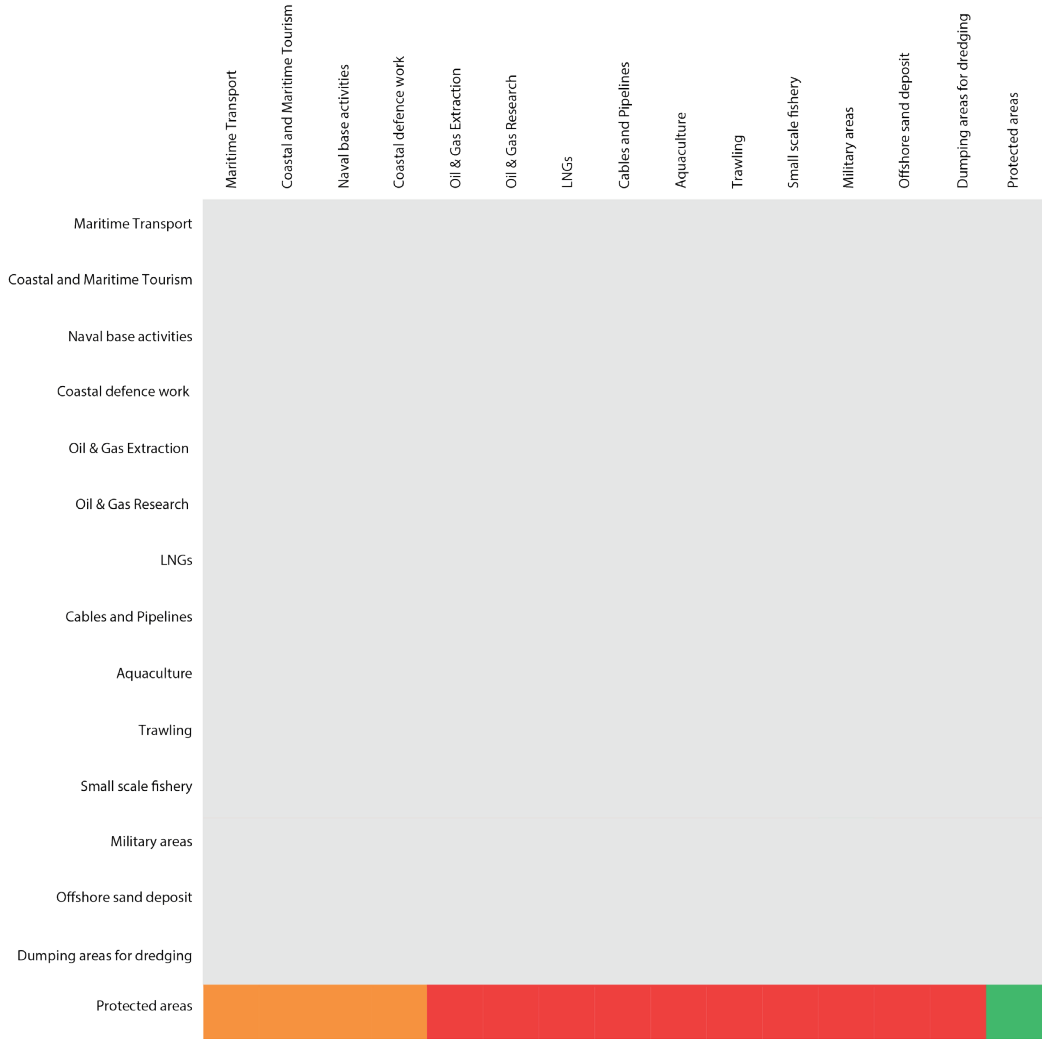


Figure 2.4-26: Compatibility matrix – ENVIRONMENTAL PROTECTION (Source: SHAPE [modified])

The main interactions identified are shown in the maps below, and are synthetically described in the boxes reported in the following pages.

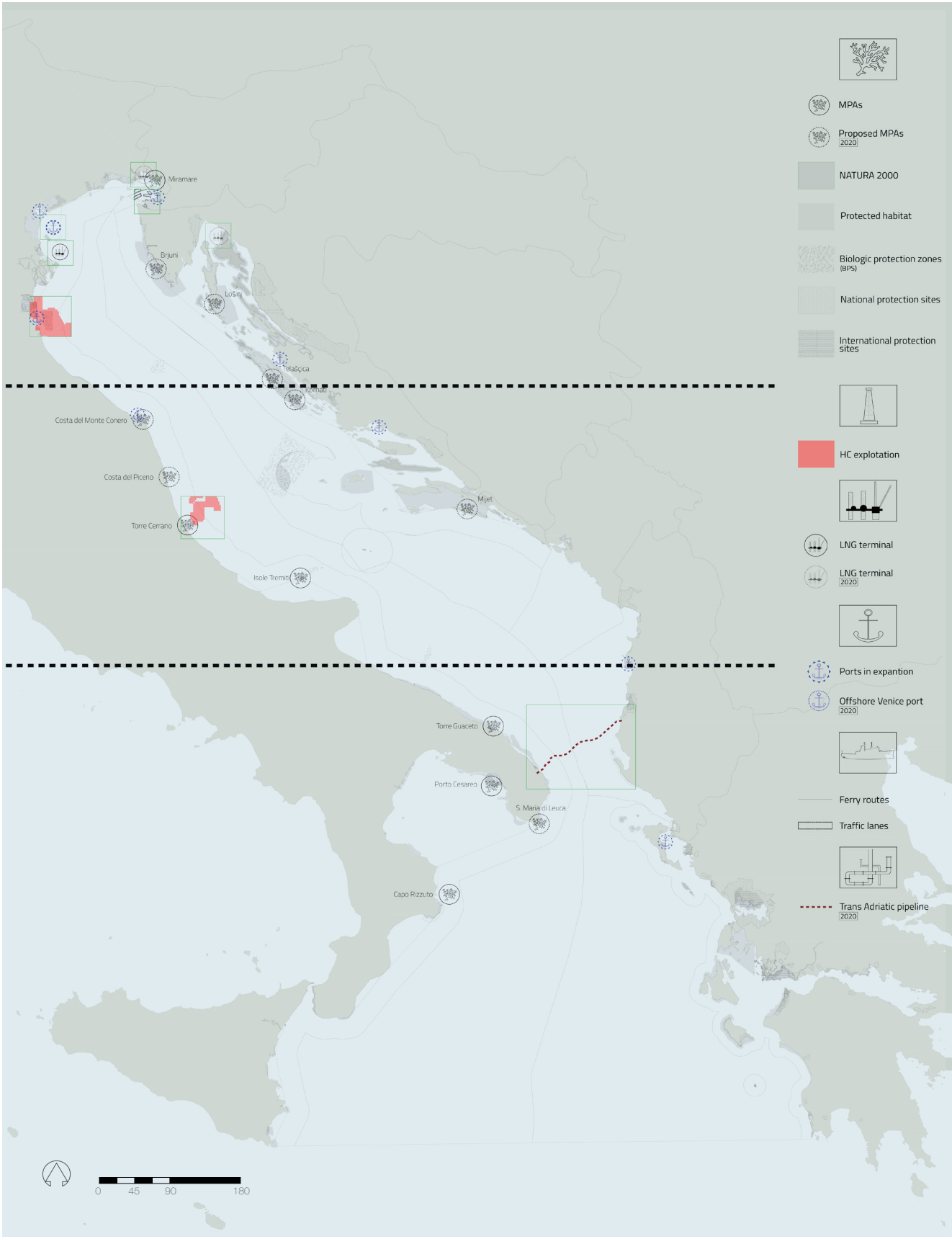


Figure 2.4-27a: Map of synergies and conflicts – ENVIRONMENTAL PROTECTION

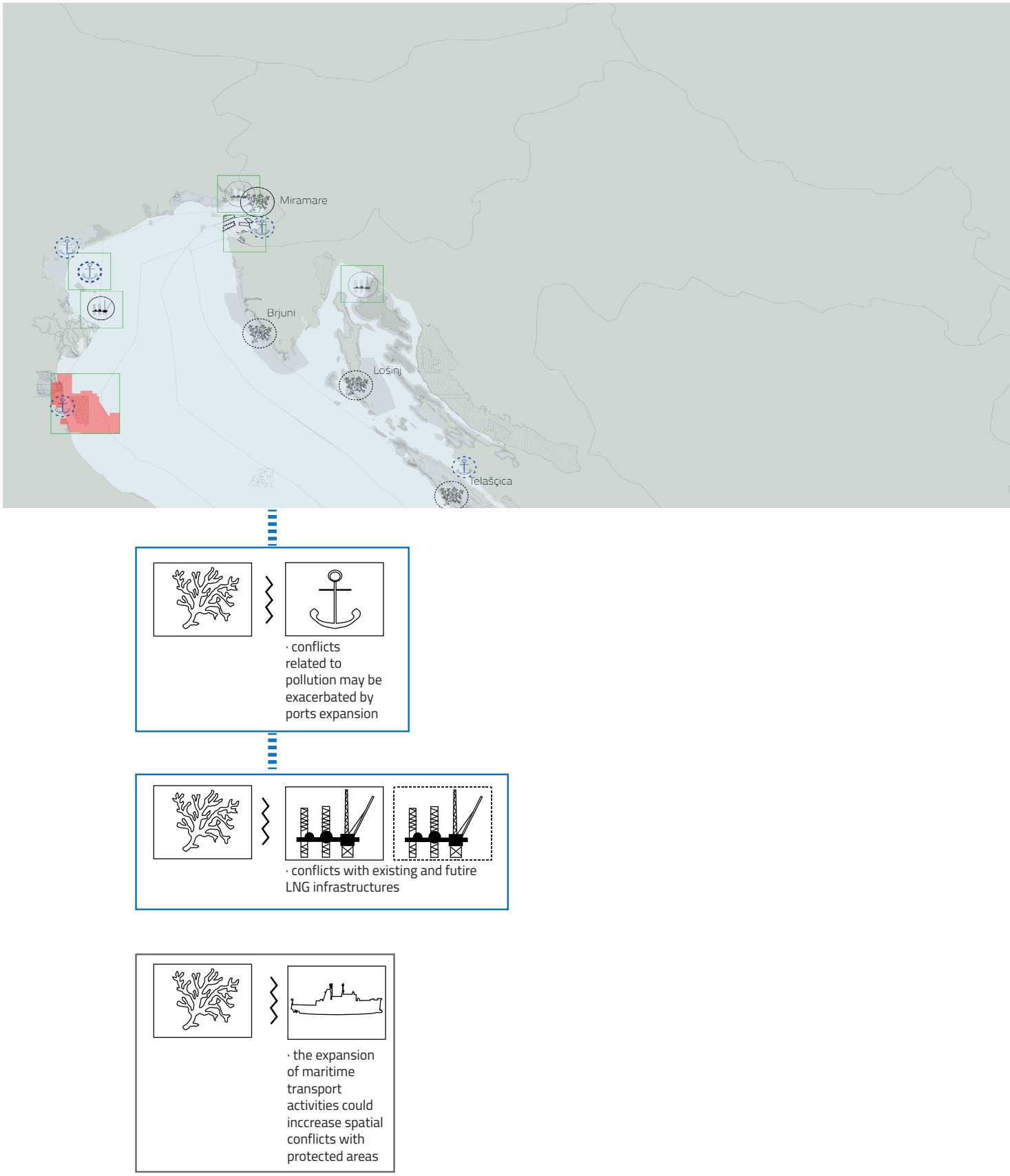


Figure 2.4-27b: Map of synergies and conflicts (zoom 1) – ENVIRONMENTAL PROTECTION

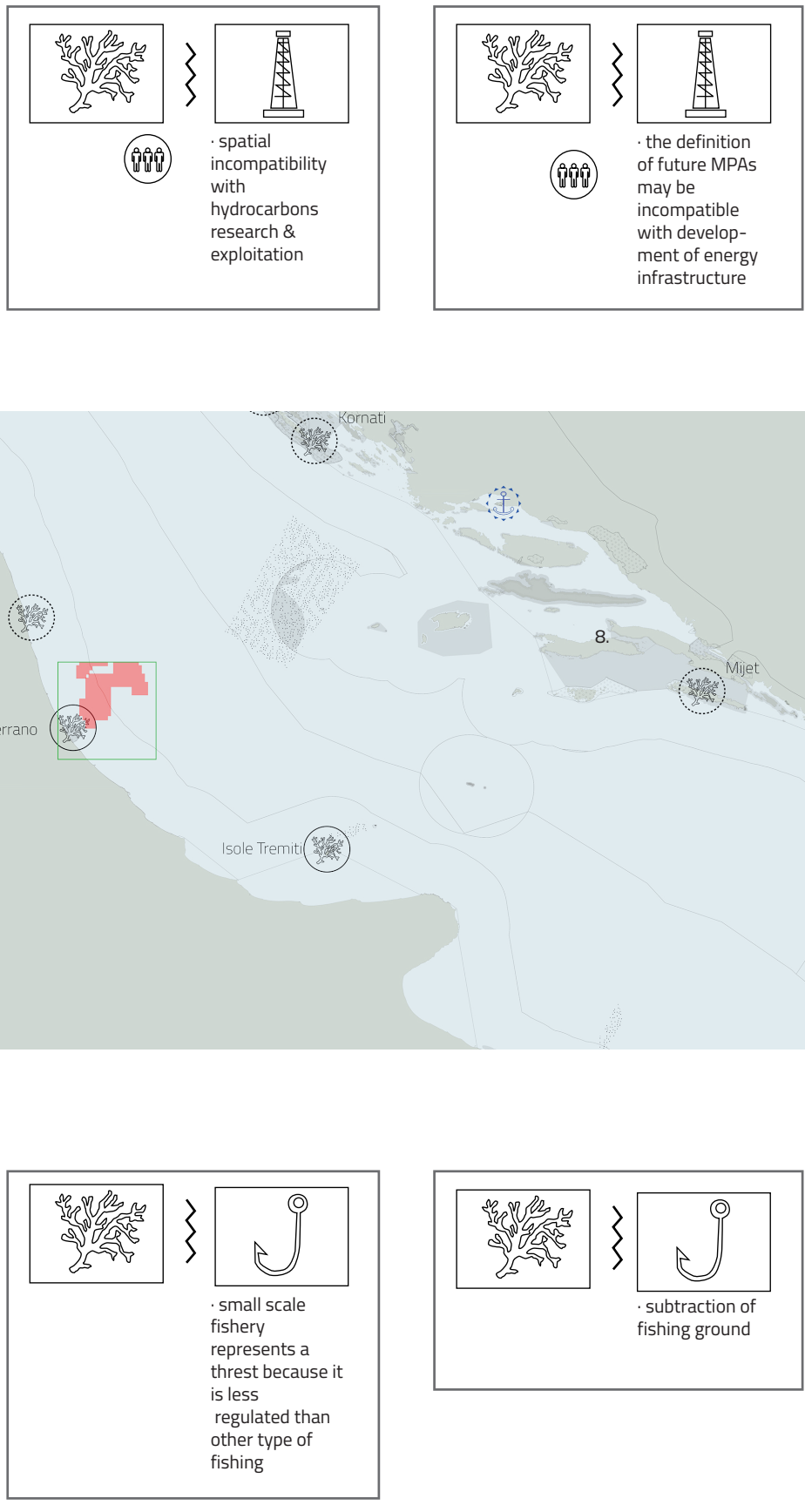


Figure 2.4-27c: Map of synergies and conflicts (zoom 2) – ENVIRONMENTAL PROTECTION

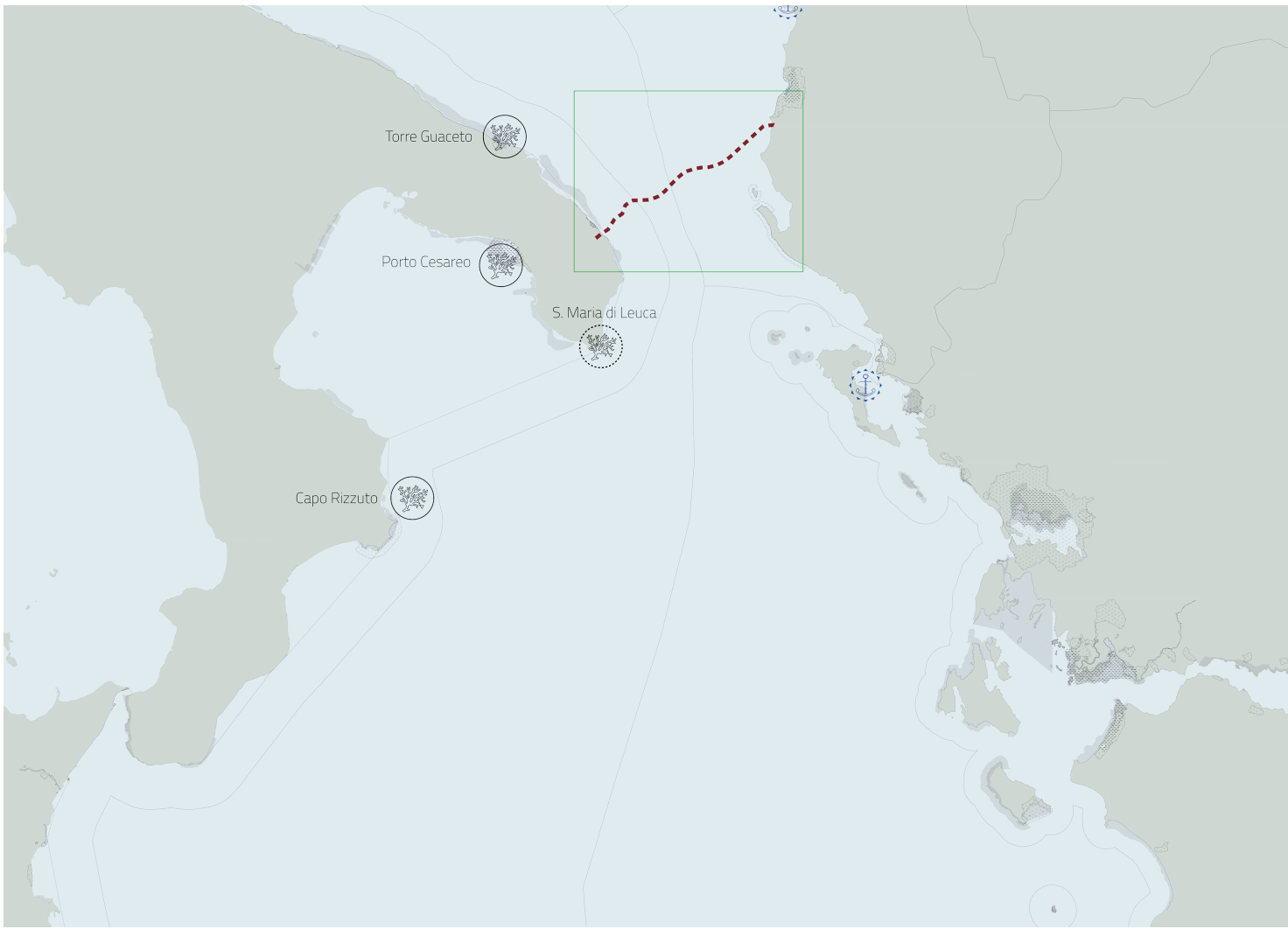
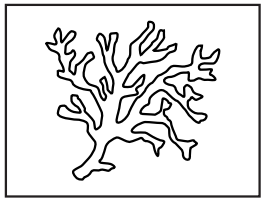


Figure 2.4-27d: Map of synergies and conflicts (zoom 3) – ENVIRONMENTAL PROTECTION



Finally, the following indications were collected.

For what concerns the environmental protection, the need to establish a Site of Community Importance (SCI), covering the Diapontia Island plateau (northwestern part of the Ionian sea, emerged. It was also highlighted that the site will include more than the 60% of seagrass (Posidonia Oceanica), meadows presents in the Greek part of the Focus Area 2, and more than the 20% of the seabord (Calonetris diomedea) population.

In addition, to reach the targets identified by EU, it is necessary to consider the strong relations between terrestrial and coastal activities with the sea. Thus, improve the regulation of inland activities to limit negative effects of the marine environment, and especially on sensitive habitats and MPAs is a key issue.

Furthermore, the enhancement of the relations between terrestrial and marine sides might be reached also through the placement of future MPAs and protected sites in proximity of terrestrial protected areas.

For what concerns the achievement of EU standards with respect to the GES by 2020 (MSFD, 2008/56/EU), to the increase of MPAs surface (EUSAIR 2014) and to the enhancement of a coherent and representative network of MPAs (MSFD, 2008/56/EU), it was suggested: i) to consider the spatial and temporal dimension of spawning and nursery areas; ii) to increase the identification of MPA in the Northern Adriatic considering its representative habitats; and iii) to consider to implement the Network of MPA till the 10% of the North Adriatic, distributing the 10% on the NA as a whole and considering the main representative parts of ecosystems.

Sand extraction and military areas

The necessity to extract sand is strongly correlated to the effects of climate change, sea level rise and coastal erosion, mainly on Italian sandy coasts. Considering the importance of beach tourism in the whole Adriatic and Ionian basin, the main aim of sand extraction is beach nourishment. A scarce availability of information with respect to the location and the classification of sand deposit enhance the difficulty to map and spatialize the activity. Thus, the identification of real conflicts is complicated. On the contrary, inter-sectoral synergies should be enhanced, specially looking at the future development of the sector.

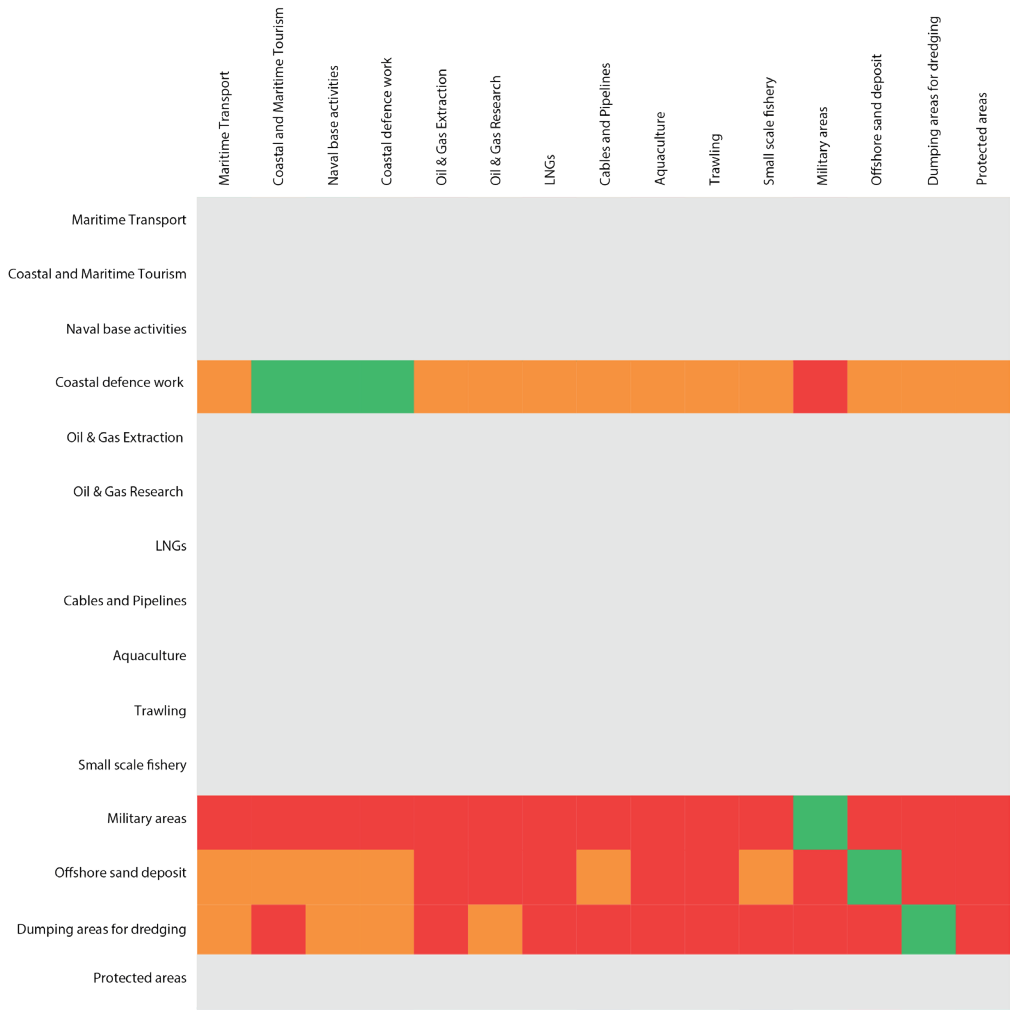


Figure 2.4-28: Compatibility matrix - SAND EXTRACTION AND MILITARY AREAS (Source: SHAPE [modified])

The main interactions identified are shown in the maps below, and are synthetically described in the boxes reported in the following pages.

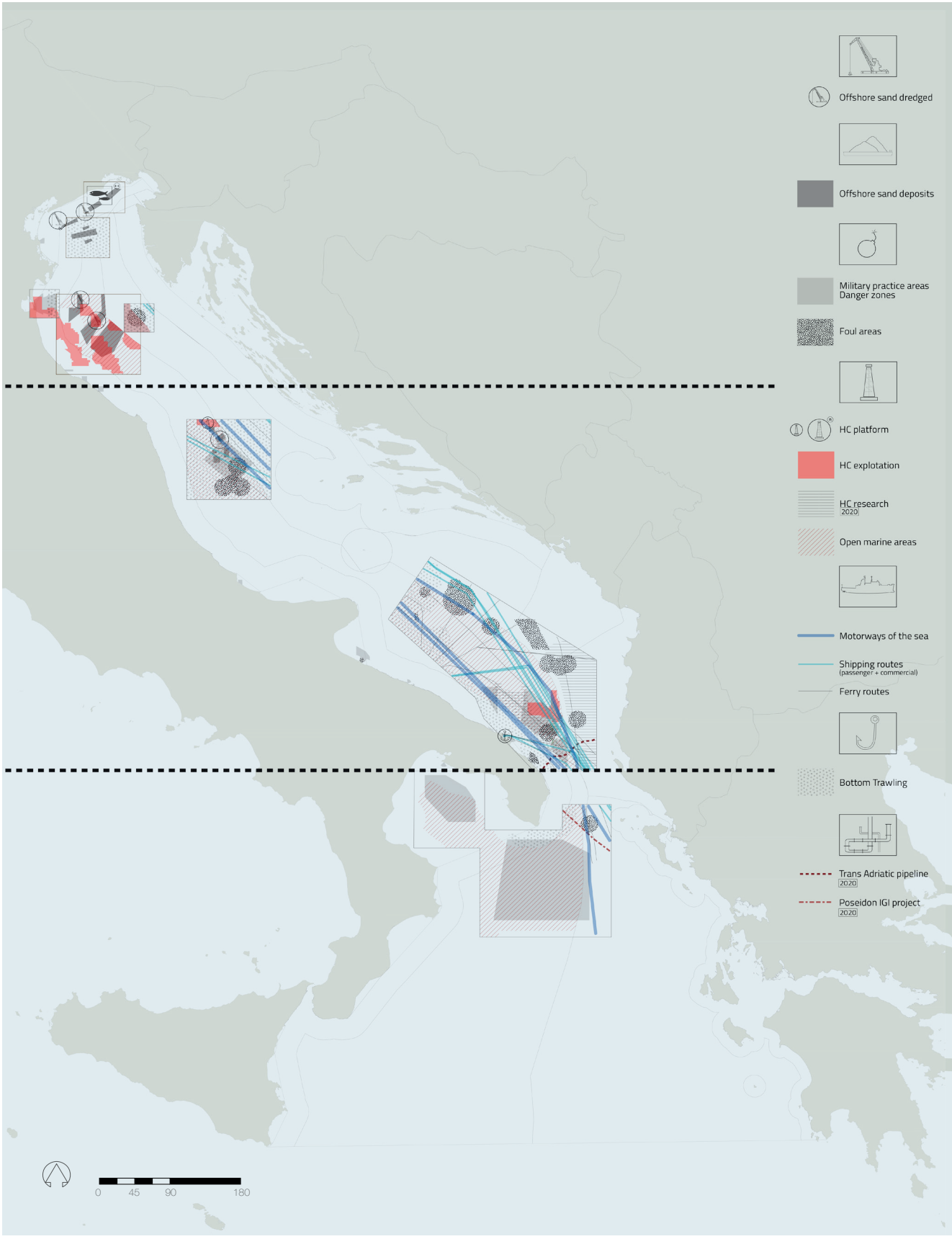


Figure 2.4-29a: Map of synergies and conflicts – SAND EXTRACTION AND MILITARY AREAS

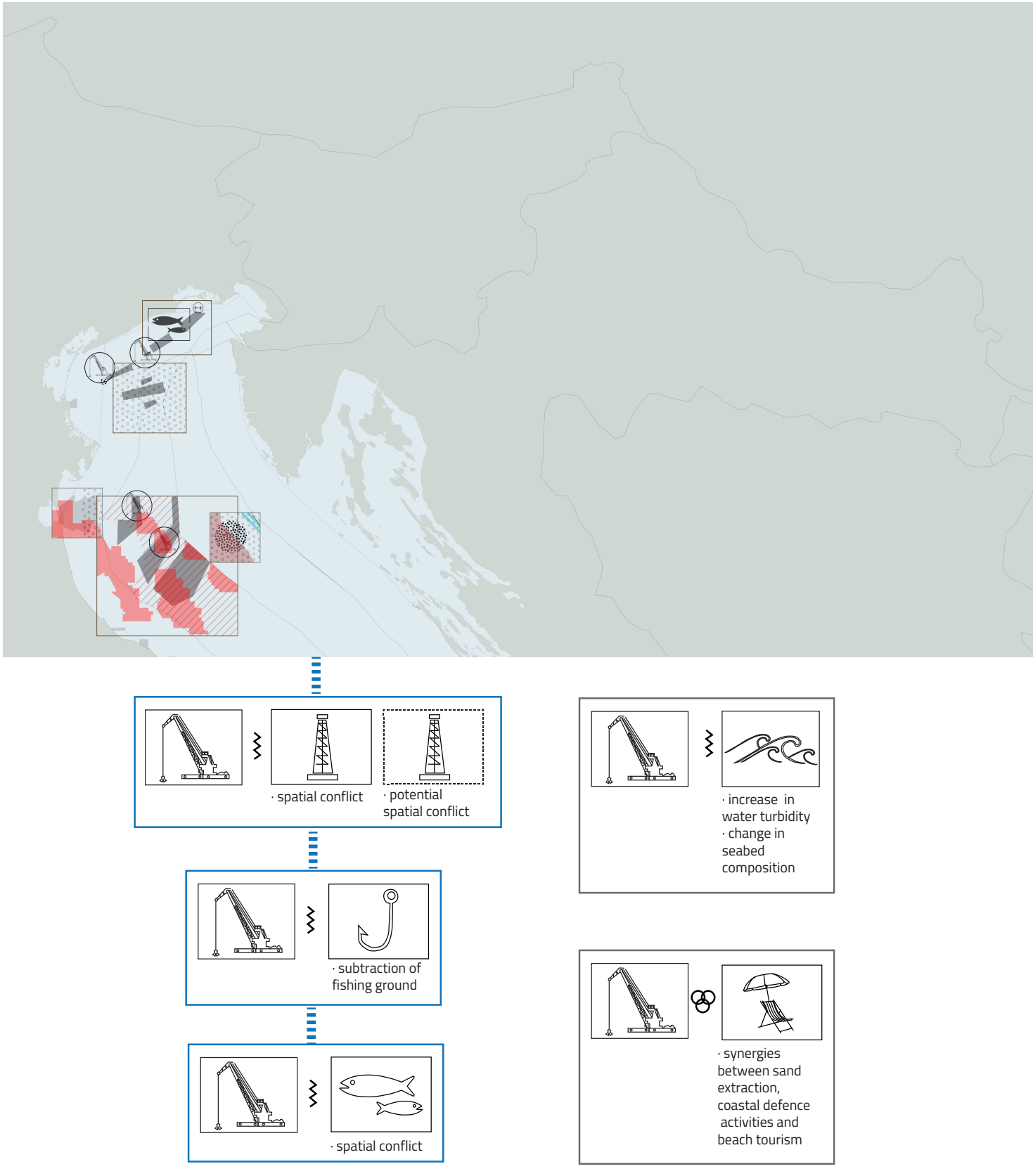


Figure 2.4-29b: Map of synergies and conflicts (zoom 1) – SAND EXTRACTION AND MILITARY AREAS

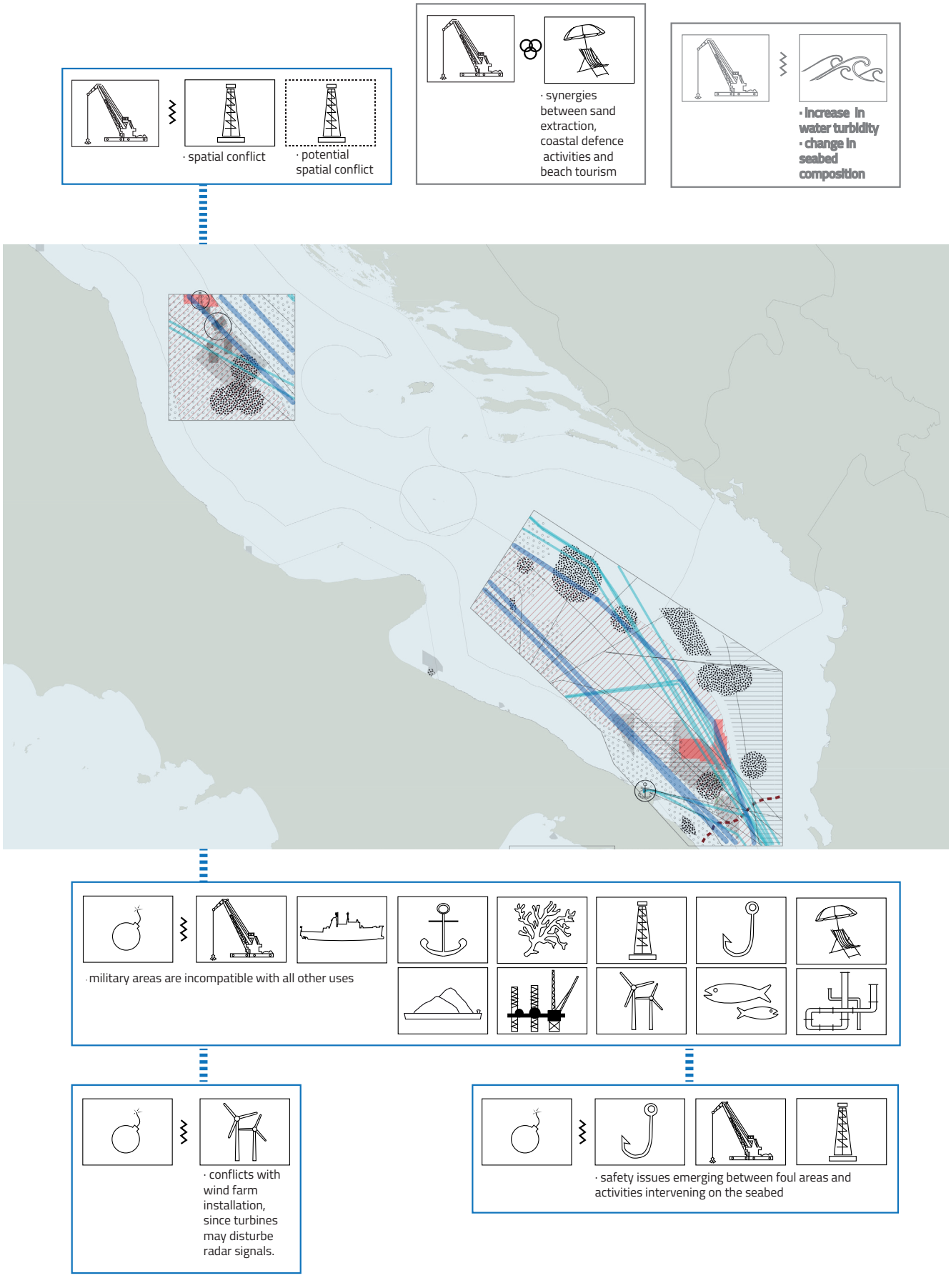
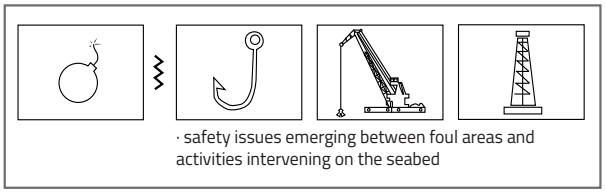
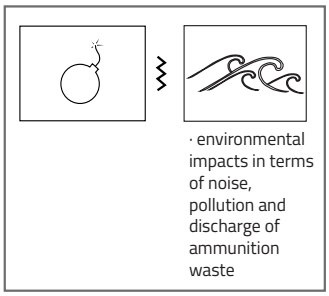
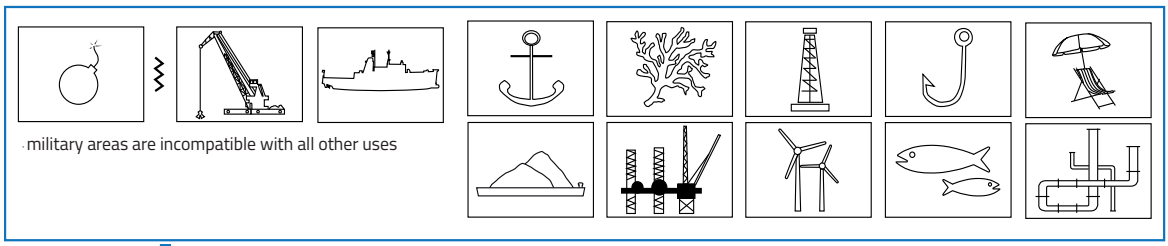


Figure 2.4-29c: Map of synergies and conflicts (zoom 2) – SAND EXTRACTION AND MILITARY AREAS







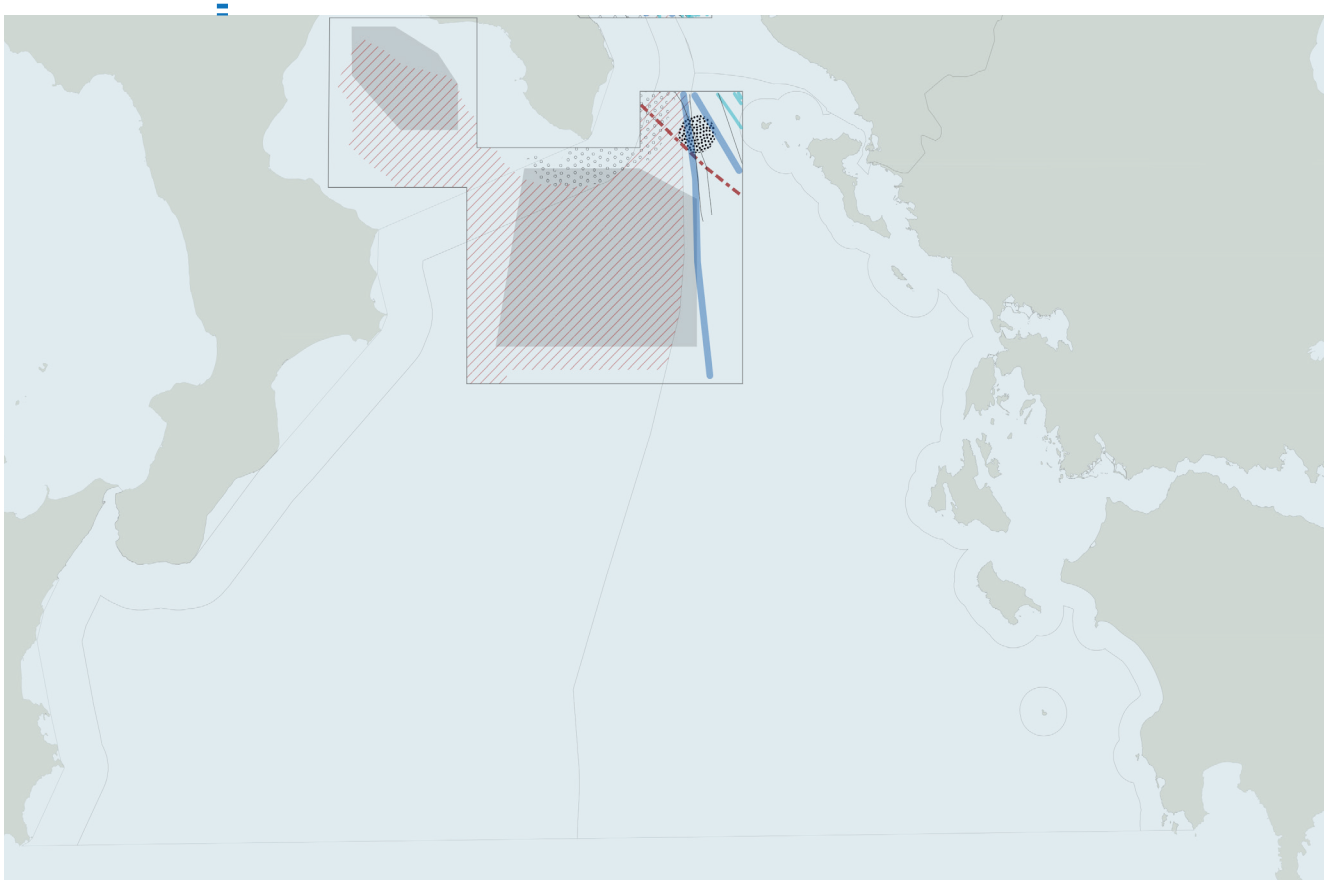
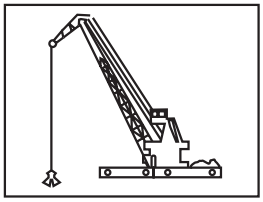


Figure 2.4-29d: Map of synergies and conflicts (zoom 3) – SAND EXTRACTION AND MILITARY AREAS



Finally, the following indications were collected.

Considering climate change effects on coastal areas in the medium-long run, mapping zones for future extraction and coastal nourishment become necessary to minimize future conflicts with fishery. Furthermore, cooperation between Croatia and Italy with respect to sand deposit should be encouraged. As a matter of fact, taking into consideration the two States needs and sand availability, an agreement should be found to use Croatian sand deposits to nourish sandy beaches along the Italian coasts. Main aim of this kind of effort is to enhance the touristic vision and development of the whole Adriatic-Ionian area, and not only of single States.

In addition, promote a further transboundary effort is suggested to enhance information with respect to sand deposit localization and composition. Finally, the high fragmentation of governance levels in terms of dune and beach maintenance increases sectoral conflicts. For this reason a strategic effort should be done to increase management efforts for beaches maintenances at different governance levels.

2.5 Planning outcomes

As previously highlighted, Maritime Spatial Planning (MSP) aims to achieve simultaneously social, economic, and ecological objectives by means of a more rational and scientifically-based organization of the use of ocean space. By balancing multiple objectives and sectorial priorities, an integrated maritime spatial plan allocates space for different human uses, informed by knowledge of ecosystem processes and function, and consultation with stakeholders across different sectors and interests. The above approach was applied in ADRIPLAN to the definition of examples of planning and management measures, which will be described in the following sections.

2.5.1 Strategic Planning Proposal for the Adriatic-Ionian Region

The elaboration of a strategy for the Adriatic Ionian Macroregion considered primarily transboundary issues, which require the setting of a transboundary governance framework. The aim is to reflect on effective governance structures to be able to tackle intensively used marine areas in high seas, entailing multi-sectoral and multi-level context in sensitive environment. The general goal is to support the implementation of Blue Growth objectives, and specifically of EUSAIR objectives through an Ecosystem Based approach as required by the Directive on Maritime Spatial Planning 2014/89/EU.

The strategy at the MacroRegional level is grounded in the identification of different types of management areas, a sort of strategic zoning characterized by specific management objectives reflecting on contextual use-use and environment-use conditions and coexistences. The basic assumption underlying the identification of different measures is that the definition of place-based strategies and measures, required by the adoption of the ecosystem-based approach, require a carefull analysis of the specific characteristics of each area, both in terms of uses and of environmental dynamics. The following subdivision is grounded on the results of the previously described phases of analysis and interpretation. On the one hand, the analysis of present and future uses was considered, also looking at future developments and trends. On the other hand, the distribution of relevant environmental components and the results of the analysis of cumulative impacts is considered.

Figure 2.5-1 shows an example of strategic zoning of the entire AIR, and identifies three typologies of management areas.

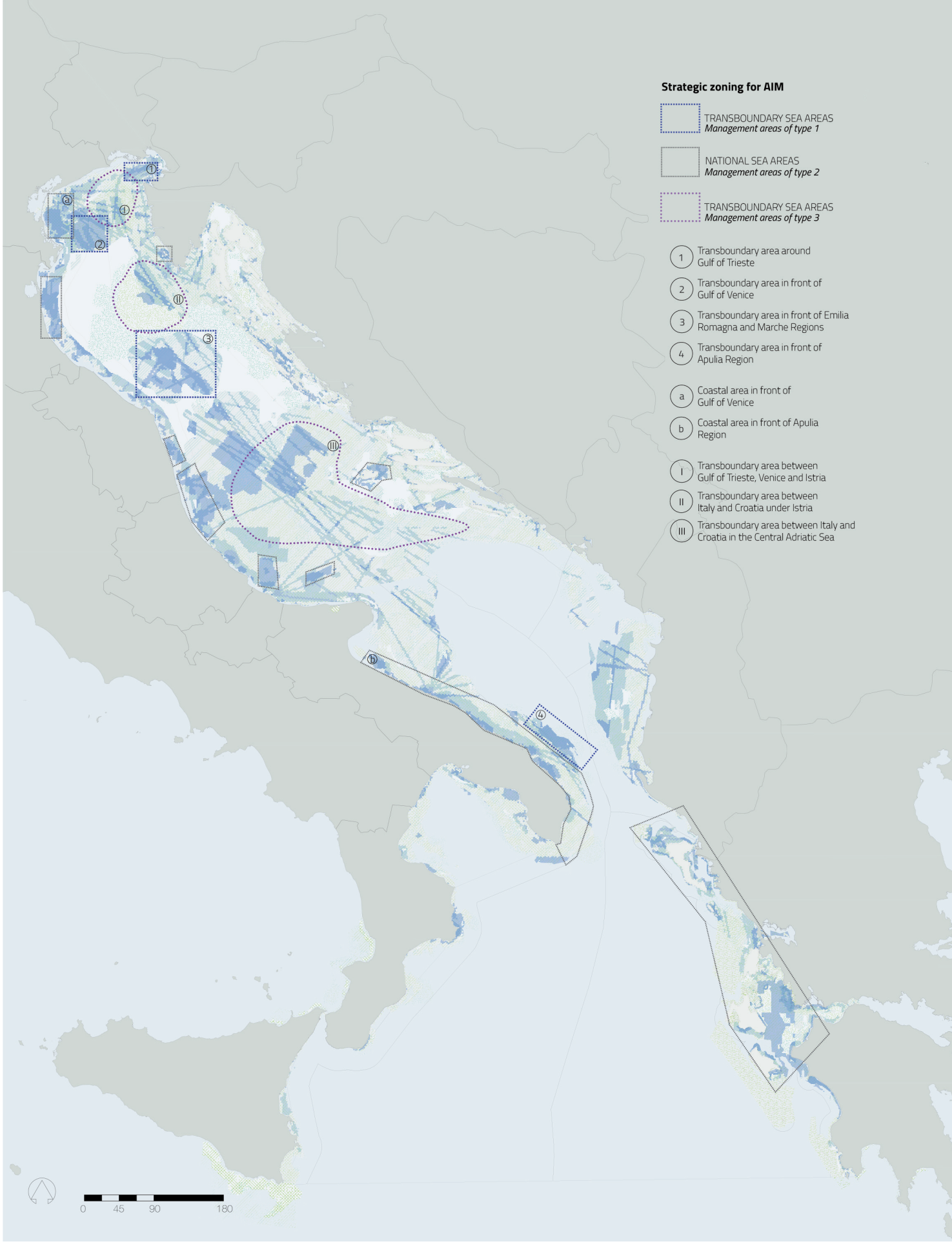
Management areas of type 1 consider the coexistence of multiple maritime uses in sensitive marine environments. These areas, located in high waters, are intensively used, entailing sectors and responsibilities in charge of International bodies. They deserve specific planning and management options based on a transboundary governance structure to be tailored according to future demand of space, to anticipate possible conflicts and to enhance synergies. International and National Institutions should be involved as the scale and levels of responsibility encompass multiple sectors (Maritime Transport, Fishery and Energy sectors in all areas) at multiple scale (International, European, National and local). These areas are also characterized by relevant environmental characters which should be considered.

Management areas of type 2 are those areas, which differ from type 1 as they are located in territorial waters, so the governance system should consider National legal framework at core of possible management strategy in relation with regional planning systems. These areas are intensively used and present environmental challenges

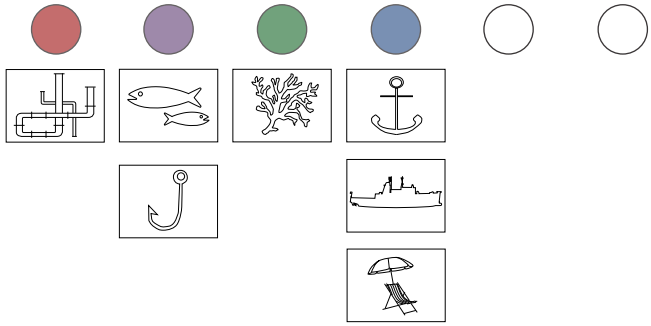
with respect to the effective allocation of maritime uses in synergies between them and with ecological features. Examples of measures implementation are reported for Focus Area 1 and 2. Further measures are also indicated as possible future implementation of MSP at regional level.

Management areas of type 3 are those areas, which assume a great importance for the delivery of ecosystems goods and services for the AIM. They only partially see the presence of intensively used areas, and they can host maritime uses and activities, which are planned and managed in synergy with environmental assets. They cover transboundary areas, including high waters, and they entail the establishment of a transboundary governance framework for their planning and management. Measures of compensation at Macroregional level can land in those areas

Figure 2.5-1: Strategic Zoning for the AIR

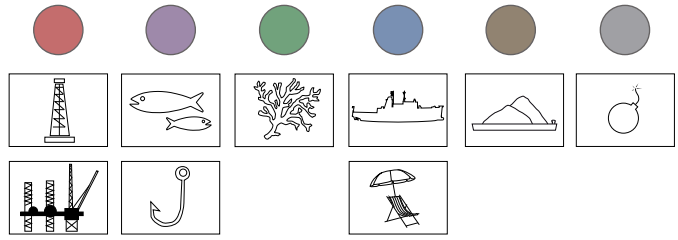

Strategic zoning for AIM
TRANSBOUNDARY SEA AREAS
Management areas of type 1
NATIONAL SEA AREAS
Management areas of type 2
TRANSBOUNDARY SEA AREAS
Management areas of type 3
1 Transboundary area around Gulf of Trieste
2 Transboundary area in front of Gulf of Venice
3 Transboundary area in front of Emilia Romagna and Marche Regions
4 Transboundary area in front of Apulia Region
a Coastal area in front of Gulf of Venice
b Coastal area in front of Apulia Region
I Transboundary area between Gulf of Trieste, Venice and Istria
II Transboundary area between Italy and Croatia under Istria
III Transboundary area between Italy and Croatia in the Central Adriatic Sea
0 45 90 180

Transboundary area around Gulf of Trieste



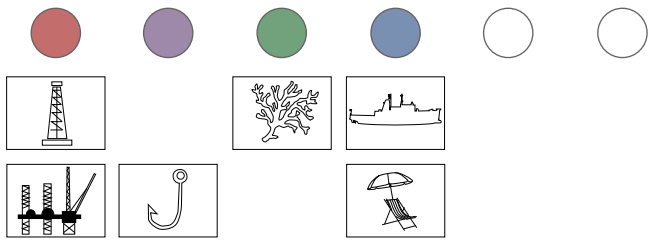
- Energy cable IT-SL
- Small scale fishery
- Aquaculture
- Natura 2000 site
- Biological Protection Zones
- Trieste and Koper Ports;
- Maritime Transport and traffic lanes;
- Maritime and coastal tourism - Ferry routes
- Maritime and coastal tourism - Marinas

Transboundary area in front of Emilia Romagna and Marche Regions



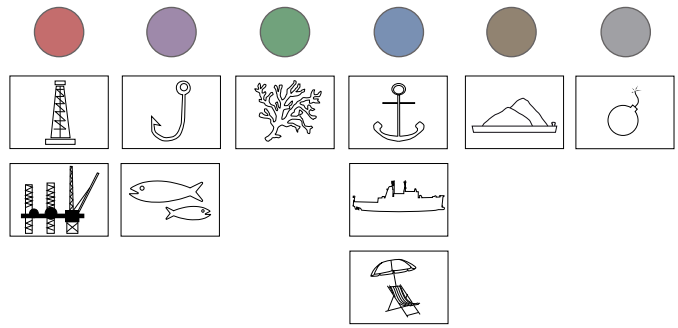
- Cables and pipelines
- HC exploitation
- Trawling
- Biological protection zone
- Maritime and coastal tourism - Ferry routes
- Maritime transport and traffic lanes
- Sand extraction

Transboundary area in front of Gulf of Venice



- LNG Terminal
- HC exploitation and HC platforms
- Pelagic and bottom trawling
- Persistence of nursery areas for commercial species
- Hard bottoms (Tegnue)
- Maritime transport - Traffic lanes
- Maritime and coastal tourism - Ferry routes

Coastal area in front of Gulf of Venice



- LNG Terminal
- HC exploitation
- Aquaculture
- Small scale fishery
- Trawling
- Biological Protection Zones (Tegnue)
- Persistence of nursery areas for commercial species
- Maritime transport and traffic lanes
- Maritime and coastal tourism - Ferry routes
- Naval base activities
- Offshore sand deposit
- Military areas

Figure 2.5-2a: Synthetic description of strategic areas in the northern part of AIR

Figure 2.5-2a and 2b shows some example of different types of management areas.

In the following table, three examples are considered more in detail.

Transboundary area between Gulf of Trieste, Venice and Istria			
Environmental components	**Relevant environmental characteristics/dynamics**	**Current maritime uses and their interaction**	**Future maritime uses and their interactions**
- Maerl beds - Coralligenous communities	- Persistent nursery areas for commercial species	- Coexistence among intense fishery activities, aquaculture and sand extraction - Presence of Natura 2000 sites and Biological Protection Zones	- Development of energy infrastructure strategically relevant in a trasboundary perspective - Intensification of Maritime Transport and Tourism
Management Area of Type 1 - *Coherent with the identification of Ecologically or Biologically Significant Areas (EBSAs) under the Convention on Biological Diversity*			
Transboundary area between Italy and Croatia under Istria			
Environmental components	**Relevant environmental characteristics/dynamics**	**Current maritime uses and their interaction**	**Future maritime uses and their interactions**
- Posidonia oceanica meadows	- Persistent nursery areas for commercial species - Macrozoobenthos of peculiar characteristics deriving from a sediments conditions related to the presence of the ancient Adriatic coastal line	- IT-HR transboundary issues related to Fishery - Intense sand extraction activities	- Relevant for future energy exploitation especially towards Croatia waters to be managed coherently with others blue economy issues and EUSAIR - Intensification of Maritime Transport and Tourism

Management Area of Type 3 - *Coherent with the identification of Ecologically or Biologically Significant Areas (EBSAs) under the Convention on Biological Diversity*			
Transboundary area between Italy and Croatia in the Central Adriatic Sea			
Environmental components	**Relevant environmental characteristics/dynamics**	**Current maritime uses and their interaction**	**Future maritime uses and their interacti ons**
	- Persistent nursery areas for commercial species of demersal fish and shellfish	- Coexistence among intense fishery activities, aquaculture and sand extraction	- Developm ent of energy infrastruc ture strategica lly relevant in a trasbound

Table 2.5-1: Examples of management areas in the northern part of the AIR

Figure 2.5-2b shows an example doe the southern area of the AIR. A specific pilot action will be developed in the area identified (see par. 2.5.3)

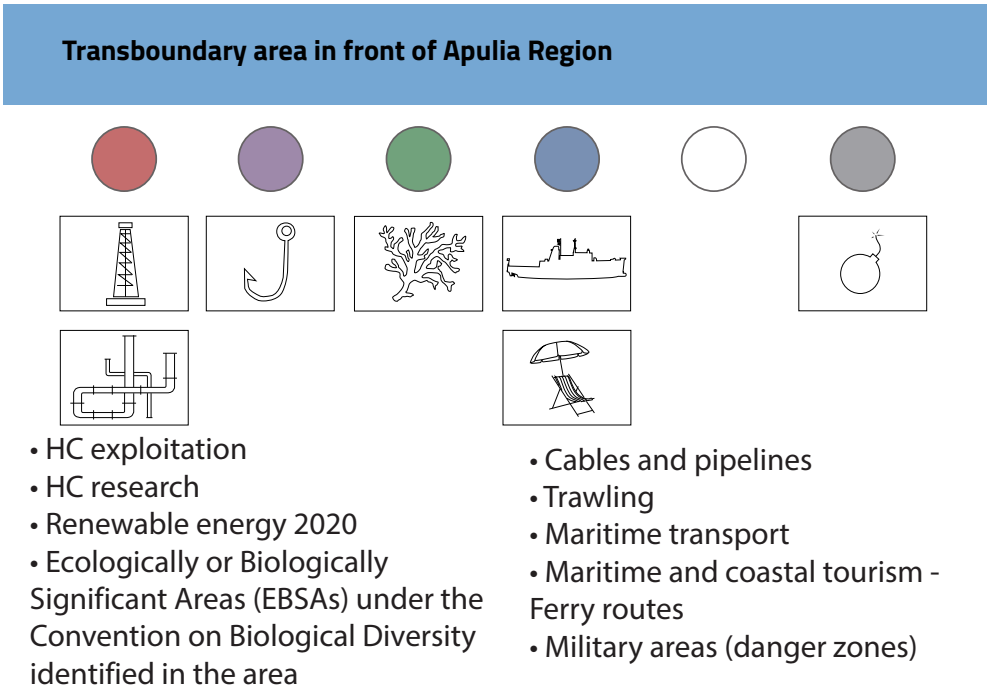


Figure 2.5-2b: Synthetic description of strategic areas in the southern part of AIR

2.5.2 Pilot Actions in Focus Area 1

Identification of relevant planning issues in the FA1

As emerged by the previously described analysis, the FA1 is characterized by a high intensity of uses, and will be significantly influenced by new anthropic uses that will be developed in the next decade (Fig. 2.5-3). The analysis performed enabled to identify a variety of conflicts and synergies that should be addressed by specific, multi-level and cross-sectoral planning measures. For ADRIPLAN porposes, three relevant planning issues were selected for the focus area. These are related: to the need to spatially define the localization of the electricity interconnection between Italy – Slovenia trough a submarine cable; to the necessity to identify compensatory actions for the fishing sector to be applied following the development of the Venice Offshore Terminal; and to the need to promote the infrastructural development of the Port of Trieste.

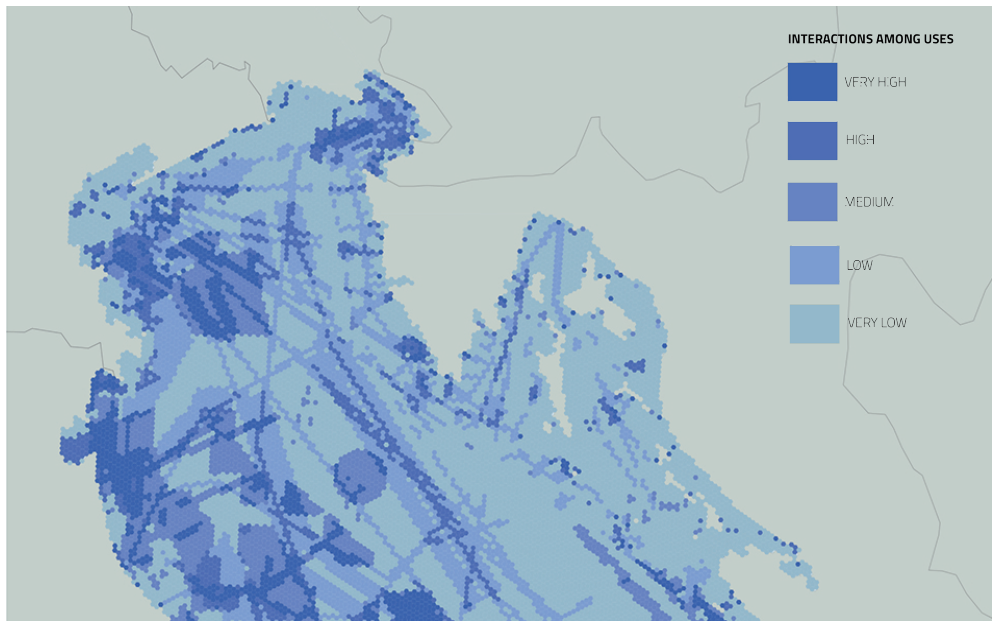


Figure 2.5-3: Map of the FA1 showing the level of interactions amongst existing human relevant activities

Starting from the identification of these issues, some pilot actions have been drafted. There are mainly spatial management measures, aimed at testing the proposed methodology and to support the definition of future MSP actions.

Measure 1 – Electricity interconnection Italy – Slovenia trough a submarine cable.

1 – Problem definition

The first measure was developed to be strategically integrated within the EUSAIR pillar 2 – Connecting the Region. It focuses on a electricity interconnection project – identified as a EU Project of common interest and formally inserted as measure 3.21 – PCI: Italy – Slovenia interconnection between Salgareda (IT) and Divača -Bericevo

region (SI). The electricity interconnection is aimed at integrating the Italian HVDC (High Voltage Direct Current) of 1000MW with other European electric networks through an underground cable with a length of approximately 150-200 Km. The project was discussed and proposed jointly by the TSO (Transmission System Operator) "ELES" of Slovenia and Terna (Italy).

The cable will interest Italian and Slovenian territorial waters, and will involve Veneto Region, Friuli-Venezia Giulia Region and possibly the Istria Region in Croatia (since the corridor is interesting the area between Grado and the Istrian Region) (Figure 2.5-4).

The area of intervention is already interested by several activities, concerning mainly small scale fishery, which is particularly intense along the Veneto Region coasts, medium to low intensity bottom trawling and by large fields of commercial bivalve mussels (*Callista clione, Chamelea gallina*). The marine waters close to the land-sea connection site at the Italy–Slovenia border are used for mussel farming and coastal tourism. The off-shore area in front of Veneto and Friuli Venezia Giulia regional coasts is characterized by the presence of offshore sand deposits, by coastal tourism especially in Veneto, close to the settlements of Caorle, Eraclea Mare and Jesolo and by intense maritime transport involving the whole area.

For what concerns the interaction with environmental components and with environmental dynamics, the area is characterized by habitats which are protected by EU legislations (Habitat and Birds Directive) and hosts spawning, nursery and recruitment areas for several economic important target species (*Scomber scombrus*, *Scomber colias*, *Engraulis encrasicolus, Sardina pilchardus*. The western part crosses areas of *Posidonia ocenica* and other seagrass beds and of coralligenous communities protected under Habitat Directive; it passes by the Sites of Community Interest SIC 3330009 Trezze di San Pietro and Bardelli and, in the eastern part, lies close to Ecological Important Area, Specially Protected Area in Slovenia.

In addition, the eastern end of the project (at the border between Italy and Slovenia) is an area of relevant underwater archeological interest (Bay of San Bartolomeo, Muggia) that needs to be preserved.

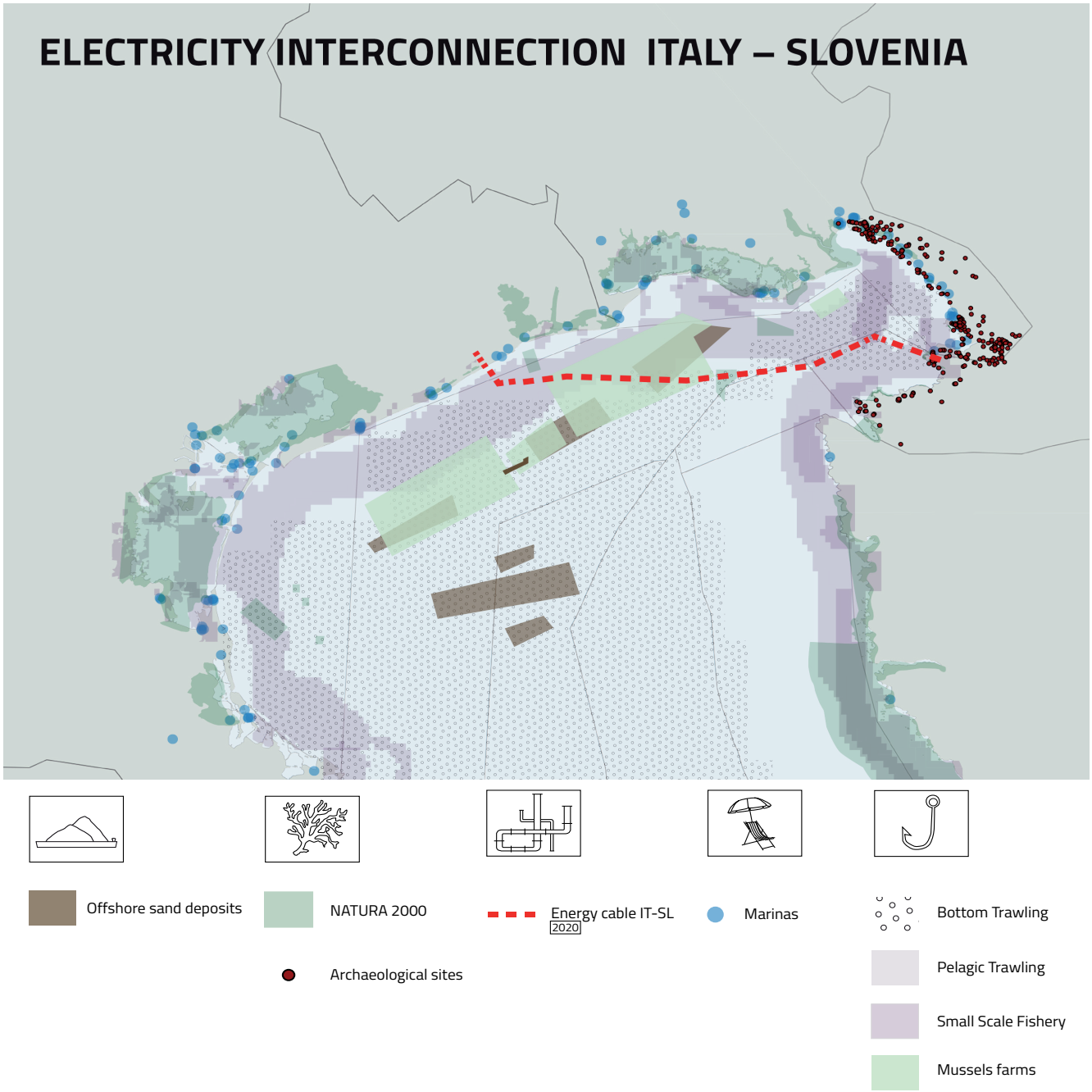


Figure 2.5-4: Position of the planned energy cable Italy - Slovenia and maps of other uses of the sea area

The main conflicts emerged are synthetically represented in the box below.

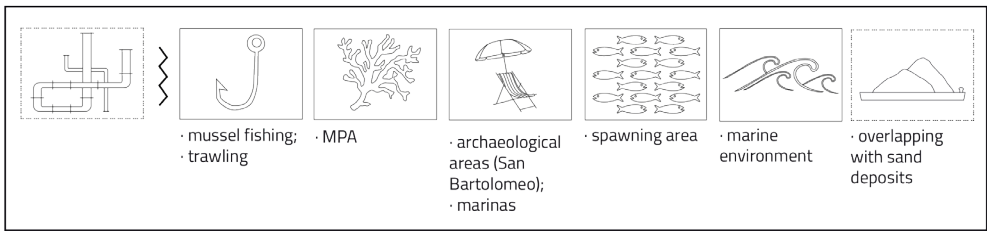


Figure 2.5-5: Problem definition

2 Definition of SMART objectives

MSP should provide solutions to reduce potential impacts on sensitive environmental components in the phases of construction and operationalization and to minimize negative impacts on protected sites (Trezze di San Pietro and Bardelli, specially protected areas). It shouls also minimize negative interactions with fishery and with activities on the seabed, regulate interactions on touristic areas along the Slovenian coast, take into consideration underwater archaeological sites in the areas of Caorle, Grado, San Bartolomeo and assist in the selection of the best timing to reduce interference with touristic activities in the coastal areas and with mussel farming at the eastern end.

3 Draft of the Planning measure

The planning measure proposes to modify the position of the cable towards Croatian–Slovenian borders in order to limit interference with fishing routes and, at the same time, to minimize impacts on Natura 2000 sites. It is suggested to deploy the cable under the seabed to limit possible damage due to trawling activities and to anchorage and to modify the land – sea connection in the eastern part of the project to reduce conflicts with mussel farming and with underwater archaeological sites.

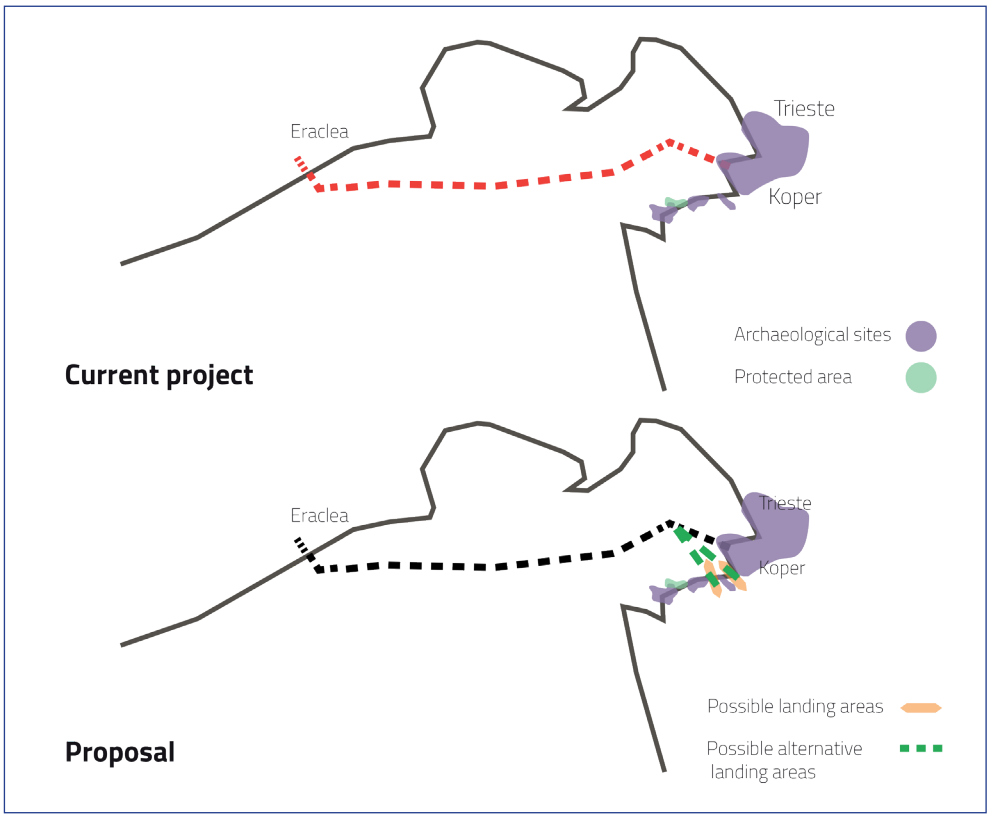


Figure 2.5-6: Schematic draft of the planning proposal

The draft of the planning measure has been presented and discussed with stakeholders at the ADRIPLAN workshop in Strunjan and at several meetings with the Friuli Venezia Giulia Region and comments and documents provided by stakeholders and institutional partners.

In order to mitigate the impacts of the realization of the project, both in terms of environment and of other economic activities, the localization of the project should be defined in agreement with local stakeholders involved in fishing, mussel farming, tourism and environment and cultural heritage conservation.

The planning measure will also select the appropriate timing for deployment to avoid and minimize conflicts with the environment and other uses of the area.

Measure 2 – Venice Offshore Terminal

1 - Problem definition

The Venice Offshore terminal project has been conceived by the Venice Port Authority in order to respond to national and European objectives (see TEN-T) and to increase the Port competiveness in a Blue Growth perspective. At a local level, the project was developed considering the Law for Safeguarding Venice (l. 798/84), which imposes to bring the oil tankers out of the lagoon and that, once the MOSE system, designed to protect the city against high water, is in operation, the port of Venice will have nautical accessibility restrictions. With a sea bottom of 12-metres, the port of Venice can today accommodate ships up to 7000 TEUs, which is considered to be no longer enough to be competitive in the global shipping market that can count on ships up to 18,000 TEUs, already in operation, which will soon be overshadowed by 22,000-TEU ships, under construction.

Positioned 8 miles offshore, where the sea bottom is at least 20 meters deep, the offshore platform will be protected by a 4.2 km long breakwater dam, which will shelter an oil terminal and a container terminal able to accommodate up to three latest generation container ships at the same time. Along the quay with its modular development, specially-made cranes and a highly automated system will be accommodated. The project provides for a synergic connection with 4 onshore terminals: Montesyndial (Marghera), Chioggia, Mantua and Porto Levante. The entire project – consisting of the onshore terminal and the offshore platform – was approved by the Higher Council of Public Works on 29 March 2012. The project received the positive opinion of the Environmental Impact Assessment (EIA) Committee of the Ministry for the Environment on the 2 August 2013. The estimated costs for the realization of the whole system lay in between approximately 2.1 billion Euros. The European Union has already allocated 770,000 Euros to co-fund engineering research, economic and financial analyses for the accomplishment of a PPP (Public-Private Partnership).

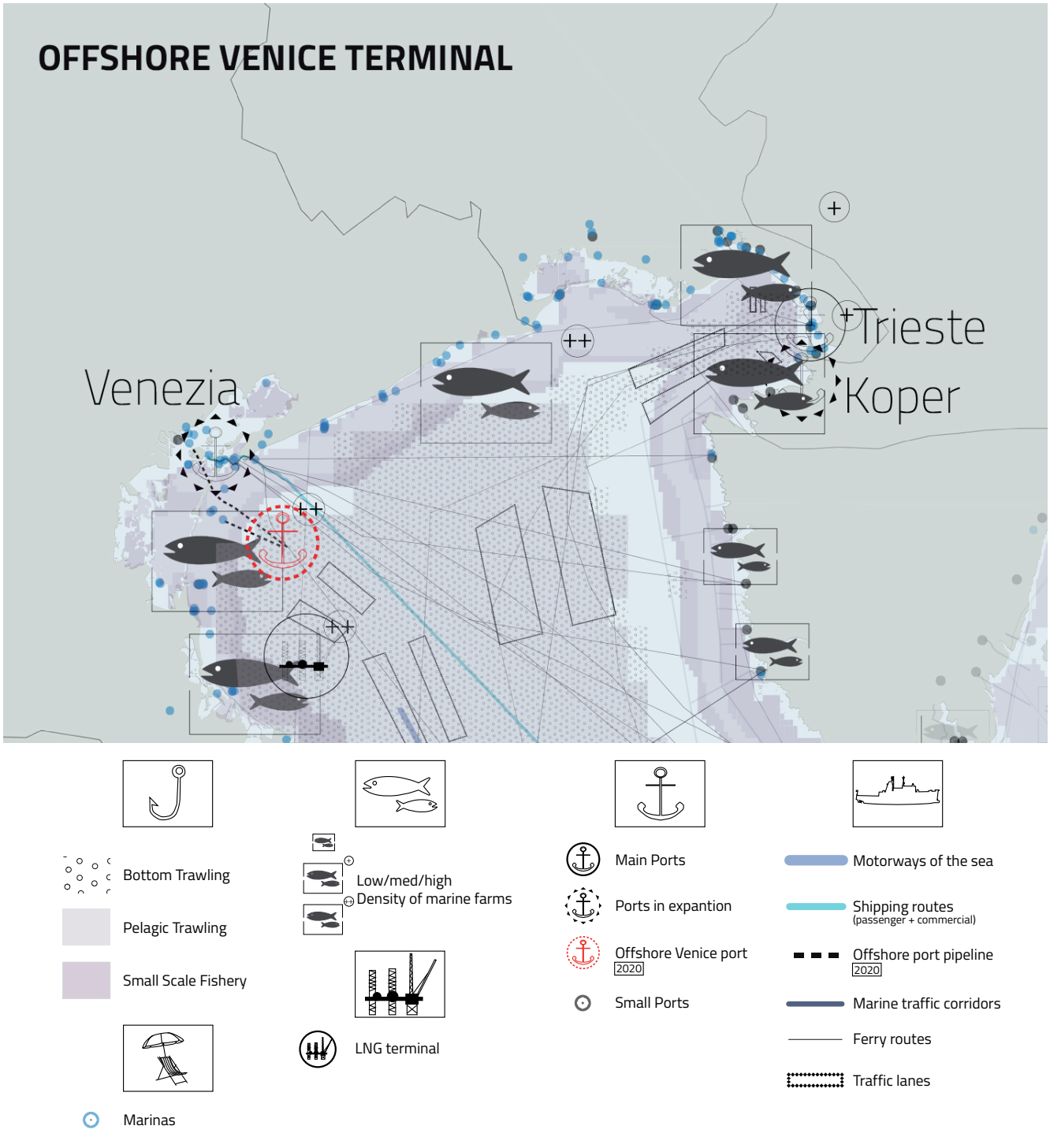


Figure 2.5-7: Localization of the Project and maps of other uses in the area

The localization and construction of the Venice offshore terminal interacts with a number of uses and environmental components, as highlighted by the EIA. With respect to future interactions with other uses, it should be considered that the area is already characterised by a high intensity of maritime activities, and especially by trawling activities, small scale fishery, aquaculture farming, protected areas, i.e. Zones of Biological Protection and Natura 2000 sites, and energy infrastructures (the area hosts the ADRIATIC LNG Terminal). In addition, shipping routes will be partially

modified once the offshore terminal is operative.

With respect to environmental components, the area hosts relevant natural habitats of community interest whose conservation requires the designation of special areas of conservation (EU Habitat Directive), as well as nursery and spawning areas of fish species of high economic relevance as well as edible mussel beds.

The realization of the project will result in a subtraction of fishing grounds. Furthermore, the area hosts spawning and nursery areas of relevant species that may be impacted both during the construction and during the operative phase.

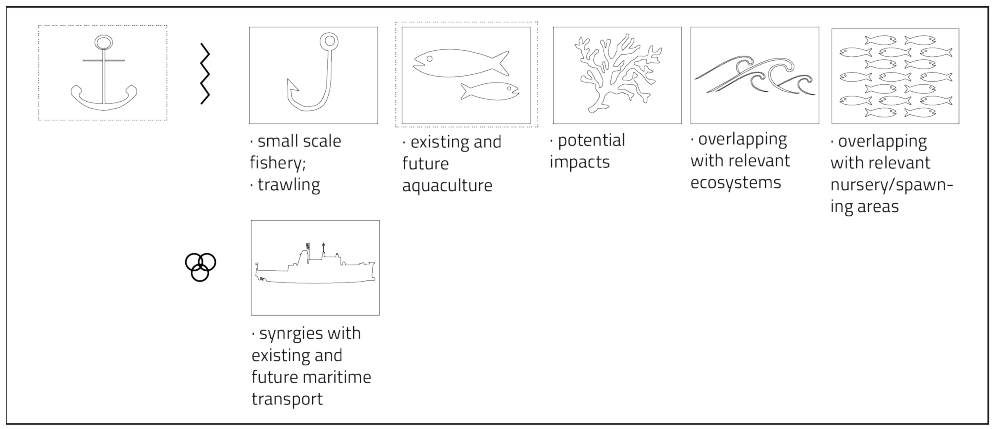


Figure 2.5-8: Problem identification

2 – Definition of SMART objectives

The planning objectives proposed consider environmental protection, but also the emerging demand to develop cross-sectoral management measures. On the one hand, the need to preserve nursery and spawning areas in the medium-long run following the EBA is recognized, and to reduce the impacts on sensitive environmental components in the different stages of realization of the Venice offshore terminal wa- highlighted. On the other hand, a major objective concerns the reduction of conflicts with the fishing sector, and may be spatially defined through the identification of compensatory measures to be implemented according to a time-plan and through the definition of appropriate time-planning for the construction.

The proposed objectives are coherent with high-level goals on sustainable maritime transport development, and in particular with the one related to spatial integration of transport activities (EUNETMAR) and to the enhancement of a TEN-T network.

3 - Draft of planning measures

The planning measure should define temporary precautionary measures in the phase of offshore construction, identify spatial compensatory measures to mitigate environmental impacts on fish species and nursery areas, and on relevant benthic ecosystems (eg. seagrasses, biogenic habitats and coralligenous communities) and on conflicts with fish farming activities. The measure should also include a draft containing compensatory/mitigation measures to be developed along the different phases of the Venice Offshore Terminal construction, i.e.: excavation, dredging, handling and laying of the material until the commissioning of terminal. These must take into account

the degree of interference for with various environmental components and economic activities (e.g. different types of fishing) that insist on the area.

In order to mitigate the impacts of the realization of the project, both in terms of environment and of other economic activities, compensating measures should be defined in agreement with local stakeholders involved in fishing and environment conservation, as well as other relevant subjects such as the Italian Ministry of Transport and Infrastructures, the Italian Ministry of Environment; Venice Municipality; Venice Port Authority and fishing category associations. In particular, the definition of spatial and non-spatial compensation measures to be achieved thorough a dialogue between the Venice Port Authority, Regional Authorities and local stakeholders would enhance the definition of participatory and effectively place-based actions. Peculiar attention should be paid to the need to respond to MSFD obligations. Specific benefits will be evaluated during environmental impact assessment.

For what concerns the draft of the mitigation/compensatory measures, these must have a time horizon divided into steps, so that it guarantees a complete and articulated reconstruction of habitats during the different phases of terminal construction/ implementation, depending on correspondent environmental impacts. For each different phase of the construction, a specific mitigation/compensatory measure must be defined in order to limit the environmental impact and possibly restore habitats and environmental components affected by the construction.

Finally, a monitoring plan should be foreseen, in order to identify measures that could be changed in case of unexpected events related to the construction phases (extensions phases of construction).

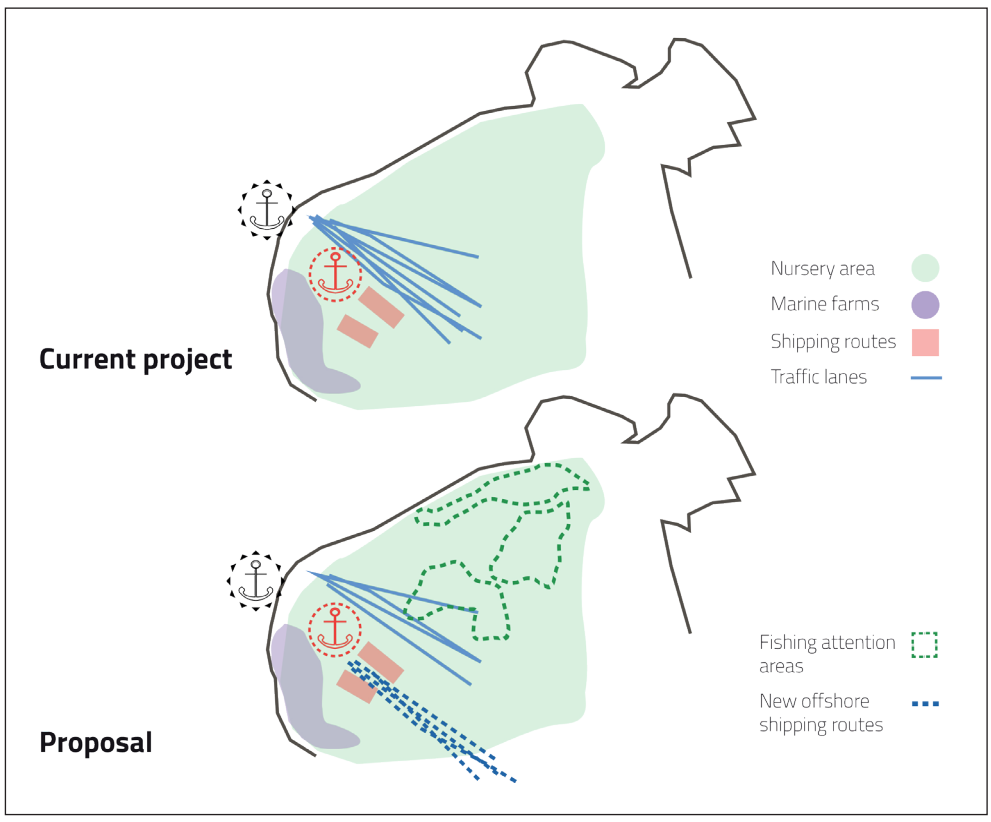


Figure 2.5-9: Schematic draft of the planning proposal

Measure 3 - Development of infrastructures in the Port of Trieste

1 – Problem definition

The recently approved plan of development of the Port of Trieste (Piano Regolatore del Porto di Trieste, Giugno 2014, Relazione Generale) includes a wide range of works involving maritime space, possibly interacting with other maritime activities and having possible impacts on the environmental status. These projects include (Figure 2.5-10a) the enlargement of the pier dedicated to cruise ships in order to allow docking of the most recent cruise ships, the execution of a new touristic marina in the city centre, the enlargement and also unification of some piers in the industrial port (leading to more than doubling the current pier surface), the construction of a new pier and of a logistic platform, the construction of a new Ro-Ro terminal, the realization of coastal infrastructures to promote yachting activities and some dredging areas.

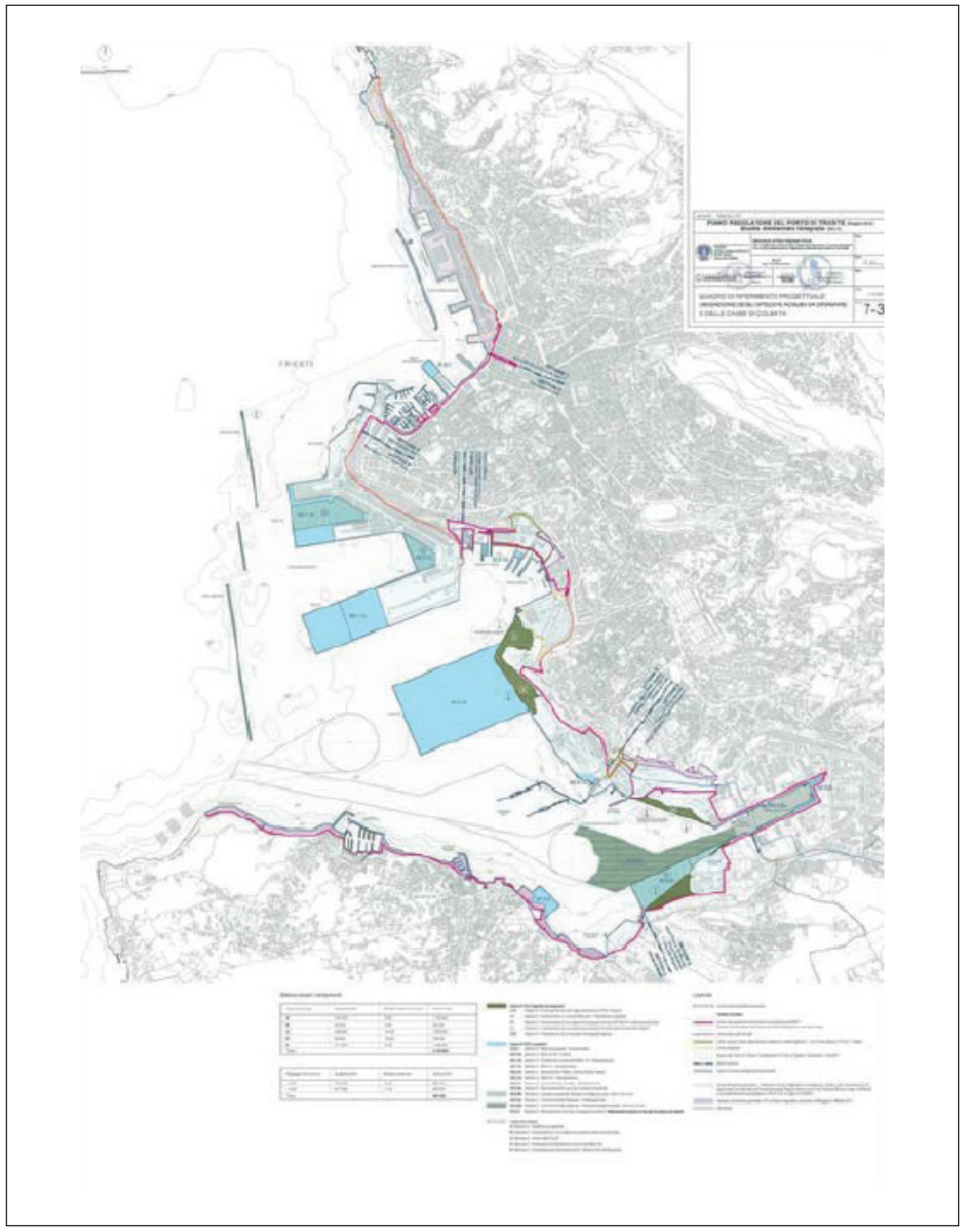


Figure 2.5-10a: Projects of development of port infrastructures in the Port of Trieste (Italy). Source: PIANO REGOLATORE DEL PORTO DI TRIESTE, Giugno 2014, Relazione Generale.

The area interested by the plan of development occupies a Site of National Concern (SIN, Port of Trieste) with a total area of 1,700.00 ha, of which 1,200.00 ha are in the sea. The site is characterized by hydrocarbons and heavy metals pollution due to past long-lasting refinery activities, which have contaminated the sediments inside the harbour (Figure 2.5-10b).

The entrance corridor of the commercial port and of the oil terminal passes in front of the historical village of Muggia and in front of a coastal area dedicated to tourism and recreational activities. The southern coast, close to the Slovenia border, is used also for aquaculture with several mussel farms.

Figure 2.5-10b: Surface of the Site of National Concern (SIN, Port of Trieste) (Source: Piano Regolatore del Porto di Trieste, Giugno 2014, Relazione Generale)

2 - Definition of SMART objectives

In this context, MSP could provide a significant contribution coordinating management measures that insist on the area. Specific actions aimed at reducing acoustic pollution are required. MSP should contribute to preserve water resources and the marine environment, to define a suitable monitoring project to assess possible environmental impacts during construction phase and to assess possible environmental impacts during operation phase. During the construction phase, MSP should define mitigation and compensation measures and special precautions to reduce impacts of sediment resuspension and dispersion during dredging and deployment of infrastructures, to reduce possible dispersion of contaminants. The plans should include the definition of adequate timing of operations to reduce interference with the touristic season, the adoption of "IMO Ballast Water Management Convention" (IMO, 2004)

to limit possible Non – Indigenous Species (NIS) introduction, the confinement of the activities to avoid interference with seabeds of phanerogrames and other relevant seabed habitats and the definition of routes to approach the harbour and limitation of speed to limit possible impacts on marine mammals.

3 – Draft of planning measures

The plan of development of the Port of Trieste is articulated in several time frames, including long term actions consisting in large infrastructures (piers, breakwaters, boathouses, dredging in several areas) and short term actions consisting in enlargement of existing infrastructures. Accordingly, planning measures are also divided into short-term and long-term actions. The planning measure should define temporary precautionary measures in the phase of construction, to avoid or limit any contamination during excavation and dredging. Adequate timing of the construction is a key issue that planning should consider, in order to limit conflicts with the intense maritime traffic activities already taking place in the Gulf of Trieste. Finally, appropriate precautionary measurements to avoid accidents and collisions must be properly defined. Actors to be involved include: the Italian Ministry of Transport and Infrastructures; the Italian Ministry of Environment; Trieste and Muggia Municipalities; Trieste Port Authority; marinas and touristic associations; fishing and aquaculture associations.

2.5.3 Pilot Actions in the Focus Area 2

Within the Focus Area 2, two main planning issues emerged during ADRIPLAN. These are the:

- Need to promote and spatially define environmental conservation measures along the Apulian coast;
- Need to define cross-border cooperation measures between Greece, Albania and Italy for fishery and aquaculture.

MEASURE 1 – Environmental protection in the western part of FA2

1 - Definition of the Problem

The main issue identified along the Apulian coast concerns the impact of anthropic uses on sensitive environmental components. In particular, the threat to marine biodiversity in the area between Otranto and Santa Maria di Leuca due to unsustainable fishing activities will be considered in detail.

Before describing the specific planning needs that emerged, a brief description of the main characteristics of Apulian territorial waters is required. The area is characterized by a high intensity of uses, which determines hot spot of conflicts. The most important ones in terms of socio-economic importance for the area (see also the outcomes from the ADRIPLAN Initial Assessment) are represented by:

1. an historical and complex fishery system, with a significant contribution of small-scale coastal fisheries;
2. a dense port network (from large commercial ports to medium-small marinas);
3. urban settlements and relative facilities such as a large number of sewages, industrial areas and power plants and a seaside tourist flow steadily increasing over the last 10 years (Figure 2.5-11a).
4. In the next years, hydrocarbon exploration and exploitation are forecasted to take

place along almost the whole Apulian coasts (1041 km of coast, out of 12 nautical miles from land).

With respect to ecosystem components, four are considered of high importance: *Posidonia oceanica* meadows, coralligenous assemblages, *Cystoseira* spp. canopies and deep-sea white corals (Figure 2.5-11b).

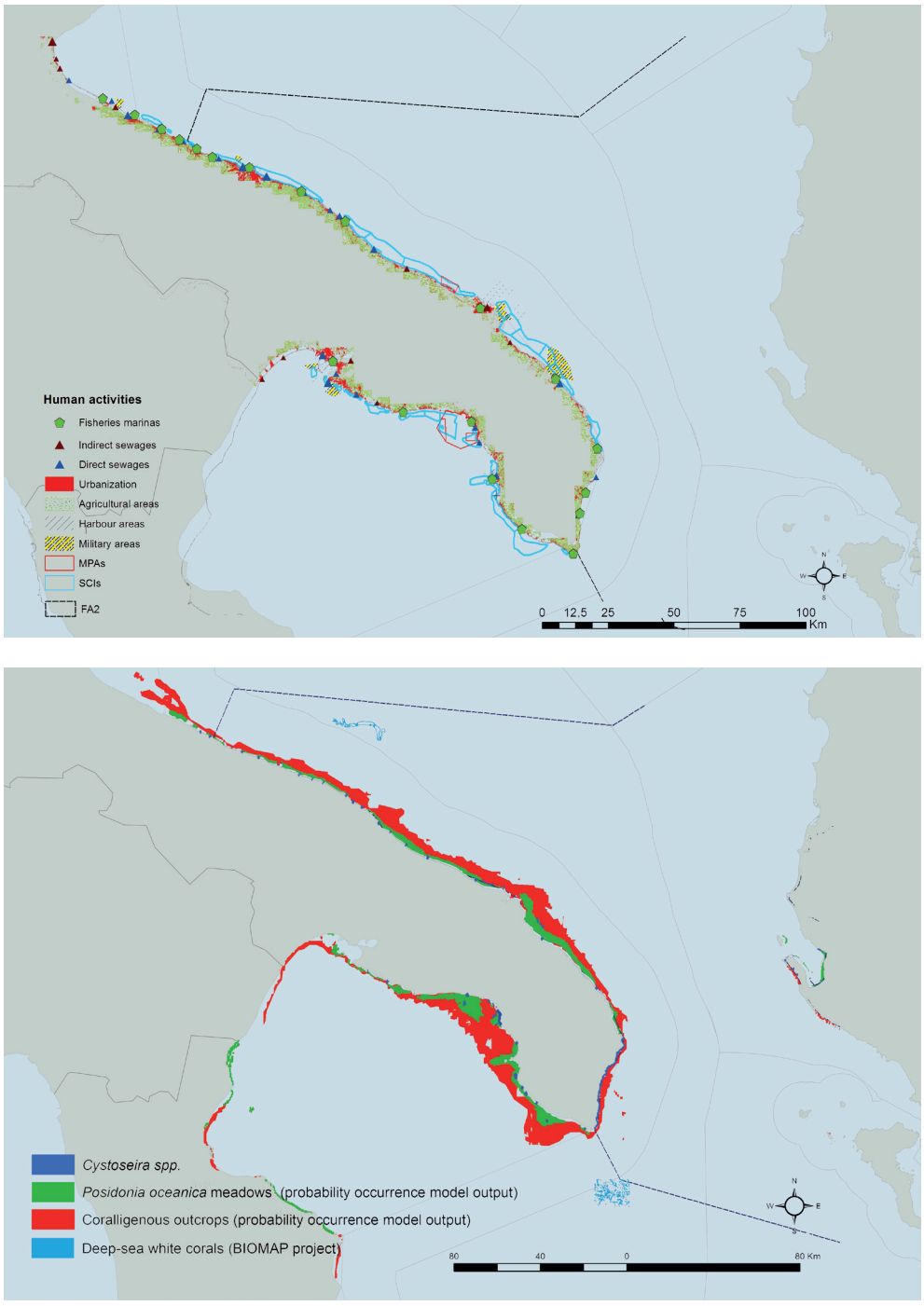


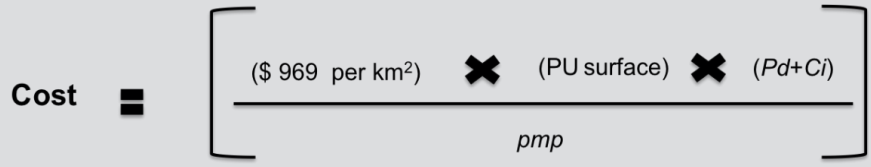
Figure 2.5-11: (a) refers to the present situation (i.e. 2014) relative to the human activities/ uses within the study area. Fig. 2.5-11 (b) shows the distribution of the ecosystem components

Supplementary Box 6: MARXAN

The identification of interactions among human uses has been implemented through a spatial analysis based on the GIS-based application MARXAN. The MARXAN software was designed to solve spatial prioritization problems with the objective of choosing areas meeting conservation targets while minimizing the total cost of a potential reserve area (Ball & Possingham, 2000). The integration of biological and socio-economic data in MARXAN enables a strong baseline for management decisions. As a result, the flexible solutions of reserve systems are more feasible from the perspective of policy makers and planners (Ball et al., 2009). In this sense, MARXAN provides a foundation tool that supports decisions for the Ecosystem-Based Management (EBM) approach. Planning, implementing, and managing MPAs require a focus not only towards the biological and oceanographic issues that influence the performance of the MPA, but equally to the human dimensions: social, economic, and institutional considerations that can dramatically affect the outcome of MPA implementation. Here, the GIS-based MARXAN tool was employed to offer best scenarios of spatial optimization by using a priori identified conservation targets of most critical habitats combined with the analyses of current and emerging human activities in the Apulian coastal zone. MARXAN includes several selection algorithms of reserves, but mainly uses the Simulated Annealing. In addition, it allows the setting of complex spatial constraints in the analysis by controlling the ratio between surface and perimeter. MARXAN analysis was used to select priority conservation sites according to the aforementioned criteria (Ball & Possingham, 2000; Game & Grantham, 2008; Ball et al., 2009).

We divided our study area in 2689 hexagonal 10 km^2 Planning Units (PUs). In our study case, fine scale data on the distributions of benthic habitats (listed previously) and essential fish habitats, were considered the basic information to elaborate conservation features. The Adriplan project (http://adriplan.eu/), Mediseh project (http://mareaproject.net) and CoCoNET project (http://www.coconet-fp7.eu/) have provided an unprecedented opportunity to merge together the most complete up to date dataset available for benthic and spawning/nursery habitat at Mediterranean scale including georeferenced data on *Posidonia* meadows (model output), coralligenous formations (model output), *Cystoseira* canopies, habitat of fish nurseries (model output) for *Parapenaetus longirostris*, *Sardina pilchardus*, *Trachurus mediterraneus*, *Trachurus trachurus*, *Engraulis encrasicolus* and spawning grounds of *Mullus barbatus* and *Parapenaetu slongirostris*. In addition, deep-sea habitats (e.g. canyons, banks, sea mounts) were also included (OCEANA MedNet 2012). Habitats selected for this study are the most important in the Mediterranean Sea for their biodiversity, ecological functions and extension.

Cost assessment is one the most critical issue in marine spatial planning. As Ban et al. (2009) show in their review, there's more than one way to deal with the problem. In the framework of Adriplan, as a proxy, we used an up to date (to 2015) of the average management cost described by Balmford et al. (2005), who analysed the management cost in 83 MPAs in the world and its correlation with different variables. Taking into account correlation evidence found in specific literature, we applied the consideration of threats and socio-economic variables to modify this proxy. Putting together the variables in an equation that indicates individual PU cost, we achieved the following:



Cost: PU cost;

$ 969 per km²/y: "Balmford" management cost update to 2015;

PU surface: 10 Km²;

(Pd+Ci), indicated the sum of Population density (ranging between 0,5 /3) and Cumulative Impact (ranging between 0,5/3): high values of this term indicates a high level of pressure, the mitigation of pressures increases the management cost (Balmford et al, 2005; Charles & Wilson, 2009);

pmp, protection measure presence, binary value, 1 indicates absence, 2 presence. Presence of protection measure makes it much more likely the implementation of management (Adams et al., 2011), then decreases the costs. In our study we took into account as presence of protection measure, Fishing Restricted Areas (FRAs) and Natura 2000 sites distribution;

'Simulated annealing' algorithm, on which MARXAN is based, solved the issue of meeting the targets while minimizing overall costs (Martin et al., 2010), selecting the lowest value in the objective function (Ball & Possingham, 2000) illustrated below:

$$\text{Objective function} = \sum_{\text{PUs}} \text{Cost} + (\text{BLM} \times \sum_{\text{PUs}} \text{Boundary}) + \sum_{\text{ConValue}} (\text{SPF} \times \text{Penalty}$$

Where *Cost* is the surrogate value in each selected PU, *BLM* is the Boundary Length Modifier ratio, which controls the importance of the boundary length (i.e. perimeter) of selected PU, *Boundary* is the length of the perimeter surrounding the selected sites, *SPF*is the Species Penalty Factor, which controls the influence of the Penalty for not meeting the target, and *Penalty* is a value added to the objective function for every target that is not met. To calibrate MARXAN's best solution scenario, it was set to run 1000 times (Edwards et al., 2010), with 10^5 iterations in each run.

The main outputs of the MARXAN runs are the following: first, the most suitable scenario in term of cost compactness and habitat protection target, between the different results produced by the analyses (*Best solution*); second, the *Selection frequency* output shows the PUs most frequently selected in the 1000 solutions produced by the analysis. The best solution produced by the analyses (Figure h) represents only one of multiples suboptimal solutions to solve potential conservation problems.

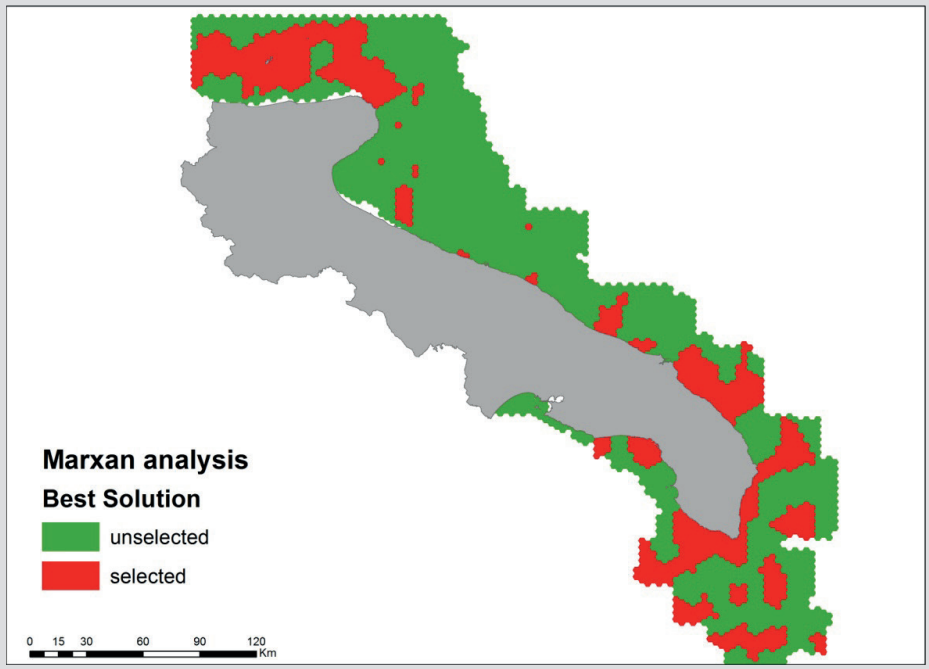


Figure h. Best solution from MARXAN analyses.

The selection frequency output is the most useful tool in order to assess priority sites for conservation. In the figure 5 are clearly indicated, in red, the most important areas in terms of priority in conservation.

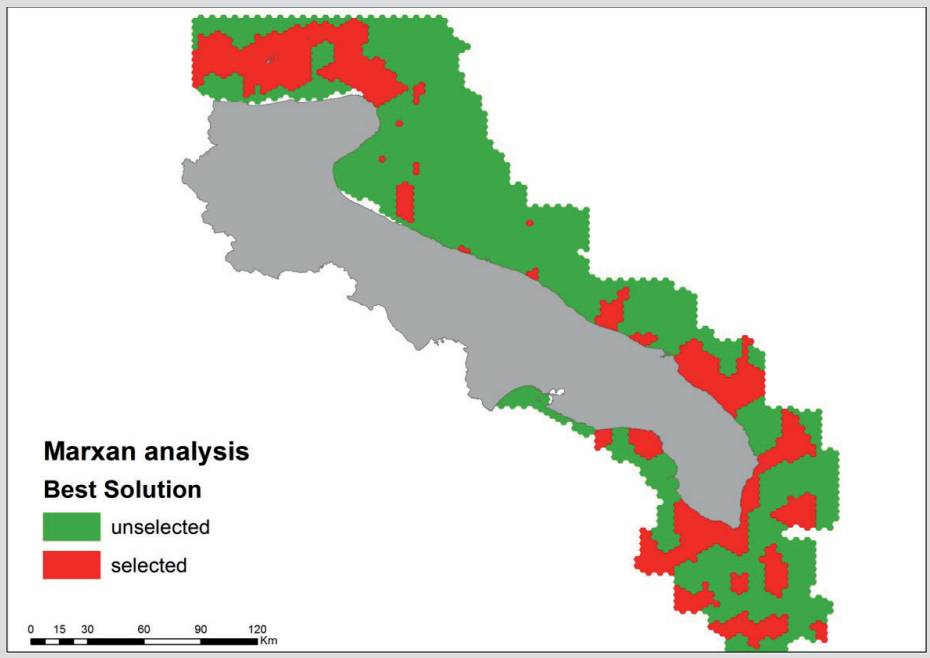


Figure i. Selection frequencies of PUs from MARXAN analyses. Red areas are the most frequently selected for protection by the algorithms in order to achieve requested conservation targets.

The comparison between the MARXAN selection frequencies and the Adriplan Conflict Score produced a map (Fig. 6) in which we underlined areas with high conflicts between multiple human uses and highly valuable conservation areas.

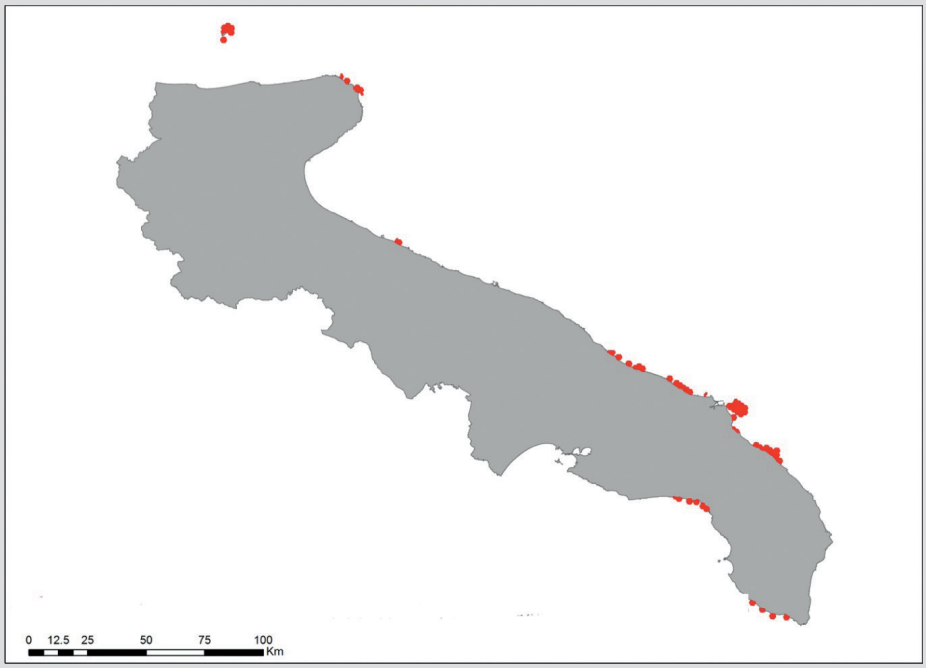


Figure I: Areas of high conservation values featuring a high concentration of uses (in red).

The results from the analyses confirm the need of a systematic spatial planning and well-managed protection policies in the area of Brindisi and "Marine leccesi", where valuable areas coexist with widespread pontentially harmful uses.

The analysis performed enabled to identify sites with high spatial interaction among human activities in the Apulian study area in 2014.

The quantification of the level of interactions between existing human activities revealed three areas with high level of interactions in the Apulian part of FA2 (Figure 2.5-12). Specific planning and management issues have been identified for each area, starting from the analysis of relevant interactions among existing uses and between uses and selected environmental components.

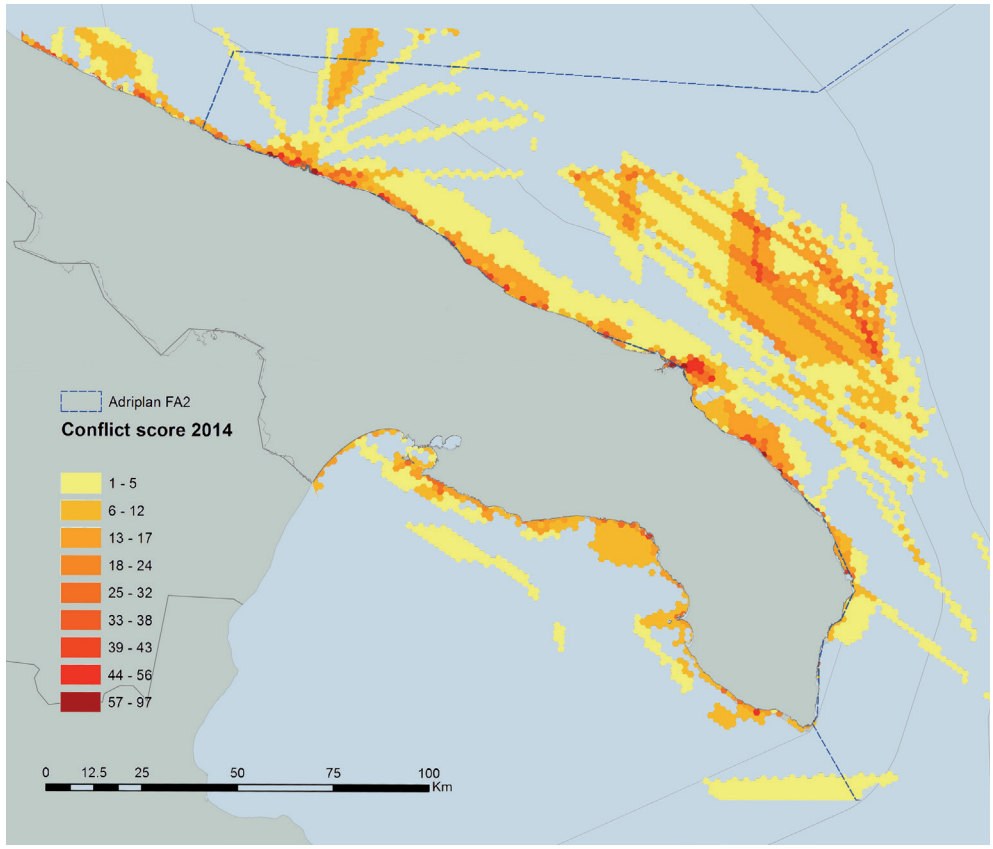


Figure 2.5-12: Map of the Italian part of FA2, where the three areas indicating high level of interactions amongst existing human relevant activities are shown

- Area 1 (Figure 2.5-12): located in the coastal area featured by the presence of the town of Bari, currently high populated and urbanized. Interactions between naval activities (due to the shipping and cruise port), increasing bathing and nautical tourism, cables, small fisheries and trawling, close to widespread Sites of Community Interest (SCIs) (covering the extension of large *P. oceanica* meadows) are the main causes of the present high level of spatial conflicts;

- Area 2 (Figure 2.5-12): although there are still widespread natural areas, Brindisi coastal area is highly populated by urban settlements and facilities, industrial areas, a carbon power plant (Cerano), a big shipping port, and a seaside tourist flow steadily increasing over the last 10 years. The Marine Protected Area "Reserve of Torre Guaceto" is also present in this area. The MPA represents a critical tool for the protection of marine biodiversity and the local management of marine resources, and fishery is strictly regulated through bottom up approach. Several SCIs are present in this area, deserving urgently a management plans together with a rezoning carried out at regional level. Hydrocarbon exploration and exploitation are also present offshore the area, stressing the need of an integrated MSP preserving the vocational characters of the different coastal areas;

- Area 3 (Figure 2.5-12) is located in the coast of the Lecce town ("Marine leccesi"). Here, the coast is mostly represented by soft bottoms with a critical erosion forcing the need of coastal defence works. The main activities in this area are small-scale fishery and trawling interacting with a massive bathing tourism flow.

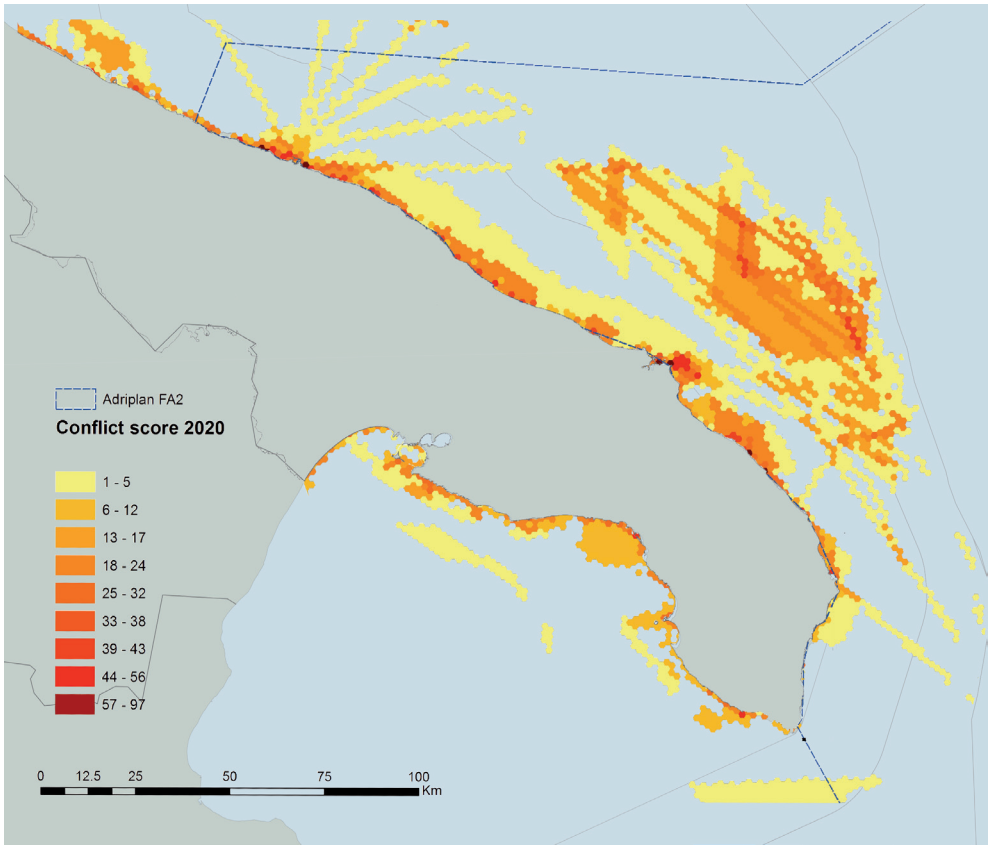


Figure 2.5-13: Map of the Italian FA2, showing the areas with high spatial interactions among human activities in 2020

With respect to interactions with future uses:

- Area 1 (Figure 2.5-13): major issues may concern the development of energy infrastructures, and in particular to the planned Trans Adriatic Pipeline cable reaching the Apulian coast slightly north of the town of Otranto. Moreover, hydrocarbon exploration authorizations are heavily increasing along the whole Apulian coasts. Conflicts with energy infrastructures can be merely spatial (e.g. spatial limitations for trawling due to pipelines) or can have greater implications. In fact, recent pressure for surveys for oil and gas using acoustic technologies is considered a heavy conflict with fisheries, since technologies such as airguns may have serious impacts on different ecosystem components, especially on fish stocks.

- Area 2 (Figure 2.5-13) appears to be a very low conflict area both in the 2014 and 2020 analyses. This suggests major attention to a proper protection of this area, featured by high summer tourism and low pressure of traditional small-scale fisheries, through the institution of a well-enforced MPA.

The results of the cumulative impact analysis are reported below.

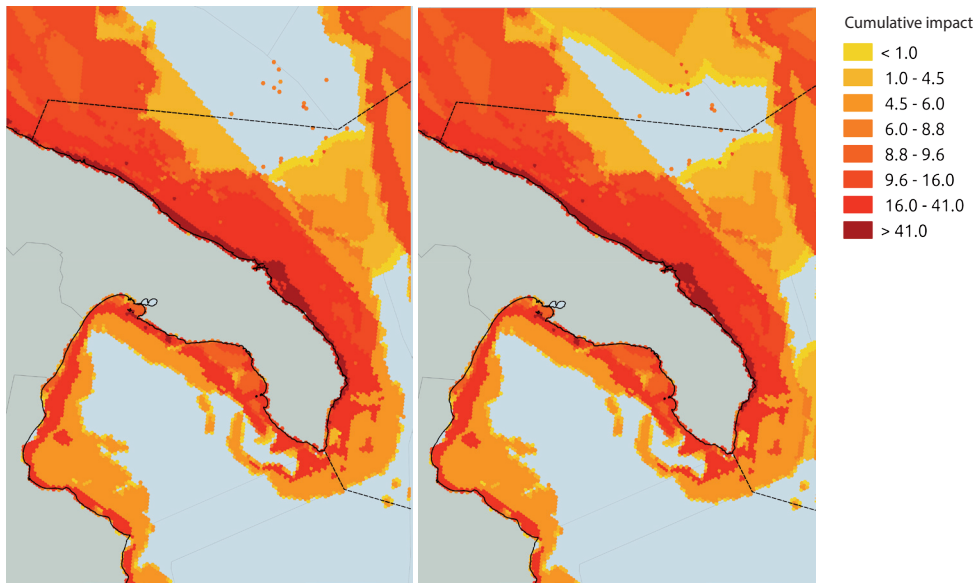


Figure 2.5-14: Map of the Italian part of FA2, showing the results of cumulative impact assessments in 2014 (a) and 2020 (b)

- 2014 cumulative impact assessment (Figure 2.5-14a): a great overlap between human activities and the selected ecosystem components emerged, especially in coastal areas. Results show that no areas in Apulian FA2 can be considered as virtually unimpacted, and areas showing critical vulnerability are largely represented along the regional coasts. A major role among the impacts mapped along the region is given by fishing activities that are very widespread, especially trawling, in areas rich of habitats of great interest and in presence of other uses, asking for a spatial management of fisheries activities.

- 2020 cumulative impact assessment (Figure 2.5-14b): in the framework of the ADRIPLAN project, an estimate of the impact of activities predicted to take place in the area in 2020 on the key ecosystem components, considering their vulnerability was attempted. The anticipated impact of activities on ecosystems is presented on the basis of the assumption that no spatial management actions will take place till 2020. Once more, it is apparent from the results of our analyses that the entire area needs an effective spatial management plan not only to minimize the possibilities of further deterioration of the status of the ecosystem but also to improve existing conditions. About fisheries, the main concern deals with the significant reduction in the quality and quantity of fishery resources in southern Adriatic (northern Ionian) that led to the decline of fishing activities. Hence, professional fishers are declining, and their community shows signs of ageing, as fisheries has become a less attractive profession for the new generation. The above underscored the need for promoting sustainable fisheries in the study region and not only.

2 - Definition of SMART objectives

In this context, a major planning priority consists in the definition of environmental preservation measures and in the spatial allocation of ecological protection actions:

- It is important to consider the "vocational" characters of this coastal area, considering

tourism and leisure, which should not be considered for energy development. On the contrary, coastal areas might be considered for offshore wind farms implementation.

- As previously mentioned, hydrocarbon search surveys using acoustic technologies should be avoided close to essential fish habitats (EFH, i.e. nursery and spawning areas) and important fishing areas of vulnerable fish stocks. It is important to coordinate actions between different institutions and bodies involved in authorization process, coordinating also the private sector and the managers of the network. Areas with existing industrial development might be considered for the implementation of energy projects (for example, north of Bari, Brindisi and Cerano).

- The local management plans should be empowered so to decide when, where and how to further develop new human activities: this is also culturally relevant with an improvement of the tools and the effort of fishery through a bottom-up approach.

- Proper management needs a thorough quantitative spatial knowledge of the different types of fishing activities to determine their effort and landings, and address issues related to their impact on fishing grounds and resources. Indeed, the assessment of essential fish habitats EFH is of key importance to Marine Spatial Planning activities leading to gradual improvement and restoration of fisheries resources through effective statutory mechanisms established at a transnational scale.

- Marine Protected Areas (MPAs) are surely critical tools for the protection of marine biodiversity and the local management of marine resources. However, there are still issues to be solved when implementing MPAs such as the consideration of the environmental features of the area and not only socio-economic features. There is a general agreement that more than prohibiting fishery with reserve areas, fishery should be strictly regulated through bottom up approach. Recently, issues of overexploitation have convinced local administrations and local fisherman to plan alternative forms of regulation/protection of the environment, with a regulatory framework that can be more context-dependent (e.g. Blue Areas).

- Achievement of Good Environmental Status (GES) of the marine environment and particularly of fishery resources would not only provide job opportunities for the fisheries community but also supply fresh and quality fisheries products to future generations. Environmental education of fishery operators, diversification, conservation of both stocks and traditional culture, improvement of fishermen's awareness on the impacts caused to habitats and enhancement of good practices of sustainable fisheries, such as consumption of local and "poor" fishes, are the baselines for responsible local fisheries. Natura 2000 sites and MPAs are crucial to investigate the existent fishing activities informing proper management actions, taking into account regional socio-economic diversity to develop shared policies.

- Touristic activities could have a positive synergetic interaction with fisheries, resulting particularly in a possible enhancement of traditional fisheries (e.g. development of fishing tourism), if both activities will be managed under a transparent and responsible ecosystem-based management (EBM) approach.

- Potential conflict with hydrocarbon search surveys using acoustic technologies should be avoided close to EFHs and to important fishing areas of vulnerable fish stocks.

3 - Draft of a Planning Proposal

Following the results of the analysis and the need to achieve the planning objective listed above, the first planning action to be promoted in the area should concern the definition of a new protected area. The localization of the new MPA should be defined where there is already a coastal protected site, in order to enhance mutual benefits. Furthermore, an improvement of the regulation of inland activities would be necessary to limit negative effects on the marine environment. Before defining in detail the planning proposal, it would be necessary to perform an analysis of good practices, in order to minimize environmental and socio-economic costs and conflicts. Finally, the definition of a sustainable planning option has to promote the cooperation among involved stakeholders, including: Italian Ministry of the Environment; Regional Environmental Protection Agency (ARPA Puglia); Local Administrations; coastal Municipalities; University of Salento/Bari; local residents; fishery associations.

Proposal targets:

- Propose common policy agreements and ensure their enforcement through co-operative monitoring and surveillance, which will increase certainty and predictability in planning;
- Engagement of fishers associations along with stakeholders from other uses in the MSP process and investigate trade-offs of different planning scenarios;
- Spawning and nursery areas need to be included in MSP activities considering their spatio-temporal dimension;
- Coordinate actions between different institutions and bodies involved in energy projects authorization processes, coordinating also the private sector and the managers of the network;
- In case of new MPA institutions, in Italy, the area Otranto- Santa Maria di Leuca should be protected.

MEASURE 2– Mitigation of conflicts in north-east Ionian Sea

In the Greek territorial waters of FA2 different types of human activities take place currently (2014), seven of which have been identified as the major ones in terms of their socio-economic importance in the area (see also outcomes from the ADRIPLAN Initial Assessment). These activities are: bottom trawling, small scale fishing, aquaculture, ports, marinas, shipping lanes, cables, and they are mapped in figure 1 (see part referring to existing activities). As for 2020, apart from the above-mentioned activities, two more (i.e. off shore wind farms, and hydrocarbon exploration and exploitation) are forecasted to take place in the locations designated in Figure 2.5-15 (see part referring to future activities). With respect to ecosystem components, five are considered of high importance; namely essential fish habitats, Natura 2000 sites, sea grass meadows, Mediterranean monk seals, and cetaceans (Figure 2.5-15: see part referring to ecosystem components).

The identification of interactions among human uses has been implemented through a spatial analysis which is based on a methodology developed within the COEXIST project (Gramolini *et al.*, 2013), described in the section on methodology. In a next step, giving as input a description of the potential relation (positive, negative or neutral) between all combinations of activities, a conflict score was calculated by sum-

marizing the interactions of individual combinations. The computation of the conflict score was made by using a grid with corresponding cell size value equal to 1km. The analysis of conflict scores was based on two spatial management scenarios. Scenario *a* referred to the existing situation (i.e. 2014) regarding the human activities/uses within the study area, while scenario *b*, aside from existing activities, took also into account the potential future development of the two additional activities mentioned above (i.e. up to 2020). Conflicts were classified into different categories (see Figure. 2.5-16), and for the sake of the present study areas indicating high level of conflicting interactions were only considered.

Then, assessment of ecosystems' vulnerability to human stressors, being of high importance in impact and risk assessment processes as it depicts which species/habitats are mostly affected by specific activities, has been attempted based on the evaluation of five vulnerability measures for the existing ecosystem components following Halpern *et al.* (2007).

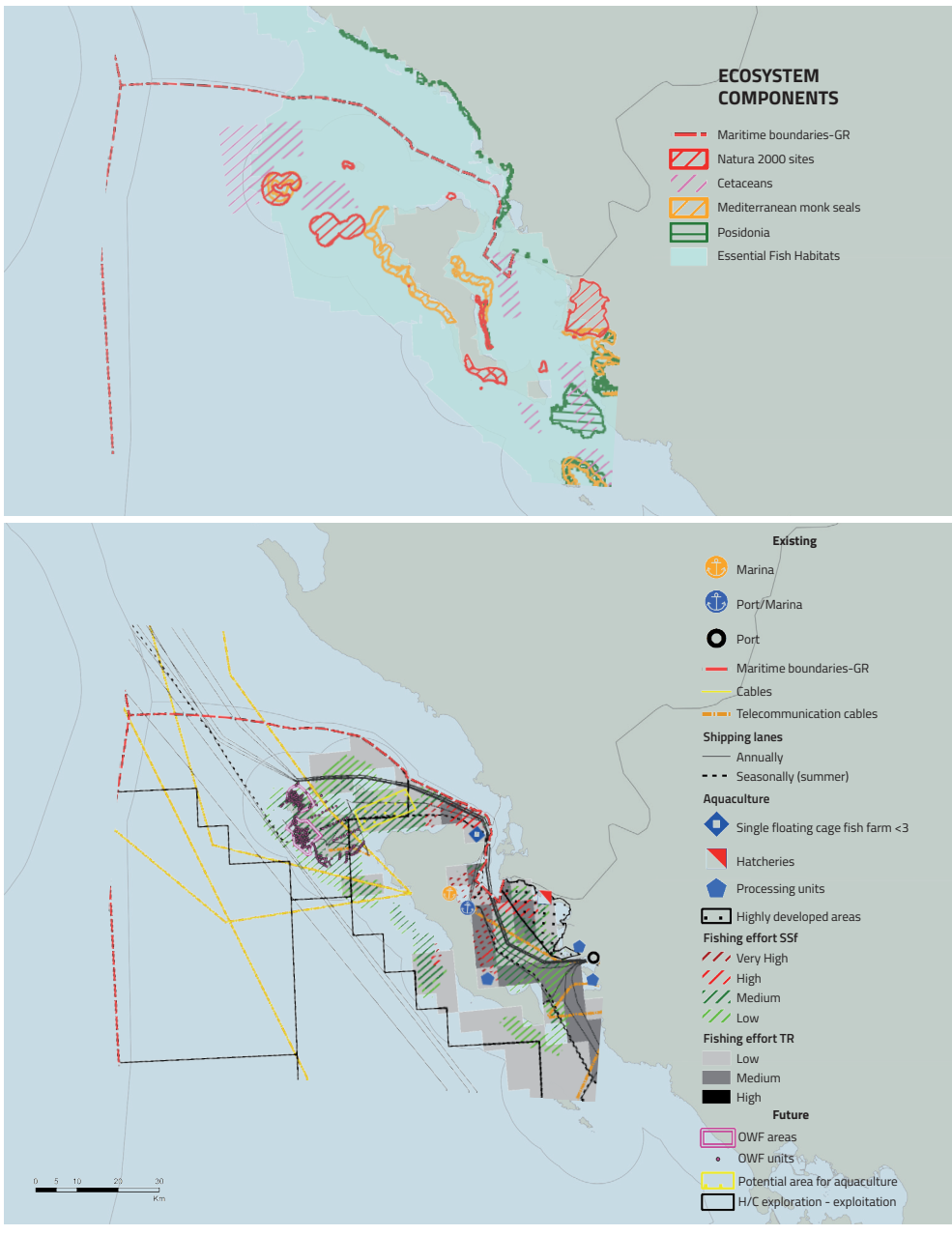


Figure 2.5-15: (top) Main activities in the area, both current and potential/future. (bottom) Key ecosystem components in the Greek part of FA2

At 2014, the quantification of the level of interactions between existing human activities revealed four (4) areas with high level of interactions in the Greek part of FA2 (Fig. 2.5-16).

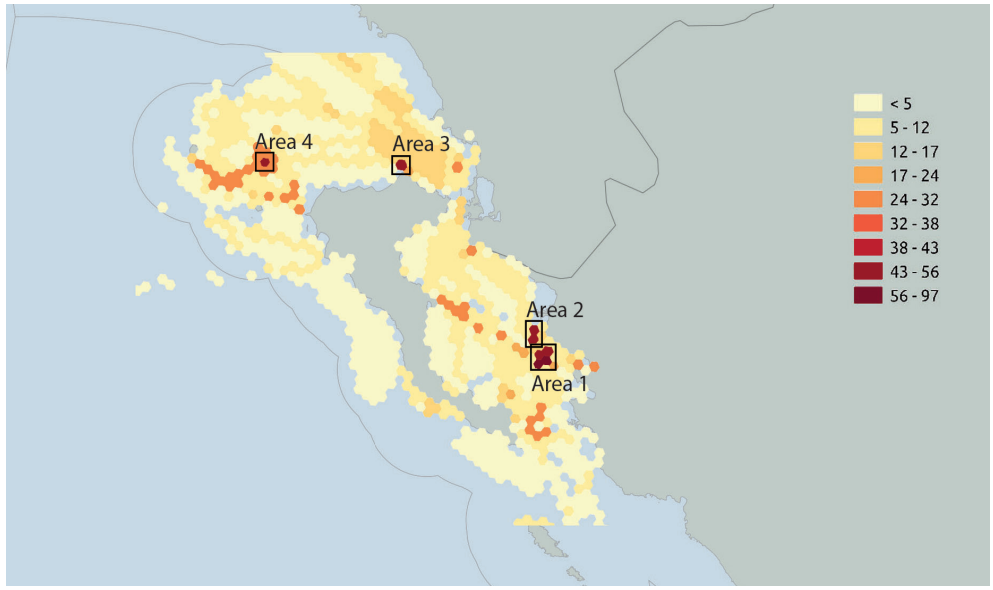


Figure 2.5-16: Map of the Greek part of FA2, where the four areas indicating high level of conflicting interactions amongst existing human important activities are shown

The first area (Area 1; Figures 2.5-17) is located in the southern part of Corfu, between the South-eastern coast of the island and the mainland (close to the city of Igoumenitsa). In this area there is currently high aquaculture development, small-scale fishing, and trawling, all activities appearing to have a strong interaction between them, while shipping lanes and cables, seemed to have low interaction. Then, off the Kalamas

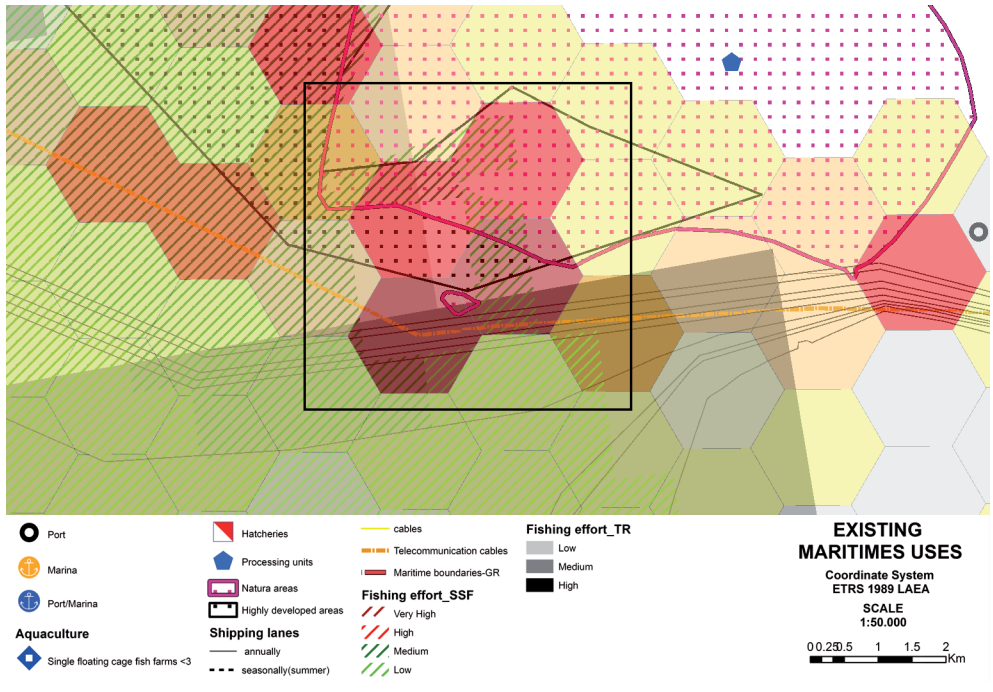


Figure 2.5-17: Identified Conflict Area 1

estuary a second area of high level of conflicting interactions among activities was identified (Area 2; Figures 2.5-18). In this area there is also highly developed aquaculture, as well as small-scale and trawl fishing. The third area (Area 3; Figures 2.5-19) was located at the northern coasts of Corfu close to the region of Kassiopi. The main interacting activities in this area were small-scale fishing and trawling. Finally, in the last area (Area 4; Figures 2.5-20) located at the Diapontia Islands complex, the major conflict existed between medium and small scale fisheries exerted there.

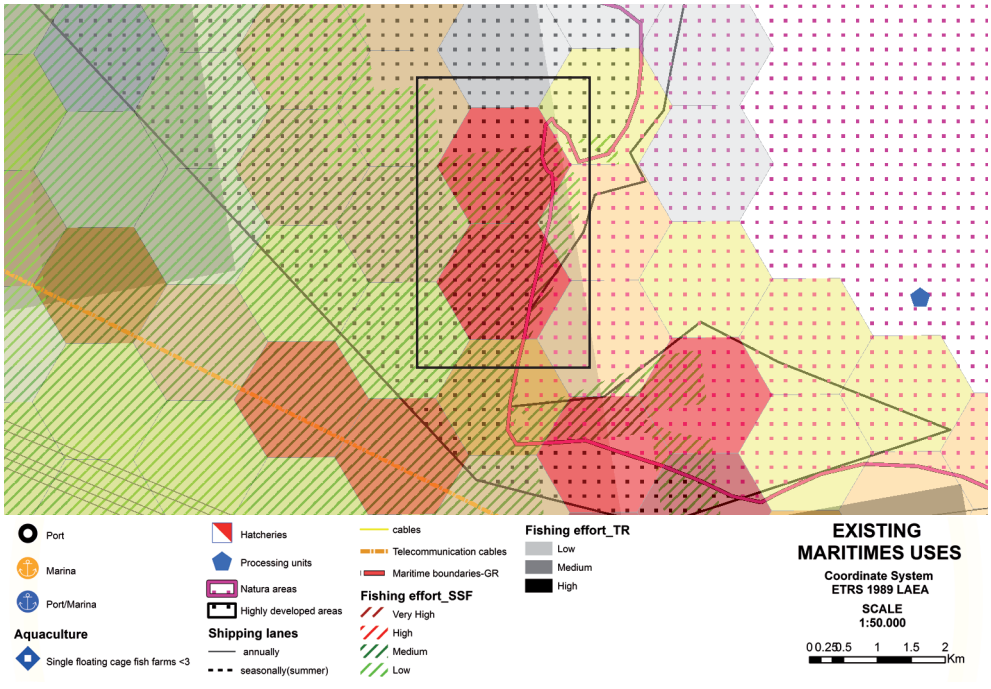


Figure 2.5-18: Identified Conflict Area 2

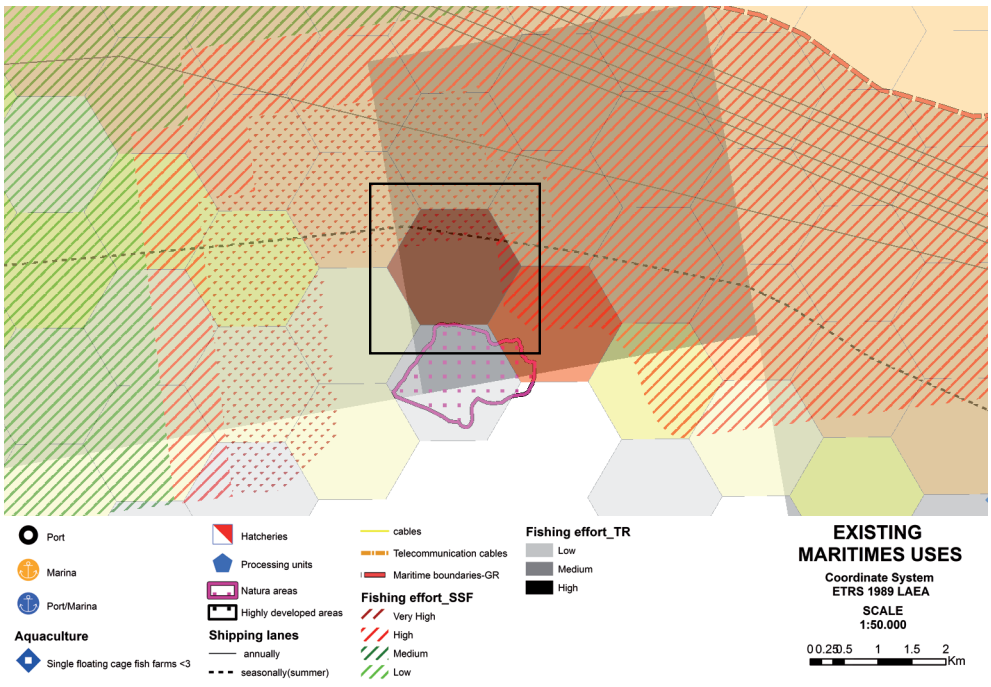


Figure 2.5-19: Identified Conflict Area 3

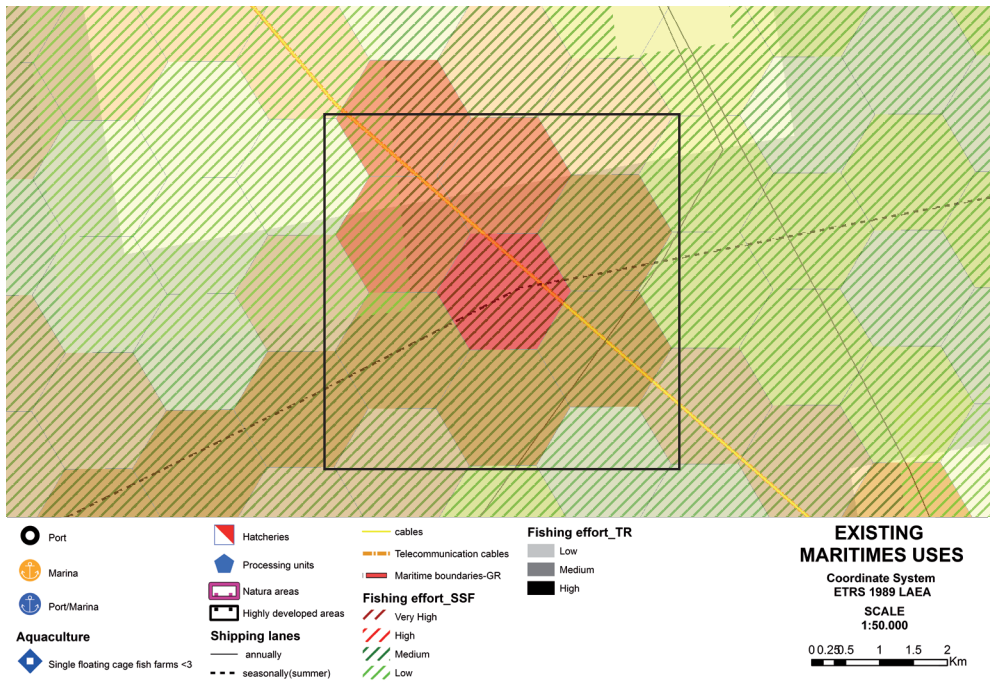


Figure 2.5-20: Identified Conflict Area 4

Apart from the existing activities, possible establishment of off shore wind farms, as well as hydrocarbon exploration and exploitation has been planned (Figure 2.5-22) in the northern part of Corfu Island. Hence, outcomes of the conflict analysis referring to the spatial management scenario in 2020 suggested that the area where the majority of conflicts would occur was that of the Diapontia Island complex (Fig. 2.5-21). At this point, however, it should be noted that particularly regarding the exploration of hydrocarbons, as it has been proposed in the 2nd International Licensing Round in 2014, three major Blocks (65 km^2 each) are foreseen in the Greek part of FA2. Yet,

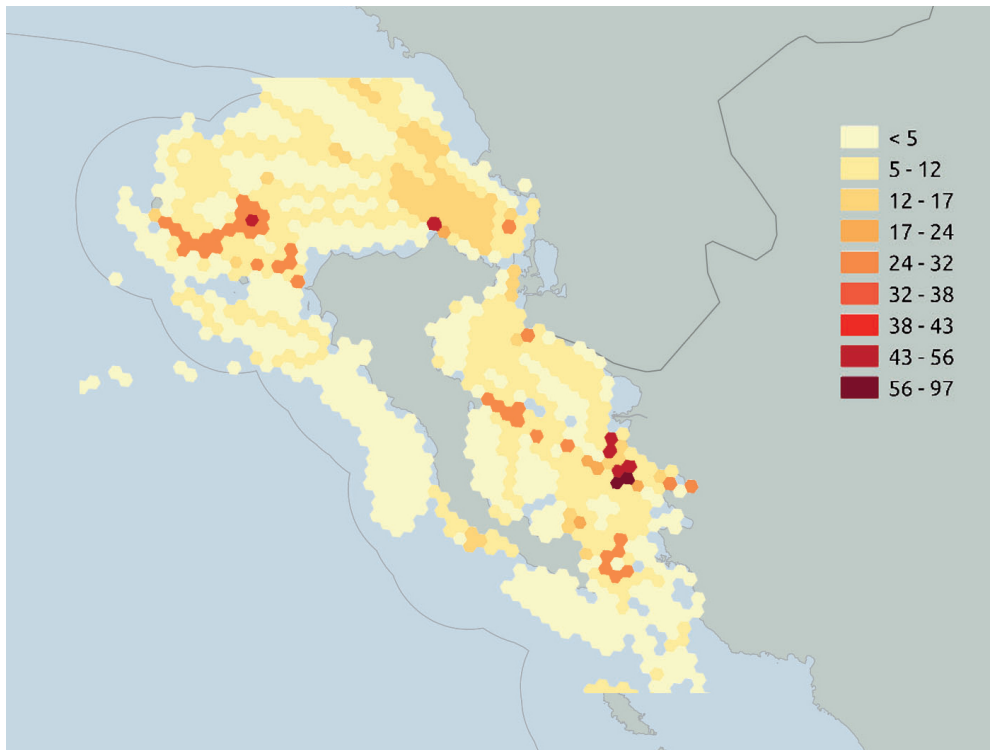


Figure 2.5-21: Map of the Greek part of FA2, showing the areas with high spatial interactions between human activities in 2014 (left) and in 2020 (right)

despite the fact that hydrocarbons were an activity incorporated in the current analysis, chances the Diapontia Islands plateau, being rather shallow and enclosed, and at the same time considered as an area of high conservation priority, to be included among the potential future areas for hydrocarbons exploration/exploitation are extremely feeble.

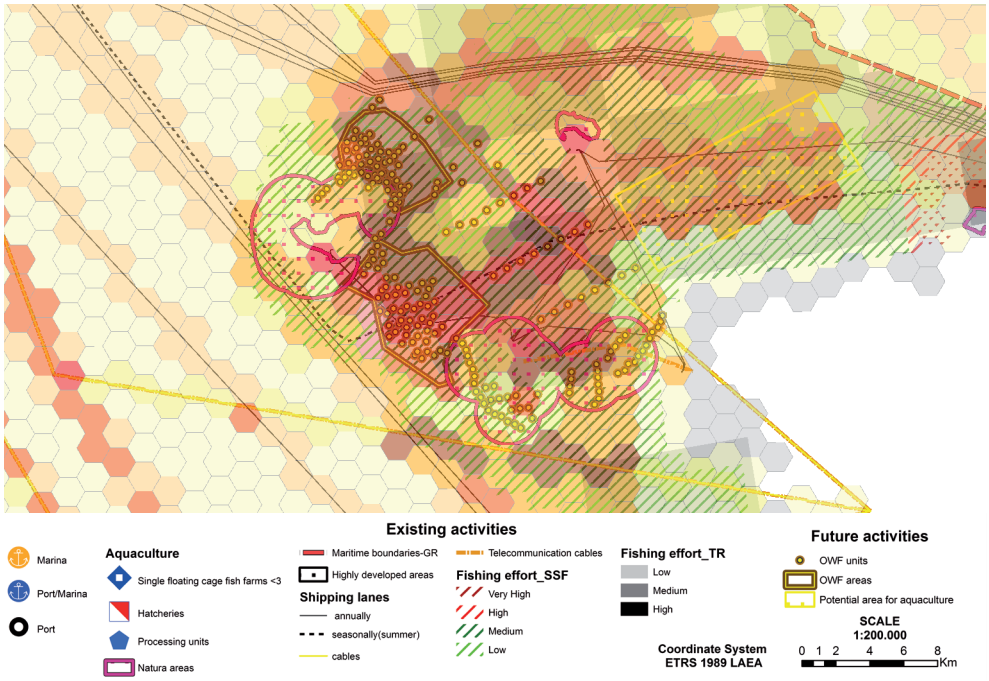


Figure 2.5-22: Area with potential future spatial interaction among human activities (i.e. in the 2020 scenario)

For what concern the analysis of cumulative impacts at 2014, outcomes suggested a great overlapping of activities and ecosystem components in the study area. The assessment of cumulative impact of existing activities on the key ecosystem components was rather high, mainly in coastal areas (Figure 2.5-23). Three areas could be identified as the most impacted. The first one is located in the area of Igoumenitsa (Area I), where essential fish habitats, sea grass meadows and monk seals seemed to have a high vulnerability to fishing pressure (from both trawling and small-scale fisheries) and then pollution from the Igoumenitsa port (Figure 2.5-23). In the central-eastern part of Corfu Island, off the city of Corfu, a second area (Area II) of high vulnerability was identified, as the Natura 2000 site established there, the essential fish habitats, as well as the monk seals seemed to have strong interactions with fishing activities (both medium and small scale) (Figure 2.5-23). Finally, the third area (Area III) was identified in the Diapontia Island complex, where almost all maritime activities had a strong effect on the key ecosystem components (essential fish habitats, Natura 2000 sites, monk seals, cetaceans). Indeed, in the case of the Diapontia complex, cumulative impact scores were higher as compared to the other areas, and considering the fact that this site constitutes an area of high importance, as it has been suggested as an Area of Special Spatial Interventions in the Reform of the Regional SP Framework of the Ionian Islands, should be considered as an area of high priority for the elaboration of a solid spatial management plan.

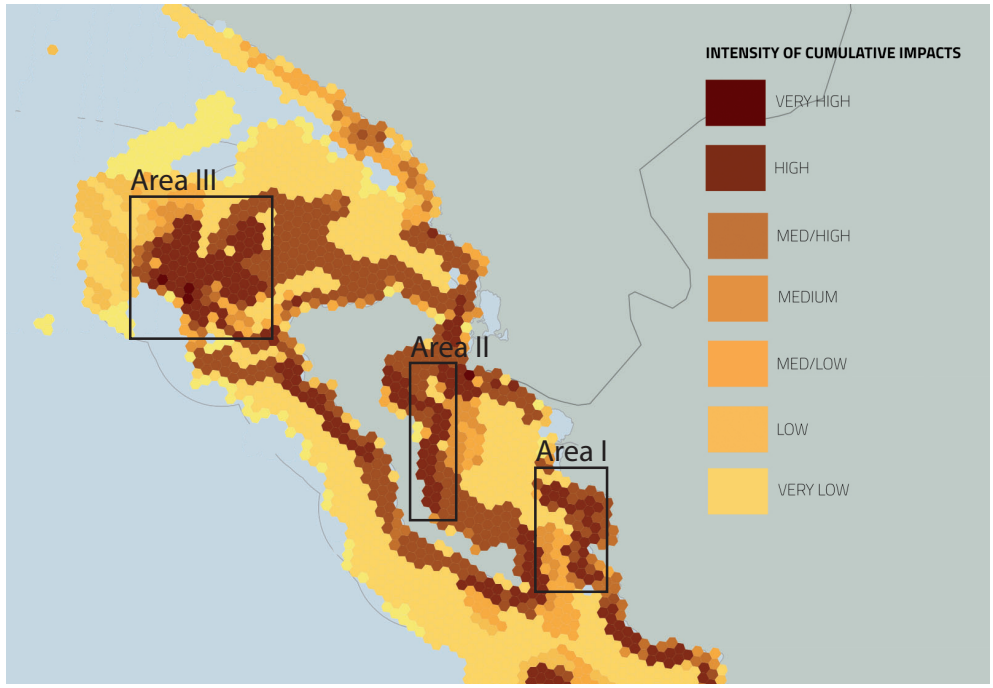


Figure 2.5-23: Map of the Greek part of FA2, where the four areas indicating high level of cumulative impacts between existing human activities and environmental components

In the frame of the ADRIPLAN project, an estimate of the impact of activities anticipated to take place in the area in 2020 on the key ecosystem components, considering their vulnerability to each one of them, was attempted. Indeed, potential future activities are planned in the already heavily impacted area of the Diapontia Islands complex (Figure 2.5-15). Nevertheless, in 2020 the application of cumulative impact assessment revealed that pressures on ecosystems would be more intense in the entire area of the Greek part of FA2 and not only in the northern parts. In Figure 2.5-24 the anticipated impact of activities on ecosystems is presented on the basis of the assumption that no spatial management actions will take place till 2020.

Once more, it is apparent, from the results of our analyses that the entire area, and especially the Diapontia Islands complex, needs an effective spatial management plan not only to minimize the possibilities of further deterioration of the status of the ecosystem but even improve existing conditions.

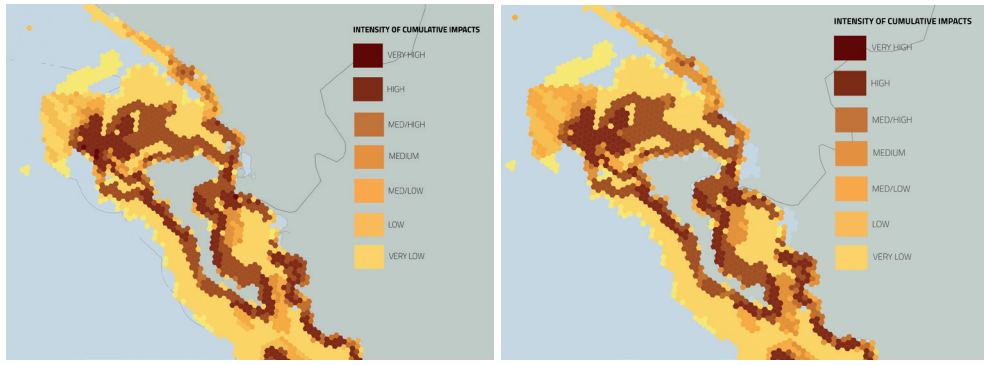


Figure 2.5-24: Map of the Greek part of FA2, showing the results of cumulative impact assessments in 2014 (left) and 2020 (right)

Supplementary Box 7: Application of Multi-Criteria Analysis in the Diapontia Islands complex

Multi Criteria Analysis (MCA) is a tool that contributes to solid decision-making as it is suitable for addressing complex ecological and socio-economic systems with high uncertainty, conflicting objectives and different interests among key stakeholder groups (J.R. San Cristobal, 2012). MCA is a transparent approach which involves interaction with stakeholders and through a clearly structured process priorities for future development/conservation in a specific area emerge enabling thus the planning activities, even at the pre-planning phase, to be efficiently organized.

Following the above, in FA2 MCA was applied to the Diapontia Islands complex aiming to capture stakeholders' perspectives in relation to a number of scenarios for planning future development in the area. Indeed, the specific site was chosen as it appears to be a highly impacted area due to pressures from existing, but also potential future activities, and at the same time it has been suggested as an Area of Special Spatial Interventions in the Reform of the Regional SP Framework of the Ionian Islands (Review and Specialized Regional Framework for Spatial Planning and Sustainable Development of the Region of Ionian Islands, 2014)).

For the application of the MCA in the selected location of FA2, the DEFINITE v.3.1 tool (decisions on a finite set of alternatives) (Janssen *et al., 2001)* was used. This software can be used to develop alternative scenarios, and in this case identify which alternative solution (i.e. anthropogenic activity) is the most suitable/sustainable for developing an effective spatial management plan in the area under study. At an initial stage, the scenarios developed considered single-sector activities including also a status quo scenario (i.e. the business as usual one) (Table a), and have been set based on the most possible activities to be developed in the area by 2020 consulting national experts and public administrators belonging to the ADRIPLAN stakeholder network.

In this case stakeholders were asked to evaluate which anthropogenic activity was more appropriate to be further developed in the area under study considering a number of criteria appearing in Table b. These criteria were common for all alternatives and were identified taking into account environmental, economic and social objectives/factors (Lasage, R., 2007).

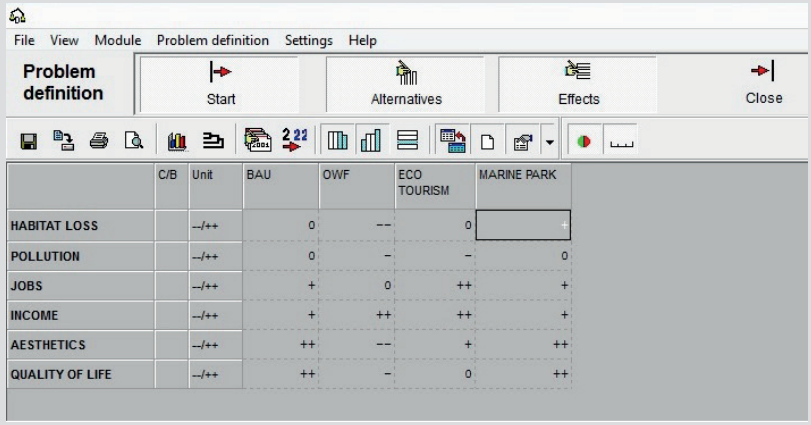
Scenarios	Abbreviation	Description
Business As Usual	BAU	Refers to keeping the same level of existing activities
Off shore wind farms	OWF	Refers to the potential development of off shore wind farms
Eco-tourism	ECO-TOURIMS	Refers to the further development of eco-tourism activities
Marine Park	MARINE PARK	Refers to the creation of a marine reserve with zoning where specific activities or combination of activities will be allowed

Table a Alternative scenarios selected for the MCA

Objectives	Criteria	Description/ Problem identification
Environmental	Habitat loss	Will the activity have a positive/negative/neutral effect on marine habitat loss in the study area?
	Pollution	Will the activity have a positive/negative/neutral effect on pollution events in the study area?
Economic	Income	Will the activity have a positive/negative/neutral effect on the income of local people?
	Jobs	Will the activity have a positive/negative/neutral effect on the creation of job opportunities for the local people?
Social	Aesthetics	Will the activity have a positive/negative/neutral effect on cultural issues (e.g. recreational space per habitat)
	Quality of life	Will the activity have a positive/negative/neutral effect on the quality of life of the local people (e.g. health)?

Table b. Objectives/criteria selected for the MCA

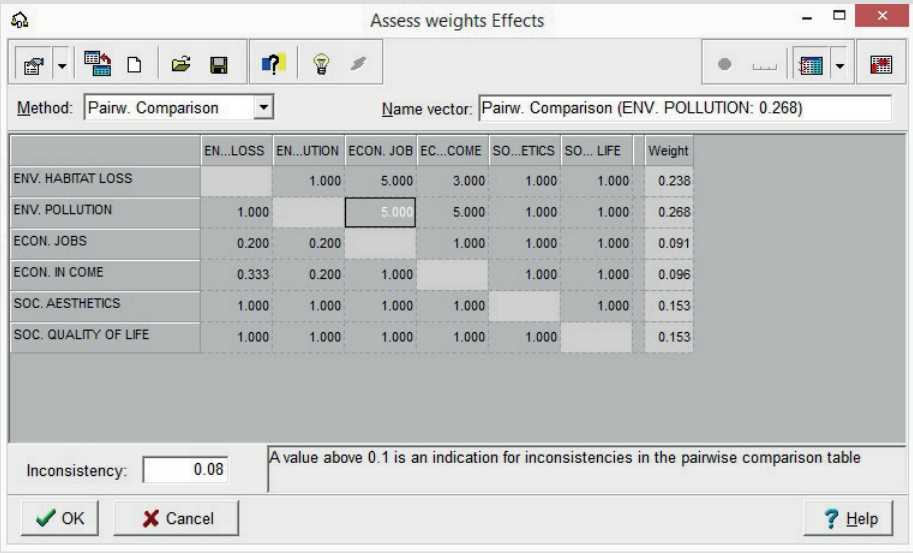
An impact matrix of the different alternative scenarios was constructed considering the abovementioned criteria after consulting the stakeholder groups involved in the Greek FA2 study area (Table c). In this case due to the lack of quantitative information, a qualitative five level scale was used where "- -" indicated a very negative effect, "-" a negative effect, "0" no effect, "+" a positive effect, and " + + " a very positive effect.



	C/B	Unit	BAU	OWF	ECO TOURISM	MARINE PARK
HABITAT LOSS		--/++	0	--	0	+
POLLUTION		--/++	0	-	-	0
JOBS		--/++	+	0	++	+
INCOME		--/++	+	++	++	+
AESTHETICS		--/++	++	--	+	++
QUALITY OF LIFE		--/++	++	-	0	++

Table 3: Matrix assigning scores in each pair of scenarios/ criteria after consultation with the group of stakeholders

Then, pairwise comparison was carried out between the set of alternatives scenarios in relation to each criterion. The Saaty scale was used and indicated which criterion was more important on the basis of a scale of 1 to 9 (where 1=equally important and 9=extremely more important) after consultation with stakeholders (scientific experts and public administrators) involved in the process. In DEFINITE the scores are automatically translated into weights that add up to a total of 1 (Table d).



	EN...LOSS	EN...UTION	ECON. JOB	EC...COME	SO...ETICS	SO... LIFE	Weight
ENV. HABITAT LOSS		1.000	5.000	3.000	1.000	1.000	0.238
ENV. POLLUTION	1.000		5.000	5.000	1.000	1.000	0.268
ECON. JOBS	0.200	0.200		1.000	1.000	1.000	0.091
ECON. IN COME	0.333	0.200	1.000		1.000	1.000	0.096
SOC. AESTHETICS	1.000	1.000	1.000	1.000		1.000	0.153
SOC. QUALITY OF LIFE	1.000	1.000	1.000	1.000	1.000		0.153

Table d: Weights assigned for each criterion by the software

MCA results showed that the establishment of a Marine Park in the area by 2020 (Figure m) was the best scenario based on the criteria selected, followed by the "Business As Usual" (BAU) scenario. However, as there is high subjectivity in the scoring process, and the number of stakeholders involved in this exercise was rather limited (<10) these results should be treated as preliminary and purely indicative..

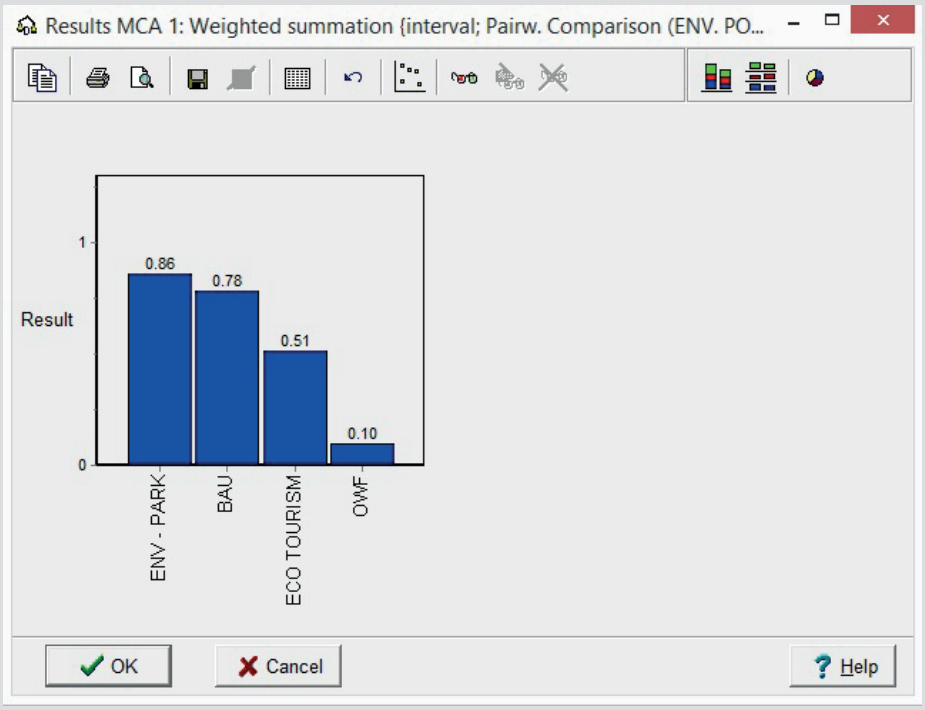


Figure m. Results of the MCA performed on exploring planning alternatives in the Diapontia Islands.

Measure 3 – Cross border regulation for fishery and aquaculture in the south-eastern part of FA2

Further to the above in the south-eastern part of FA2, two examples of cross-border planning issues, one referring to aquaculture activities and the other to fishery ones, were explored.

a. Aquaculture activities

1 – Problem definition

A first spatial management issue to be considered is related to disputes possibly emerging from the need to promote spatial expansion which is required to enable the development of aquaculture sector in Greece.

Aquaculture is a flourishing sector in the Adriatic Ionian Macroregion (AIR) and its importance in the economic growth of the area is vividly highlighted under the EUSAIR Pillar I: Blue Growth. Greece has already a well-developed aquaculture activity and the highest production in relation to the other AIR countries (source: http://www.medmaritimeprojects.eu/section/med-iamer-redirect/outputs). A number of units are placed in the Greek Ionian Sea, few of which close to the transnational waters with Albania. The latter country has a rather limited development of aquaculture, but substantial progress has been made in recent years, particularly in the southern part close to the Greek border.

In detail, in Greek territorial waters of FA2, there are several existing aquaculture units, while areas for the establishment of new units have been defined through the "*Special Framework for Spatial Planning and Sustainable Development for aquaculture and its strategic environmental impact assessment*" (Greek Government Gazette B' 2505/2011). Existing aquaculture units spread along the coasts of Thesprotia (Sagadia-Kalamas), where they have been successfully operating for several years (Figure 2.5-25), while there is another aquaculture unit off the North-East coasts of Corfu (off Kassiopi). Moreover, according to the aforementioned framework (GGG B'2505/2011), new areas of potential aquaculture development have been proposed (Figure 2.5-25).

As for Albania, and particularly the southern part of the country adjacent to the Greek maritime boundaries, there are already a few units operating (source: Fishery & Aquaculture Policies Sector, Ministry of Agriculture, Rural Development & Water Administration, Albania; Google earth). Moreover, the Albanian Ministry of Agriculture, Rural Development & Water Administration is currently preparing the new legislation regarding aquaculture, with the pivotal contribution of GFCM, which will explicitly address issues related to allocation zones for aquaculture (AZA) (M. Cobani, personal communication).

2– SMART objective identification

From a planning perspective, a major objective is related to the location of future aquaculture facilities. These have to be properly planned and managed outside protected areas and under an EBM approach. In parallel to the planning process, however, enhancing cross-border collaboration between Greece and Albania requires the establishment of bilateral policy agreements that will provide a solid legal platform and promote such investments.

3 - Draft of the Planning Measure

Within ADRIPLAN and particularly through interactions between Greek and Albanian stakeholders, an area of potential cross-border collaboration for future development has been identified (Figure 2.5-25). However, precise designation of the cross-border AZA between Greece and Albania is needed. Towards this direction, the proposed area identified within ADRIPLAN, could be further discussed in a stakeholder meeting that has been scheduled by the Albanian authorities to take place in autumn 2015 (M. Cobani, personal communication). Development of cross-border collaboration urges for policy agreements between the two countries. Moreover, as it has been identified by EUSAIR (Action Plan, 2014), under pillar I (Blue Growth), a number of barriers, although not explicitly of a transboundary nature, still prevent the development of the full potential of aquaculture, amongst which the most important are: (a) limited access to space and licensing; (b) industry fragmentation; (c) limited access to seed capital or loans for innovation; and (d) time-consuming administrative procedures. Finally, the proposed area for cross-border aquaculture development falls within the Corfu strait, where international agreements for navigation/shipping are valid under UNCLOS, imposing the safeguarding of the right of transit passage for vessels of all states and should be considered during elaboration of possible plans.

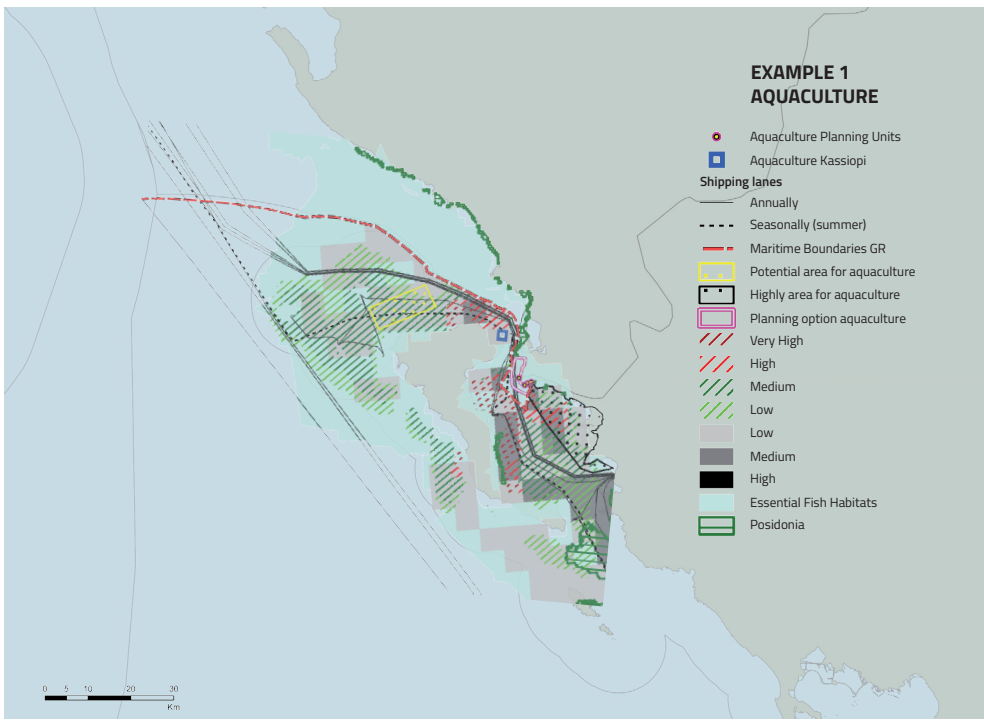


Figure 2.5-25: Map indicating areas of existing (black dotted zone) and planned aquaculture sites (yellow dotted zone), and a proposal for cross-border development (purple lined zone)

b. Fishery activities

1 – Problem definition

Regarding the second cross-border planning issue that was explored in the south-eastern part of FA2 was related to fishery activities and particularly to the lack of transboundary cooperation among states, i.e. Greece, Italy and Albania, whose fishing vessels operate in common grounds. As a consequence, intra-sectoral conflicts related to the exploitation of shared fishing stocks emerge. Fishery is a traditional activity in all three neighbouring countries (Albania, Greece and Italy) of the ADRIPLAN FA2. The main types of fishing fleets operating in cross-border areas are trawlers and small-scale fishing vessels (i.e. gill-neters, long liners and sword-fish long liners). Both in Greece and in Italy, fisheries are being regulated by national and EU legislation, whereas, since Albania is a non-EU country, only national legislation is imposed.

With respect to Greece, territorial waters are limited to 6 nm. Due to that fact, other fishing fleets have the legal right to operate in marine are as within the 6 to 12 nm zone, as they are still international waters, and hence stocks being fished there are considered as "shared stocks". In addition, national legislations on fisheries differ amongst the three countries. According to the Greek legislation, trawling is prohibited each year from May 23rd till September 30th, both in national and international waters. Yet, this is not the case for the Italian trawling fleet, with Italian trawlers operating in international waters that are in the proximity of the Greek territorial ones throughout the year (source: http://www.marinetraffic.org/).

2 – SMART objectives identification

For what concerns the definition of SMART objectives, the following needs emerge:

Different socio-economic, spatial and temporal aspects related to fishery activities in the three countries should be characterized and analyzed in detail.

Essential Fish Habitats (i.e. spawning and nursery grounds) in the area should be identified.

To enhance cross-border cooperation suitable policy agreements need to be in place along with an effective enforcement mechanism.

3 – Draft of the planning proposal

Following the above, a specific area lying in international waters west of the Corfu Island (Figure 2.5-26- Area 1) has been identified by Greek fishermen during the stakeholders' consultation process as a fishing ground where Italian trawlers operate to exploit deep-water red shrimp. As the latter can operate in these waters even during summer months, when the activity of Greek vessels is banned, Greek fishermen consider this as unfair competition for shared resources and seek for cross-border spatio-temporal management measures. What is more, in the Lecce stakeholder workshop organized within ADRIPLAN, another fishing ground in Greek territorial waters was indicated by the representative of the Department of Fisheries of the Ionian Islands Region as an area where Italian trawlers fish illegally for mixed demersal resources (Figure 2.5-26- Area 2). Moreover, off the north and north-east part of Corfu, Greek fishermen have identified fishing grounds either in international water where vessels of the three neighboring countries operate (Figure 2.5-26- Area 3), or in Greek

territorial waters (Figure 2.5-26- Area 4&5) where Albanian small-scale fishing vessels operate illegally. Taking into account that one of the aims of the EUSAIR Pillar I is "*to promote sustainable and responsible fishing practices*", through "*adopting fisheries management plans at sea basin level*" and "*harmonising standards across the Region*", it is important to move towards the achievement of bilateral/trilateral fisheries policy agreements in the area, and meanwhile proceed with the effective enforcement of existing management measures.

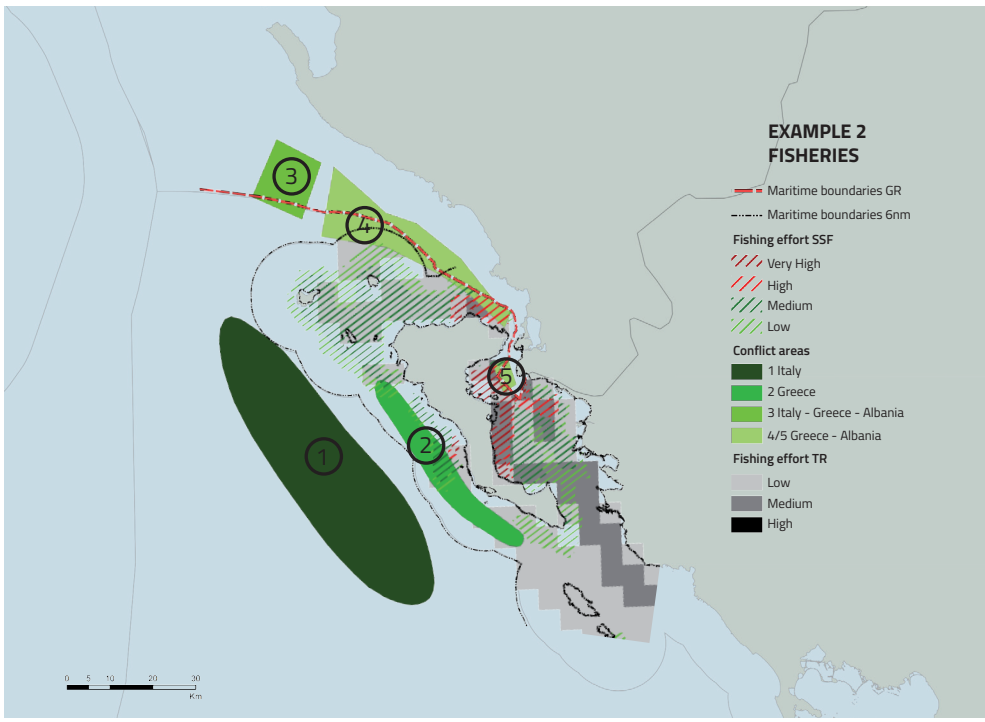


Figure 2.5-26: Map indicating areas where the Greek fishing fleet operates within the Greek territorial waters (grey-gradient for trawlers and lined areas for small-scale fisheries). Five areas (in green), indicated by Greek stakeholders of the fishery sector as areas where vessels of the three neighbouring countries compete for shared resources, are outlined

PART III
Lesson learned and future challenges

3.1 Environmental and socio-economic benefits from MSP in the Adriatic-Ionian Region

The aim of this section is to present the environmental and socio-economic benefits coming out from the MSP approach adopted to the AIR in order to quantify the success of the project itself.

Benefits have been coming out from the results achieved and the recommendations arisen from the project, as explained hereafter.

The MSP approach developed in ADRIPLAN, adopted an integrated perspective for the entire macro-region and the two Focus Areas, contributing thus to the four pillars of sustainable development (society, economic development, environmental protection and governance). Through this integrated approach, ADRIPLAN produced the following outputs, which can be converted into valuable recommendations for similar future exercises and initiatives, taking the vision, protection and development of the entire macroregion a few steps towards Blue Growth. More specifically, an effective and adjustable MSP methodology has been developed based on a consistent step by step approach, including a socio-economic analysis and analysis of the environmental cumulative impacts that in turn have led to the identification of synergies and conflicts among pivotal maritime uses and the formulation of planning options. Part of the methodology has been the continuous stakeholder involvement providing data, suggestions and evaluating the procedure and its results. Stakeholders have indeed an important role in transboundary MSP, as they represent the various user and interest groups active in the planning area, from statutory, regulatory and non-statutory perspectives (TPE good practice guide, 2014). This exercise has led to an enhancement of the role of local administrations that have contributed with data provision, stakeholder engagement and to the improvement of a scientific networking among different disciplines interested in coastal and maritime issues. MSP may benefit from the involvement of scientific organizations, which can provide expert knowledge and a good understanding of transboundary dynamics. Additionally, the effective data management and integration has led to the development of a easily used data tool linked also to existing databases and providing spatial and coherent information for the entire Adriatic-Ionian macroregion (ADRIPLAN Data Portal, data.adriplan.eu). Moreover, the ecosystem based approach adopted and the incorporation of the Integrated Coastal Zone Management principles for the MSP exercise has contributed to the improvement of the analysis between land and interactions and influences on the marine environment and the enhancement of cross-border cooperation for governing transboundary maritime issues among the Adriatic-Ionian countries according to specific MSP principles. Finally, the MSP process has taken into account the European, Mediterranean and Adriatic-Ionian Regional policy recommendations, such as the MSFD, Barcelona Convention and has been in line with the EUSAIR Action Plan and related initiatives contributing thus to an integrated vision on a regional, Mediterranean and European level.

It is on the basis of stakeholders' involvement, earlier mentioned, that the project also identified some possible measures/potential actions. They have been identified as examples, not developed but included as indications for future actions planning.

Considering the above mentioned recommendations arisen from the project and according to Ehler and Douver (2009), the environmental and socio-economic benefits from the macroregional scale and the pilot actions identified, are presented below. Note that some benefits also fall back to the terrestrial areas hosting the economic activities that go to the sea.

Benefits derived from the macroregional strategic planning

From a macroregional point of view, MSP social and economic benefits could be attributed both to the planning and implementation phase. More specifically, a basis for the future planning framework of the macroregion has been set, encompassing the interests and gaining public acceptance. In this respect, the socioeconomic benefits of the trade-offs among sectors and the public acceptance of planning measures will reach the highest possible levels.

Additionally, through the analysis of overlapping uses, the mutually exclusive uses have been spotted while uses hat could create synergies have been highlighted and spatially defined. Moreover, concentration of uses has been for the entire macroregion highlighting the marine areas that offer opportunities for new investments in Blue Economy activities. Furthermore, the socioeconomic analysis undertaken by ADRIPLAN provides a better understanding of the competitive advantages of the region within a globalized economy while the analysis in a subregional level highlighted the strengths and weaknesses of Blue Economy.

Concerning the environmental benefits, the MSP integrated approach adopted in Adriplan, can provide benefits in quantification of the descriptors of the Good Environmental Status required by the MSFD. In particular at the macroregional scale MSP can identify protected areas of important ecological values (e.g. Apulia region), thus preserving biodiversity; places important for well-being of fish (spawning and nursery areas), thus contributing to keep the population of commercially exploited fish and shellfish within the biological limits. Whenever the data portal would acquire further environmental information, MSP would provide: habitats necessary for maintenance of food web, thus ensuring long-term abundance of the species of the marine food webs; areas affected by eutrophication, thus minimizing human-induced eutrophication; sea floor integrity, safeguarding benthic ecosystem; hydrographical conditions in order to not adversely affect marine ecosystems; underwater noise control in order to avoid negative effects on the marine ecosystems.

Benefits derived from the pilot actions

The environmental and socio-economic benefits arisen from the possible carrying out of the pilot actions identified, have been presented in the table below.

Pilot action	Socioeconomic Benefits	Environmental benefits	Related Uses
FA1			
PCI: Italy – Slovenia interconnection between Salgareda (IT) and Divača-Bericevo region (SI). The main objective of the project is to integrate the Italian High Voltage Direct Current of 1000MW with	- The new position is providing a fertile ground for the development of coastal tourism activities, which under the initial position could be negatively affected. - By adopting the new underwater route of the cable, the probability of adverse effects on fishing activities, due to possible spatial restrictions, is	The new proposal of location of the electricity cable will have benefits on Natura 2000 sites, thus preserving biodiversity.	Underwater Energy Cables Fisheries MPA Archeological Sites Coastal Tourism

other European electric Networks through an submarine cable with a length of approximately 150-200 Km	reduced. Therefore, the action is beneficial for local fishermen as it is better protecting their total production and incomes. - The new location does not pose threat on the underwater archeological sites of the area keeping tourism, the capital sector of the region, unchanged. - The proposed action is rather cost efficient, as the repositioning of the cable is not linked to a substantial increase of its length. The proposed change retains all the benefits linked to the current project such as lower electricity rates for households and enterprises while at the same time reduces the negative externalities associated with the initial plan.		
Positioned 8 miles offshore, the offshore platform will be protected by a 4.2km long breakwater dam, which will shelter an oil terminal and a container Terminal able to accommodate up to three latest generation container ships at the same time	When the terminal begun its operation the shipping lanes, which are currently passing through Lido entrance, will become sparser and fishing attention areas in the area northeast to the new terminal could be developed. The new fishing zones will result to a more efficient and effective fishing activity thus increasing the income of fishermen and the employment in the fisheries sector.	The proposal of the offshore platform foresees the allocation of compensation areas corresponding to spawning and nursery areas, thus contributing to keep the population of commercially exploited fish and shellfish within the biological limits.	Maritime Transport Ports Fisheries
Pilot action	**Socioeconomic Benefits**	**Environmental benefits**	**Related Uses**
FA2			
Fishery - intra-sectoral conflict related to the exploitation of shared fishing stocks by neighboring fleets. Aquaculture - spatial expansion is required for further	**Fishery** The action will have a positive impact on the production possibilities of local fishermen since the rationalization of fishing activities in the area and the prevention of illegal fishing will lead the sector to more sustainable operational standards. **Aquaculture**	Sustainable fishery and aquaculture will have benefits on the environment in terms of maintaining sea floor integrity and limit contamination.	Fishery Aquaculture

Table 3.1-1: Benefits of the pilot actions

3.2 Monitoring and evaluating MSP implementation in the Adriatic-Ionian Region

3.2.1 Evaluation criteria and indicators for MSP implementation

This paragraph refers to the "in itinere Assessment", which is related to the evaluation of the implementation of the planning proposal elaborated during the planning phase. More specifically, it refers to the monitoring and evaluation of the advancements of the plan's implementation, and the plan against its objectives and the achievements because of the plan. Taking this into account and considering the existing practices, a general framework for monitoring and evaluation can be proposed as illustrated in figure 3.2-1, including the adaptation phase (described in the following section).

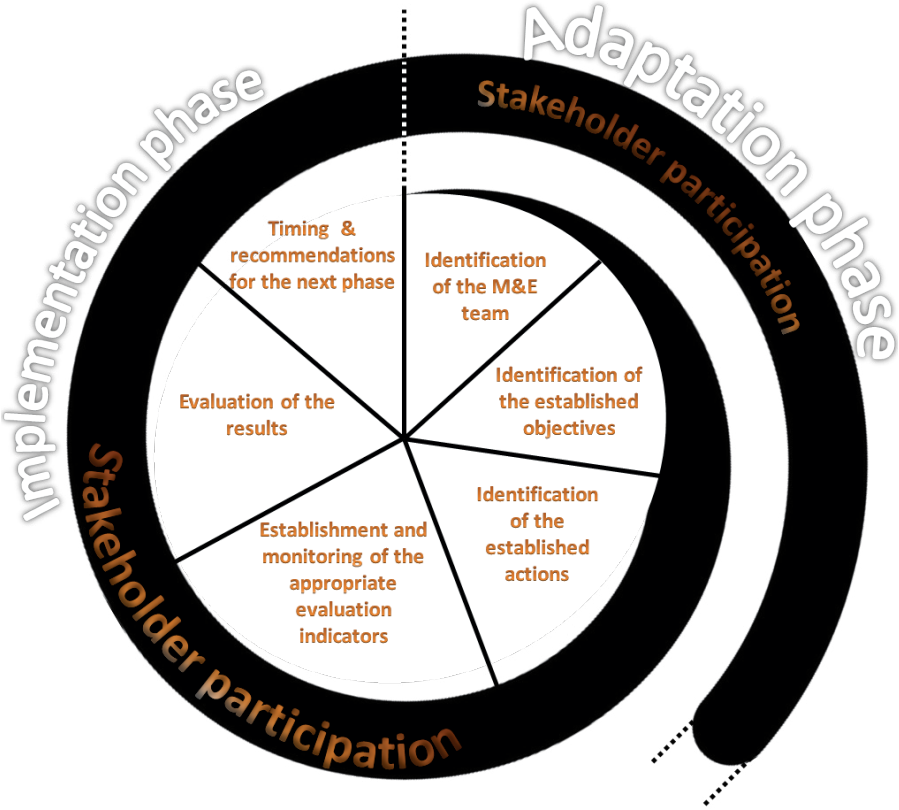


Figure 3.2-1: Proposed steps for a monitoring & evaluation process

The different phases of the evaluation are:

Identification of the Monitoring and Evaluation team

The monitoring and evaluation team could consist of relevant experts related to maritime issues that have the competences to improve the implementation process.

Some indications for possible members are the:

- Scientific team involved in the maritime spatial planning process representing different scientific backgrounds. During the planning process a series of scientific institutions have been contributing representing Universities and research centers.
- Stakeholders involved in the maritime spatial planning process. For ADRIPLAN, institutional partners, representing the different Adriatic-Ionian countries, with varying competences at a national, regional and local level.
- Experts related to data management and information processing
- Experts from the public/private sector familiar with the MSP process
- Other relevant experts representing international, EU, Mediterranean and sub-regional institutions, initiatives, arrangement etc.

A monitoring and evaluation team should not consist of more than 15 people and should be adaptable to changes (addition and/or replacement of team members if considered relevant).

Identification of the established objectives

A list of clear objectives for the plan's implementation could contribute to reducing uncertainty and improve the implementation process. Therefore, their clear identification during the implementation phase could help measure their performance. It should be noted that ADRIPLAN has adopted the development of SMART (Specific, Measurable, Achievable, Relevant, Time-bound) objectives during the planning phase. However, their revisit is essential for the improvement of their performance during the implementation process.

Identification of the established actions

For each established objective, there is at least one identified action or a set of actions whose implementation should achieve the objective. In ADRIPLAN, each planning action is linked to the problem definition and SMART objectives to be possibly achieved by the proposed pilot action, and accompanied by the measure description, time frame definition, rationale, possible implementation tools and related actors for its implementation. The evaluation of these actions relate to the measures (regulatory, sectoral etc.) that will be taken for their implementation and the competent authority to ensure their implementation. Such actions also refer to the specification of human activities in the implementation areas, the type of development for these activities as well as their temporal and spatial boundaries.

Establishment and monitoring of appropriate evaluation indicators

This task follows a specific focus on the development of possible evaluation criteria and indicators which can be used for the evaluation of the plan's implementation while the principles established by the ecosystem-based approach foreseen by MSP (as explained in the methodology) have been considered, namely adaptive, ecosystem based, integrated, participatory, strategic and future oriented, place-based and transboundary.

Concerning the type of such criteria and indicators, a harmonized conceptual framework related to monitoring and evaluation is proposed related to all phases, namely planning (task 1.3.5 of the project), implementation and adaptation phase (task 1.4 of the project). The criteria are: effectiveness (in terms of process and objectives); efficiency (adequacy of the human, financial, technical, institutional resources); inclusiveness (involvement of relevant stakeholders); transparency (accountability and

dissemination of each phase all the stakeholders involved) while the proposed indicators will refer to three types:

- State indicators: connected to the state of system, they assess general state conditions and trends;
- Process indicators: they assess how well each phase of the process is run, evaluating its capacity to achieved the operational objectives set for each phase;
- Performance indicators: they measure how well a project/action/measure is accomplishing their intended result, by comparing the results obtained to the situation beforehand (Ehler, 2014).

These types of indicators cover also social, economic, environmental and governance aspects, incorporating, thus, an integrated and sustainable approach during the evaluation process, ranging from quantitative to qualitative indicators. It should be noted that this is an indicative list of proposed indicators according to the existing knowledge provided by similar initiatives and recommendations derived during the planning process of the project. The sets of indicators could be adjusted, including sub-indicators and reorganized, according to the plan's needs and priorities. For example, socio-economic and ecological sub-indicators such as those proposed by UNESCO/IOC (2006) are proposed in order to assess the state of the environment. Moreover, in the context of the ADRIPLAN project and the method and indicators developed for analyzing cumulative impacts and overlapping activities (COEXIST methodology and Maritime Socio-economic Index) can be used as state (sub)indicators for assessing the particular conditions of the environment during the implementation period.

The proposed indicators can be organised according to six main sets. These are:

- Integration referring to the thematic (social, economic, environmental) and geographic (spatial coverage, land and sea interface) integration of the MSP implementation.
- Setting of objectives by re-confirming that implementation objectives are well specified and updated.
- Governance referring to transboundary issues, governance structures for enhancing coordinated actions among the countries of the macroregion, engaging relevant stakeholders, ensure dissemination and awareness raising
- Setting of actions relating to the achievement of the proposed implementation actions and the mechanisms put in place to ensure their implementation as well as their estimated short-term and long-term impacts.
- Adaptation referring to the foreseen monitoring and evaluation processes set during the implementation procedure including the review of the proposed time frame, alternative scenarios, actions and evaluation team.
- Data relating to the overall data management and availability, including quality, timeliness and accessibility.

Set	Criteria	Indicators
1. Integration (thematic, geographic, policy)	Balance and correlation among the social, economic and environmental aspects	Proportion of social, economic and environmental issues addressed
	Typology of dynamics of maritime uses	Synergies and conflicts identified among maritime uses
	Overlapping of uses over space and time	Level of identified intensity (in socio-economic and environmental terms)
	Cumulative impacts over space and time	Number of areas with cumulative impacts (socio-economic and environmental pressures)
	Policy frameworks for coastal and maritime planning	Proportion of coastal and maritime issues for which policy frameworks are in place
	Integration between coastal and maritime issues	Consistency between MSP and ICZM and terrestrial planning
	Policy effectiveness of MSP	Policy frameworks created (after its implementation)
	Transboundary integration	Level of consideration of differences among involved countries (legal, administrative, planning framework)
	Adherence to related policy frameworks	Level of incorporation of related policies
	Ecosystem-based approach	Ecosystem scale matching the scale of the plan
2. Objectives	Identification of objectives	Objectives clearly defined for the MSP implementation
	Number of SMART objectives identified	Number of specific objectives
	Acceptance of objectives during the implementation process	Proportion of objectives gaining satisfactory or higher score in participant evaluation
	Spatial definition of objectives	Identification of hot spots
3. Governance	Transboundary character of the established actions	Number of actions with transboundary character
	Stakeholder involvement in plan implementation	Representativeness-ratio of participating versus potential stakeholders as identified by stakeholder analysis
		Level of satisfaction
	Awareness plans put in place	Number of awareness plans
	Wider communication of planning outputs	Number of publications (reports, press releases etc) for wider public information
		Clear and useful facilitation
	Cross-border cooperation: legal and administrative provision	Legal instruments requiring/promoting cross-border cooperation in MSP activities

4. Actions	Interlinkage of proposed actions	Number of linkages identified
	Existing or foreseen supporting structures /mechanisms for the actions' effective implementation	Number of structures /mechanisms
	Financing mechanisms for its implementation	Number of mechanisms
	Estimated impact of the plan's implementation	Development of an impact assessment
	Effectiveness of actions in addressing perceived needs and opportunities	Regional and local plans especially regarding coastal and environmental protection, introducing indication on MSP in their normative annexes

Table 3.2-1: Criteria and indicators during the MSP implementation phase

Evaluation of the results

The final elaboration of the evaluation results involves data analysis and interpretation including the identification of possible trends, possible categorizations, the identification of relationships among different types of information, the development of an overall performance assessment, the identification of potential problems and their possible solutions, the formulation of recommendations and best practices for decision-making and management.

Timing and recommendations for the next evaluation phase

A short term revision of the implementation plan is proposed in two years after its completion. This step provides a summary of recommendations, which can be incorporated and taken into account for the next phase of the evaluation, namely the adaptation of the planning procedure.

The proposed recommendations could include lessons learned by the evaluation performed during the implementation process, which relate to the process itself, the involved evaluation team, the implementation objectives, targets and actions, the stakeholder involvement and dissemination strategies.

It should be noted that stakeholder involvement should be put in place throughout the whole monitoring and evaluation process in order to ensure accountability, credibility and transparency of the performance evaluation results. Stakeholders could act as essential support providing conflict solution alternatives when setting an evaluation procedure, selecting and guiding the evaluating team, selecting the system of the evaluation indicators, review the evaluation results and more importantly disseminating the evaluation process and results.

3.2.2 Reccomendations for an evaluation process

This chapter aims at providing useful recommendations to adapt the planning process to emerging issues considering also the existing and possible policies, visions and governance structures put in place in a European, Mediterranean and sub-regional level. It refers to the "ex post Assessment" related to the revision of the planning

targets and objectives and to the re-elaboration of the plan for the second round of the planning process.

The recommendations described below have taken into account the suggestions and considerations provided by stakeholders and observers during the planning process in order to achieve the evaluation effectiveness and improve the evaluation structures. The issues of scale and integration of transboundary activities have also been taken into account considering the Adriatic-Ionian macroregion and the two Focus Areas.

The modifications proposed by an ex-post evaluation should be considered as part of the plan revision contributing to the next planning process. In this respect, the entire process, from the planning phase until its adaptation takes a continuous form following the principles of an adaptive approach. Therefore, the suggested tasks include the re-assessment of the implementation process, the evaluation of objectives' and actions' performance by adjusting the proposed list of criteria and indicators (table 1.4.10), the review and updating of the available data and information, the elaboration of sources re-allocation, the communication and elaboration of results with the stakeholders and the provision of recommendations. The tasks proposed here are similar to the steps described during the 'in itinere assessment' described above. However, here, hints can also been found about the changes in behavior of human maritime activities towards the desired future planning vision.

Special emphasis should be given at the MSP targets and objectives, assessing whether these have been achieved according to the foreseen time frame and with a reasonable cost against socio-economic and environmental benefits. Sometimes, the planning phase sets objectives too ambitious to achieve, especially in the short term. Additionally, the established actions should be reviewed addressing their cost effectiveness also in terms of their geographic distribution and end users that these refer to. Alternative combinations and projects should then be considered against the initial strategies. The achievement of desired outcomes is also linked to the achieved actions because the type and level of a proposed intervention or protection measure should be reconsidered according to the desired outcome.

Moreover, the acquisition of updated information should be an integral part of the ex-post evaluation. Any uncertainties or lack of sufficient data and information during the planning and implementation process could be reviewed and updated. In some cases, the process could also require data collection and applied research. In the long run, this type of commitment to data management will lead to the development of data sets extended back to decades contributing thus to a better understanding of the impacts generated by human activities against natural processes taking place in the marine environment.

Furthermore, the process of re-evaluating the financial resources for maritime spatial planning and implementation is very similar to reviewing the plan's targets and objectives. When funding opportunities identified during the implementation are no longer considered sufficient then alternative opportunities should be sought. This re-visiting of funding opportunities should not only include the search of alternative resources coming from different financing mechanisms (e.g. governmental budgets, grants and donations by the private sector, sectoral revenues etc). The establishment of a sustainable funding strategy for the plan's implementation should be developed including environmental, social, political and economic conditions in the countries surrounding the Adriatic-Ionian region. The transboundary character of such financing mechanisms is a major challenge for such an exercise because of the different conditions taking place in each country as well as the barriers in coordinating a funding strategy

supported by these different national conditions. For example, the lack of legislation for establishing funding mechanisms could jeopardize MSP in case of lack of resources. Additionally, it is fundamental that this kind of strategy will include a combination of funding mechanisms supporting different objectives and their respective actions.

Concerning the timing issue, the proposed timing for the ex-post evaluation and revision of the planning process is 6 years after the project implementation which is reasonable period for the plan's implementation period in order to assess the outcomes of its performance and revisit the plan during the adaptation phase.

In terms of stakeholder participation, the established evaluation team, the planning and management team and the relevant stakeholders affected by the MSP implementation should be involved again throughout the entire process of ex-post evaluation towards the plan adaptation by collecting the lessons learned by the evaluation results, interpret them according to the revised vision for a successful maritime spatial planning in the area. An important part of this process is also the communication of the proposed revision to the wider audience, including the target audiences in order to ensure transparency and accountability.

Finally, it should be stressed that the evaluation process has drawn from relevant governance arrangements, initiatives and policy frameworks related to coastal and maritime issues as these have been identified also through the ADRIPLAN project. More specifically, a series of legal and policy frameworks have been identified that play a key role in affecting maritime spatial planning in the Adriatic-Ionian macro-region such as the United Nations Convention on the Law of the Sea (UNCLOS), the Barcelona Convention (BC), the EU Directive on establishing a framework for maritime spatial planning (MSP), Marine Strategy Framework Directive (MSFD) and Water Framework Directive (WFD), the RAMSAR Convention (RC) and European Landscape Convention (ELC) in a European and Mediterranean context and the EU Strategy for the Adriatic-Ionian Region (EUSAIR) and Adriatic-Ionian Initiative in a sub-regional level. The continuous consideration of these frameworks' vision and objectives and the close cooperation (through their participation) throughout the whole monitoring and evaluation process is essential for achieving a coordinated and adaptive management and planning procedure for the Adriatic-Ionian Region.

3.3 Data needs and tools for MSP in Adriatic-Ionian Region

The discovery and collection of data in an MSP process is an expensive task and can take large amounts of time and resources. Despite all the efforts that can be taken, it won't be possible to collect all the data available at the maximum detail for all the investigated areas and not all the data collected will be useful for the scope of maritime spatial planning; so careful selection is needed. A general rule is that data should be up-to-date, objective, reliable, relevant and comparable

3.3.1 Which data are needed?

The process of collection of information has to be an incremental process. It needs to move from a simple inventory used to gather information, providing the necessary background information for MSP and it should be refined during the MSP process to reflect modified objectives and new sources of data (Ehler and Douvere, 2009). On this regard, ADRIPLAN in not different from several other similar projects and, to address this issue, it started with the creation of an inventory of MSP information related to the Adriatic and Ionian region, then evolved filtrating and aggregating relevant data using a list of Priority Maps (as described in section 3.1.2), finally worked directly in the ADRIPLAN Data Portal to improve and make accessible information through a collaborative process together with ADRIPLAN partners.

Data are usually not the main limiting factor but are for sure a key enabling factor for a quantitative, conscious (incl. knowledge gaps), transparent MSP and for MSP implementation and monitoring in time.

Different typologies of data (planning, uses, ecosystems, socio-economics,..) are needed and most of them have different spatial resolution, time trends, update plans, purpose of collection, file formats, data policies, data models and, in a transboundary context, also different languages.

There's a need to stay focused on the objective of the whole process, to follow problem-driven management of information (i.e. management objectives) and fit for purpose approaches and use tiered approaches where needed (since data are never enough) .

3.3.2 Lesson learned

In ADRIPLAN one of the first phases in the data management process was the selection of the main data sources to create a sort of catalogue from where discover the data relevant for the MSP exercise.

This "data mining" phase needs a broad investigation—not to lose important information—but also a careful selection of sources—to avoid unofficial or not updated inputs.

In ADRIPLAN this included:

- Data from Project Partners and other Administrations;
- Capitalization of existing information from existing portals (e.g. European Atlas of

the Seas, EEA, SeaDataNet, EMODNET) and from past or on-going projects (e.g. SHAPE, MAREA-MEDISEH, CoCoNet);
- Collection of data from available scientific literature.

Special attention has to be put in the analysis of data policies related to data collected specifically for the project or accessible in the web from portals, repositories, catalogues. This is important for various reasons: firstly because data owners want—and have the right—to be recognised and cited as the originator of data; secondly because some data can be used only in specific context (e.g. for scientific purposes) and must not be distributed to third parties; thirdly because a good information about provenance and lineage related to data is fundamental to understand how much that information is relevant and re-usable in similar or different context.

ADRIPLAN decided at the beginning of the project to produce a clear data policy document in which "ADRIPLAN encourages partners and data provider to evaluate whether one of the available Creative Commons Licences[5] suited to their needs and, in that case, adopt it as the licence for their data." and "ADRIPLAN has decided to adopt, for outputs and products it will produce, the Creative Commons Attribution (CC BY) license[6]".

This step of openness of the outputs of a project could seem an easy and trivial one, but we think it has a great importance to promote the use of data, to avoid under-use of it and to really create a positive feedback for future projects and initiatives able to re-use that information.

This is also connected with the use of metadata for describing the data, and the use of standard services to disseminate and share geospatial information.

3.3.3 Tools to manage, integrate, visualize, process data

MSP is a highly integrated process that needs data to be available and analysed for various purposes by different users. For this reason there are numerous tools potentially useful to answer questions in an MSP context, and several projects, studies and documents have already investigated this issue. we can mention here a few significant examples:

- the MESMA Central Exchange catalogue (MESMA, 2013) listed and described tens of tools organised per different categories (e.g. Decision support, Spatial analysis, Visualization);
- the report "Decision Guide for Selecting Decision Support Tools for Marine Spatial Planning" (Coleman et al., 2011) analysed in depth and tested a few tools describing their possible use in the various steps of the MSP process;
- Stelzenmuller et al., 2013 reviewed various tools supporting MSP and developed a suite of prototype tools dedicated to specific users.

A general and common message is that different users have multiple goals, and usually tools are focusing only on specific needs and use cases; this is true also in relation to the different steps in which the MSP process in subdivided. As a consequence, depending on the focus of the projects and initiatives, different tools have to be considered and used to fulfil all the need,s and there's no one single tool "to rule them all".

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5 http://creativecommons.org/licenses/
6 http://creativecommons.org/licenses/by/4.0/

The ADRIPLAN Data Portal is not different, and it has been developed with a multiplicity of goals in mind:

- easy discovery and access of information,
- different levels of access to information depending on the users,
- data interoperability through standard services,
- flexible and collaborative environment to allow sharing of knowledge,
- constant maintenance,
- Data processing and support to decision-making (MSP tool-box)

3.3.4 Future perspectives

EUSAIR SDI

We strongly suggest to create an EUSAIR permanent ICM-MSP oriented Spatial Data Infrastructure, based on Open Data policies and enhanced co-operation at sea basin level.

As suggested in the previous paragraphs, the ADRIPLAN Data Portal has the ambition not to be "simply" a web GIS supporting a specific European funded project, but to effectively contribute to the creation of a network of Atlases and Spatial Data Infrastructures for a better and sustainable management of the seas, and in particular of the Adriatic-Ionian macroregion.

ADRIPLAN Portal can contribute to this goal with its features and peculiarities:

Integration among database, web-gis and customized processing tools

Site-specific and dynamic (high resolution, multiple sources, what is actually available)

Collaborative use (i.e. upload of data and metadata, interactive data processing and maps production, potential collaborative development)

CNR-ISMAR is committed to maintain and develop the Data Portal.

INSPIRE Directive

The effective integration among different sources of information and infrastructures can be achieved, from the technical interoperability point of view, through the adoption and implementation, for all actors involved in MSP-related activities, of international standards for the exchange of the geospatial information collected in the data infrastructures. The use of OGC standards for the discovery (CSW), view (WMS) and download (WFS, WCS) of data will be for sure the core of this interoperability effort, but this won't probably be sufficient.

In fact, the integrated use of such diverse type of data requires not only that web services are interoperable, but also that metadata and data themselves are harmonised and can be exchanged and retrieved in a standard way.

The INSPIRE Directive (European Commission, 2007) requires that both the metadata and the data follow specific schemas that are detailed in official Regulations

and Technical Guidelines (see http://inspire.ec.europa.eu/ for more information). The adherence of data to the requirements of the INSPIRE Directive would greatly improve the homogeneity and comparability, and so the possibility to integrate it create new added value from existing information.

This is a challenge especially in the MSP context, where data come from various domains (environmental, industrial, touristic, legislative, …).

3.4 Land and Sea interaction: connecting ICM and MSP

The need for linking MSP and ICZM stems from the distinctive characteristics of oceans and coasts as they require special planning and management methods due to their high productivity and intense mobility and interactions. Therefore, it is crucial that they will be addressed as a system. According to Kerr et al (2014), a list of relative differences between land and sea environments can be viewed in Table 3.4-1. Furthermore ICZM is a legal requirement for states parties to the Barcelona ICZM Protocol.

Terrestrial environment	**Marine environment**
Building blocks • Individual locations dominated by single land uses • All subject to the sovereignty of 1 state only • Absolute landownership supported by law • Little public land • Enclosure of common land is a historic fact • Private property rights held by individuals • Highly man modified environment	*Building blocks* • Multi user environment • Important commonrights (e.g. fish, navigation) • Wide areas beyong the sovereignty/jurisdiction of a single state, where mopre states have concurring rights • Seabed managed by state on behalf of the public • Quasi-property rights being created • High level of wildness
Development control • 1943 Origins of modern planning • Roots in modernist scientific approach • Recent shift towards "planning through debate" • Development plans with zoning supported by planning permission and development control are the planning key tools • Planning control limits the private rights of individual landowners • Significant role for local authorities and local priorities to influence decisions • Emerging mechanism for levering community benefits from renewable energy developments	*Development control* • MSP is a recent phenomenon • MSP driven by competing interests of environmental protection and economic development • Extreme reluctance to zone areas for specific uses (in UK and US), results in case decision making • EIA key to decision making process • Decision making power will be central driven by national priorities • Limited scope for public to influence decisions • Less opportunity to leverage community benefits

Conservation	*Conservation*
• Traditionally urban and rural planning treated separately • Traditional conservation focuses on designation of small number of remaining sites which have high level of naturalness • Well established network of conservation designations and sites • Conservation designations driven by science • Relatively well understood environment • EU legislation increasingly important	• Environment and development tension • Difficulty identifying conservation priorities • Conservation interests often highly mobile or dispersed • Specific locations of conservation value often impacted by off-site or transient pressures (e.g.pollution) • Incomplete knowledge of environment, physical processes & human impacts • EU legislation increasingly important

Table 3.4-1: A comparison of key characteristics of terrestrial and marine environments (Source: Kerr et al, 2014)

The marine space constitutes a complex environment with a variety of uses competing for the same geographic area. These uses include the communities located at the coastal and island areas with strong socio-economic relationship to their adjacent seas as well as inland communities exploiting the sea resources from a distance (Kerr et al, 2014). The increased spatial development taking place at the sea along with the increased role regional seas promoted by Europe impose the need to treat coastal zones as ecosystem-based areas with a strong socio-economic potential rather than boundary zones (Smith et al, 2011). Some key issues to consider are the cumulative impacts by the development of small scale areas (e.g.marinas, windfarms), the impacts on coastal landforms, habitats and species due to land and sea use alterations, changes in landscapes/seascapes caused by new developments or restoration, accessibility restrictions to the coast due to special use (e.g. military zones), adaptation to climate change impacts (e.g. sea level rise, increased rainfalls, flooding), the socio-economic implications for communities depending on key maritime sectors,

Through the past years, ICZM has been considered as the most appropriate tool for integrating maritime spatial planning and land use planning whilst incorporating environmental management (Smith et al, 2011).

Maritime Spatial Planning (MSP) and Integrated Coastal Zone Management (ICZM) target at regulating the uses being developed in maritime and coastal space, respectively. The two concepts encompass different spatial targets as MSP is focused on marine waters while ICZM mostly focuses on coastal areas. Additionally, MSP has a more spatial character while ICZM mostly constitutes a management plan. Despite these differences the two concepts share the common target of promoting the sustainable development of human uses. Additionally, in spatial terms these two tools are interlinked and tightly connected as many of the uses are taking place both at sea and coast (Douvere, 2010; EC, 2014) while their impacts at sea can also be observed on land and vice versa. Therefore, the integration of marine and coastal planning across land and sea is needed. Although, ICZM has been promoted as an important tool towards the successful integration between land and marine planning, its implementation has been limited in terms of scope and geographic coverage (Kerr et al, 2014). Since the introduction of MSP, it has often been stressed by the interna-

tional literature that MSP could contribute to the successful implementation of ICZM through the operationalization of its principles. For example, Douvere (2010) provides a clear linkage between the strategic principles of ICZM and the respective approach regarded by MSP. More specifically, the holistic approach promoted by MSP refers to the overall geographic and thematic perspective of ICZM. In geographic terms, a holistic approach goes beyond political and administrative boundaries focusing more on the (eco)system as a whole and including also possible external factors and processes affecting the planning area. In the case of European coastal states which are closely bordered, this approach takes up also a transboundary character. In thematic terms, a holistic approach includes all the activities affecting the system taking into account their interdependencies and aiming at achieving multiple objectives. Moreover, the long term perspective fostered by ICZM refers to MSP's incorporation of future sea use scenarios that include spatial implications of alternative visions and assumptions created on the basis of defined targets and objectives. Finally, the ecosystem based approach used in MSP can be considered in line with ICZM strategic principle of respecting and conserving ecosystems and promoting the sustainability of human activities.

Further linking of both tools could involve the failures of ICZM acting as a prerequisite for the successful implementation of MSP. More specifically, according to Douvere (2010), the unsatisfactory involvement of stakeholders in ICZM combined with the need for local based processes of public participation have promoted stakeholder engagement as an important process for decision making taking place through the entire MSP process. On the other hand, the the implementation of ICZM at a local scale has rendered the need for addressing coastal and marine risks more effectively through the application on a more regional scale (regional seas). Additionally, the successes resulted by the implementation of ICZM within the EU, namely the increased awareness and level of preparedness regarding long-term coastal challenges, the incorporation of sustainable management in the planning process, the linking between land and sea legislation have highlighted the need for a more operational and better communicated MSP.

An evaluation in 2006 of the ICZM practice in the EU revealed successes in progress toward ICZM, as well as failures. Major failures were: (1) not all member states have implemented an ICZM national strategy or have an agreed ICZM policy; (2) unsatisfactory involvement of stakeholders; (3) threats to coastal areas are often seen on a local scale while they can be more effectively approached on a global scale, preferably a regional seas approach. Successes toward implementation of ICZM within the EU are: (1) new awareness and increased level of preparedness regarding long-term coastal challenges; (2) rethinking of traditional planning approaches by promoting sustainable management; (3) local ICZM based processes created pressure to increase participation in decision making; (4) ICZM is considered the instrument to link terrestrial to marine legislation; (5) the proper implementation of ICZM can improve the livelihood and employment in coastal areas. Although governance failure is considered a major obstacle in ICZM progress, the conclusions of the review also recognize that the principles of ICZM need to be made more operational and better communicated. Additionally, according to Smith et al (2011), ICZM efforts usually encompass specific features towards integration between land and sea. These are:

- Public participation and stakeholder involvement from spatial scales covering both coastal and maritime environments
- Incorporation of land and sea interactions
- Incorporation of aspects not necessarily related to planning such as capacity building, development of collaborative projects and measures related to the changing of human activities and human behavior.

Maritime Spatial Planning (MSP)	Integrated Coastal Zone Management (ICZM)
• Iterative, participatory and adaptive process	
• Social, economic and environmental targets towards sustainability	
• Integration among sectors, among levels of government, across the land-water interface, among disciplines, among countries	
• Focusing on the long term	
• Ten phases of the MSP process as defined by UNESCO-IOC (2009): • (1) Identifying need and establishing authority • (2) Obtaining financial support • (3) Organizing the process through pre-planning • (4) Organizing stakeholder participation • (5) Defining and analyzing existing conditions • (6) Defining and analyzing future conditions • (7) Preparing and approving the spatial management plan • (8) Implementing and enforcing the spatial management plan • (9) Monitoring and evaluating performance • (10) Adapting the marine spatial management process	• Five phases of the ICZM process as defined by UNEP-MAP/PAP-RAC (2012): • (1) Establishing an operational foundation for the implementation of ICZM • (2) Building the evidence and identifying the future • (3) Setting the vision • (4) Designing the future • (5) Realising the vision
• Governed by national authorities	• Governed mostly by local authorities
• Large scale (international and transboundary cooperation)	• More local scale
• More legally binding	• More flexible and informal
• Three dimensional	• Two dimensional

Table 3.4-2: A comparison between MSP & ICZM

However, the lack of a binding ICZM framework and therefore the inability to sufficiently address the allocation of coastal space to achieve ICZM targets have resulted in little recognition and acceptance by the institutional actors at the local level where mostly ICZM initiatives have been developed.

Until recently, the European legislation has mainly focused on environmental issues emerging at land and sea interface through the Birds and Habitats Directives and the Marine Strategy Framework Directive. Therefore, the need for supporting sustainable development has led to the introduction of the Integrated Maritime Policy and Blue Growth Strategy and more recently to the Directive for Maritime Spatial Planning and Integrated Coastal Zone Management (Kerr et al, 2014). More

specifically, in 2008 with the Communication from the Commission "Roadmap for Maritime Spatial Planning: Achieving Common Principles in the EU", it became obvious that there is a clear connection between MSP and ICZM. The link between maritime and coastal planning constituted a key principal of MSP, in order to achieve coherence between terrestrial and maritime zone. Later, in 2010, the Communication from the Commission "Maritime Spatial Planning in EU – Achievements and future development" significance of this link is repeated considering that planning from land to sea is very important and requires coherence between terrestrial and maritime strategies and tools. Finally, on March 2013, in Brussels, the European Commission, with a proposal from the European Parliament and Council, and in 2014, established a framework that refers to the relationship between Maritime Spatial Planning and the Integrated Coastal Zone Management.

The main objective of the directive is the promotion of sustainable development activities of the marine and coastal areas, and the sustainable use of their resources. In order to achieve this goal, the European Commission established a framework that will effectively implement MSP in the EU maritime area and ICZM in the Member States (EC, 2014). According to the Directive, emphasis should be given in the fact that MSP and ICZM are complementary tools. Their geographic scope overlaps in the coastal and territorial waters of Member States, where maritime spatial plans are expected to map existing human activities and identify their most effective future spatial development, while integrated coastal management strategies will ensure the integrated management of these activities. Applied jointly, they both improve sea-land interface planning and management (EC, 2014). Briefly, the Directive provides a framework for a systematic and coordinated approach in order to improve maritime governance in the Member States. Its main goal is the establishment, by the Member States, of one or more systems that will contribute to effective collection of data, identification of conflicts, decision making, planning and monitoring, and stakeholder involvement (EC, 2014).

Maritime spatial plans and integrated coastal management strategies shall apply an ecosystem-based approach to facilitate the co-existence of coastal and maritime uses and prevent conflicts between competing sector activities in marine and coastal zones, and shall aim to contribute to (EC, 2014):

- Securing the energy supply of the Union by promoting the development of marine energy sources, the development of new and renewable forms of energy, the inter-connection of energy networks, and energy efficiency;
- Promoting the development of maritime transport and providing efficient and cost effective shipping routes across Europe, including port accessibility and transport safety.
- Fostering the sustainable development and growth of the fisheries and aquaculture sector, including employment in fisheries and connected sectors.
- Ensuring the preservation, protection and improvement of the environment as well as the prudent and rational use of natural resources, notably in order to achieve good environmental status, halt the loss of biodiversity and degradation of ecosystem services and reduce marine pollution risks.
- Ensuring climate resilient coastal and marine areas.

The need for linking MSP and ICZM has been identified in previous planning and management efforts in an international level such as the Eastern Scotian Shelf Integrated Management (ESSIM), the Great Barrier Reef Marine Park Zoning Plan, the Oregon Coastal Management Program (OCMP), PlanCoast project (2008) and the case of Belgium national MSP policy.

3.4.1 Linking MSP and ICM in ADRIPLAN methodology and results

The challenge for the ADRIPLAN project, as well as to similar future exercises, is to reduce the complexity of implementing a transboundary plan across countries with different national frameworks, engage stakeholders representing coastal and maritime interests and achieve integration between land and sea.

The criteria chosen by the project, namely the trans-boundary and cross-border issues, the maritime uses and environmental and socio-economic domains related to specific uses, thegovernance and legal issues, the planning regimes, in order to define priority issues as well as the boundaries for each study area, express the incorporation of coastal and marine management into the planning procedure.

The project follows an Ecosystem Based Approach (EBA) for the planning of the Adriatic-Ionian Region (AIR) due to the transboundary nature of the emerging issues in the region. Moreover, there is a need for addressing both maritime spatial planning and integrated coastal zone management priorities stemming from ecological, geographical, political and socio-economic reasons. AIR is a semi closed sea with short shore to shore distances if compared to the rest of the Mediterranean sea. Therefore, the development of maritime activities creates pressures on coastal zones because in most cases, the available marine space in AIR is not situated in a capable distance from the shore. As a result, competition for space among activities in AIR is not limited only among marine uses but also among marine and coastal uses and it is expected to increase in the near future. Some examples of conflicts can be found, according to the project results, between traditional uses (such as shipping, oil exploration and fishing) and emerging activities (such as tourism/recreational uses, aquaculture and, in particular, offshore renewable energy) as well as coastal and marine environment protection (including marine protected areas, in addition to the already existing marine and coastal Natura 2000 sites).

In order to achieve connectivity between the terrestrial and marine spatial planning, the surrounding coastal and marine area should be recognized and maintained. Therefore, this project has aimed at a good scientific understanding not only of the ecological features of the study areas but also the identification of socioeconomic, cultural linkages and connectivity between ecosystems and human activities in the coastal and marine area.

It is, therefore, becoming evident that, on the one hand, no MSP could be implemented without taking into account the possible ICZM plans that fall under the marine area under regulation and, on the other hand, no ICZM plan can be effective if its impact on the marine uses of the area is not pre-evaluated. More precisely, Table 3.4-3 presents the most frequent uses developed within the implementation area of MSP and ICZM. As can be seen from this table, there are several uses developed in both marine waters and coasts such as fisheries and recreation. Additionally, uses like maritime transport and port services are tightly connected and consequently examining each use separately cannot lead to effective results.

Activity	Type	
	Maritime	Coastal
A. Direct socio-economic impact		
Fishing	+	+
Aquaculture		+
Water Transport	+	
Port services		+
Recreation	+	+
Housing		+
Sand and Gravel Extraction	+	+
Hydrocarbons Search and Extraction	+	
Dredging and Disposal	+	
Renewable Energy Production	+	
Cables and Pipelines	+	
Agriculture		+
Industry		+
Desalination		+
B. Indirect socio-economic impact		
Marine Protected Areas	+	+
Military Zones	+	+
Site of Conservation Interest	+	+

Table 3.4-3: Human activities with socio-economic impact (Sources: Colgan, 2003; Ehler and Douvere, 2009; Own elaboration)

The development of uses at both coast and sea and the interconnection between coastal and marine uses adds significant complexity to the task of uses' socioeconomic impact evaluation. The complexity mostly arises from the fact that the socioeconomic outcomes of each use cannot explicitly connect to their marine or coastal dimension. According to Smith et al. (2011), all economic activities contributing to regional development, apart from manufacturing industries and the non-transport part of tertiary and quaternary services, extend over both land and sea. These activities can be divided in three groups: a) uses such as maritime transport, cables and pipe-

lines and military areas which follow specific spatial organization patterns; b) uses that are related to resource extraction such as fishing and energy and c) resource dependent (associated with human activity and wellbeing) such as maritime tourism, waste disposal etc.

In spatial terms, there is a real challenge in addressing the added economic value of each use. This is the case, for example, for yacht renting since yachts are moored on the coast while they can also be used for sailing in the sea. Additionally, a cruise journey generates income both because of the expenses of passengers onboard and because of the fees paid by cruise lines to the local ports for mooring licensees. Thus, GVA can be attributed both to the cruise use (marine) and port operations (coastal).

The examples mentioned above render clear that both ICZM and MSP can not only focus on the area they are foreseen to regulate. Socioeconomic analyses, under the context of MSP can be a valuable input for the effective management of coastal use while the same also applies for the socioeconomic analyses in the context of ICZM and their contribution to effective MSP. In this respect, planners involved in MSP and ICZM should follow certain steps which will ensure the effective incorporation of socioeconomic analysis in the process. These steps include the identification of coastal and maritime activities, their spatial identification, the identification and analysis of the interconnections among them and, finally, the incorporation the socioeconomic analysis into the planning and management process.

The incorporation of analyses for cumulative Impacts, uses' coexistence and a Maritime Socioeconomic Index during the planning procedure performed by ADRIPLAN concerned both the marine and coastal activities. The project, following an integrated approach to address priorities and actions regarding the Adriatic-Ionian Macro-region level and the two focus areas, has identified specific pilot actions which deal with transboundary issues involving also stakeholders representing coastal and marine issues. This consultation process performed by the project complies with the principles adopted by both ICZM and MSP for public participation and consultation.

Finally, the project has been in line with the Barcelona Convention, its Protocol on Integrated Coastal Zone Management and its objectives including the sustainable management and use of coastal zones, ecosystem conservation, reduction of the effects of natural hazards and in particular climate change and coordination and coherence among all authorities exercising their powers in the coastal and maritime zone. Moreover, the project has supported Article 17 of the Protocol for the promotion of a common regional framework which will integrate the application in the coastal zones of individual thematic concepts and approaches such as the eco-system approach, spatial planning of land and marine areas, economic development, biodiversity, climate change etc.

3.4.2 Implication and challenges

In terms of implementation, so far MSP and ICZM have been different with ICZM obtaining a more informal and flexible character and MSP, aiming at the development of spatial plans with specific actions, being more legally binding. However, some countries have developed more legally binding approached for ICZM as opposed to MSP mostly due to the lack of Exclusive Economic Zones. Therefore, it is evident that the differences of the definitions of ICZM and MSP have led to different interpretations of their implementation and incorporation in national policies and legislation systems (DG ENV & DG MARE, 2012). This heterogeneity of ICZM implementation across Europe, even among Member States, creates barriers in using ICZM as tool for

enhancing land-sea integration of planning systems (Smith et al, 2011).

ICZM and MSP as complementary tools could serve country specific needs (MSP) as well as more local specificities (ICZM). However, this can only be achieved only through successful governance structures which enable the full engagement of relevant coastal and maritime stakeholders (COREPOINT project, 2008).

A further key aspect is the capacity building required for planning professionals to develop legal, cultural and geographical knowledge of each other's' backgrounds and different interests and targets. Even for cases where there is a clear guidance for integration between coastal management and land use planning, research has revealed inadequate integration of planning efforts mostly due to different perspectives and technical knowledge as well as significant time and resource constraints (Smith et al, 2011).

3.5 Transboundary MSP and cross-border cooperation

MSP focuses in planning marine/maritime activities towards sustainable management of existing space in coherence with the ICZM initiatives. More specifically, the holistic approach promoted by MSP refers to the overall geographic and thematic perspective of ICZM. In geographic terms, a holistic approach goes beyond political and administrative boundaries focusing more on the ecosystem as a whole and including also possible external factors and processes affecting the planning area. In the case of European coastal states which are closely bordered, this approach takes up also a trans-boundary character, aiming at increasing synergies and minimizing conflicts among different uses at a cross-border scale, taking into account GES, and preservation of environmental goods and services.

Within the ADRIPLAN project effort has been put to compile existing knowledge and experience gained through a stakeholder participatory process in order to propose MSP plans in the Adriatic and Ionian Region, under the concept of promoting smart and sustainable development in the area. The ecosystem based approach was adopted and the incorporation of the ICZM principles for the MSP exercise has contributed to the improvement of the analysis between land-sea interactions and their influences on the marine environment by establishing better connections between offshore and onshore activities. The latter enhanced the identification of synergies in trans-boundary maritime issues among the Adriatic-Ionian countries according to the MSP key principles. Furthermore while developing the European, Mediterranean and Adriatic-Ionian macro regional policy recommendations, such as the MSFD, Barcelona Convention, and has been in line with the EUSAIR Action Plan and related initiatives have been taken into account contributing thus to an integrated vision on a regional, Mediterranean and European level.

Experience gained within ADRIPLAN suggested that the most important step towards integrated MSP is the sound definition of priorities in terms of space use and identification of priority elements that need cross-border interventions. Thus, clear and well-defined objectives are key element for planning. Blue growth orientated targets facilitate coordinated action and national policy implementation. It is essential for cross-border MSP to prioritize objectives, listing as more important those that are of common interest among adjacent countries, and especially those that enhance blue growth and are in consistency with the EUSAIR pillars. The adoption of a regional strategy and vision will facilitate the efforts for a coordinated spatial use of regional waters by balancing interests, considering at the same time the underlying natural processes in order to ensure sustainability of ecosystem resources. In fact, one of the key messages in the recent (2015) Union for Stakeholders in the Mediterranean Conference was that Mediterranean countries should be invited to explore the added value of possible Sea Basin Strategy(ies), which can be driver for enhanced coordination of human activities in the region in agreement with the Blue Growth targets (https://fr.amiando.com/UMSC.html).

Then a key challenge in developing a trans-boundary maritime spatial plan refers to data availability and compatibility. Lack of data, fragmented and scattered data, as well as the problem of data gathered without following common standardized protocols created inconsistencies in the existing spatial information, which posed constrains in the development of a trans-nationally coherent MSP in the region. Indeed, in some cases and particularly in specific cross-border areas there were important data gaps, and data acquisition and sharing was rather limited. ADRIPLAN underlines

the necessity to establish commonly agreed protocols for gathering ecological, social and economic data and create an integrated regional database that will ensure quality and comparability at different scales, and will enable efficient data sharing. Moreover, implementation of trans-boundary analysis and stakeholder consultations requires a joint methodological approach to be adopted during all the steps of the MSP process, and the project has definitely contributed towards this direction.

What is more, implementation of a common transnational vision depends on input by and agreement with key stakeholders from all countries in the region. A transparent and consistent stakeholder participation in all phases of the project proved to be essential to progress towards the definition of the planning objectives. In most situations, it was necessary to insist in the participation of key stakeholders, since the importance of the MSP process is not yet perceived and the benefits of a shared approach are not sufficiently clear. Indeed, there has been little experience in planning for marine areas in the region, and even less in cross-sectoral discussions aiming to identify planning priorities as well as to seek for commonly agreed solutions or compromises. The project has provided stakeholders with the opportunity to express their opinion about the MSP at cross-border level, and at the same time the scientific team has learnt the different needs and planning perspectives presented by the representatives of each country involved in the project's stakeholder network. Yet, despite the willingness of stakeholders to participate in the consultation process, they had the tendency to focus on local rather on trans-boundary issues.

Stakeholder consultation also brought up the key issue of lack of coordination/ integration between administrations of neighboring countries, as well as crucial differences of national legislation of adjacent countries, a fact that is more intense among EU and non-EU countries. For each specific sector (e.g. fisheries) there seemed to be great discrepancies between neighboring countries, especially in the national legislation approaches. Moreover, the above is even enhanced by time-consuming administrative procedures that do not facilitate trans-boundary co-operation and clustering. Hence, the need of cross-border administrative coordination seemed to be of key importance. Inconsistency in legal issues could be overcome by establishing bilateral-trilateral, regional, or even basin-wide policy agreements, both intra- and inter-sectoral, and meanwhile proceed with the effective enforcement of existing management measures of activities. Involvement of the competent international bodies would be beneficial, as they have the mandate to regulate also areas beyond national jurisdiction. An operational legislative framework and the associated mechanisms need to be established at a trans-national scale in order to ensure effective cross-border management of commonly identified MSP objectives. Through the ADRIPLAN experience it was more than evident that the implementation of a successful MSP requires the harmonisation of national and regional treaties, laws and regulations, which in turn can be achieved through a shared and transparent supporting legal framework.

Finally, as one of the basic axes of MSP is "increasing synergies and minimizing conflicts", exploring the possibilities for cross-border collaborations and clustering is of utmost importance. Integrated MSP should be in line and enhance the increased participation of private sector enterprises, and introduce more intensive cooperation in the region among public and private stakeholders. In order to attract blue investment and jobs, clusters among private sector and national administrations should be encouraged. Minimizing the legal obstacles with bilateral/regional/basin-wide agreements, reducing the bureaucratic procedures and facilitating access to seed capitals or loans for innovation on behalf of national administrations, will lead to a greater confidence and financial attractiveness of the area. Towards this direction the relevant institutions should explore how MSP can be applied and/or adapted to the different

concepts of the Mediterranean basin considering best practices of MSP application in other areas, while of key importance is a tailor-made capacity building and knowledge transfer of the stakeholders and the general public in the MSP specifics (https://fr.amiando.com/UMSC.html). Following the above the application of MSP is expected to create an optimal investment climate and boost maritime economy under the umbrella of the Blue Growth Strategy not only in the Adriatic-Ionian region but also in the South European Seas.

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Annex I
Adriplan Data Portal

The ADRIPLAN Data Portal (http://data.adriplan.eu) is the access point for all the geospatial information used in the ADRIPLAN project (http://adriplan.eu) and it's a joint effort undertaken by all partners, coordinated by CNR-ISMAR.

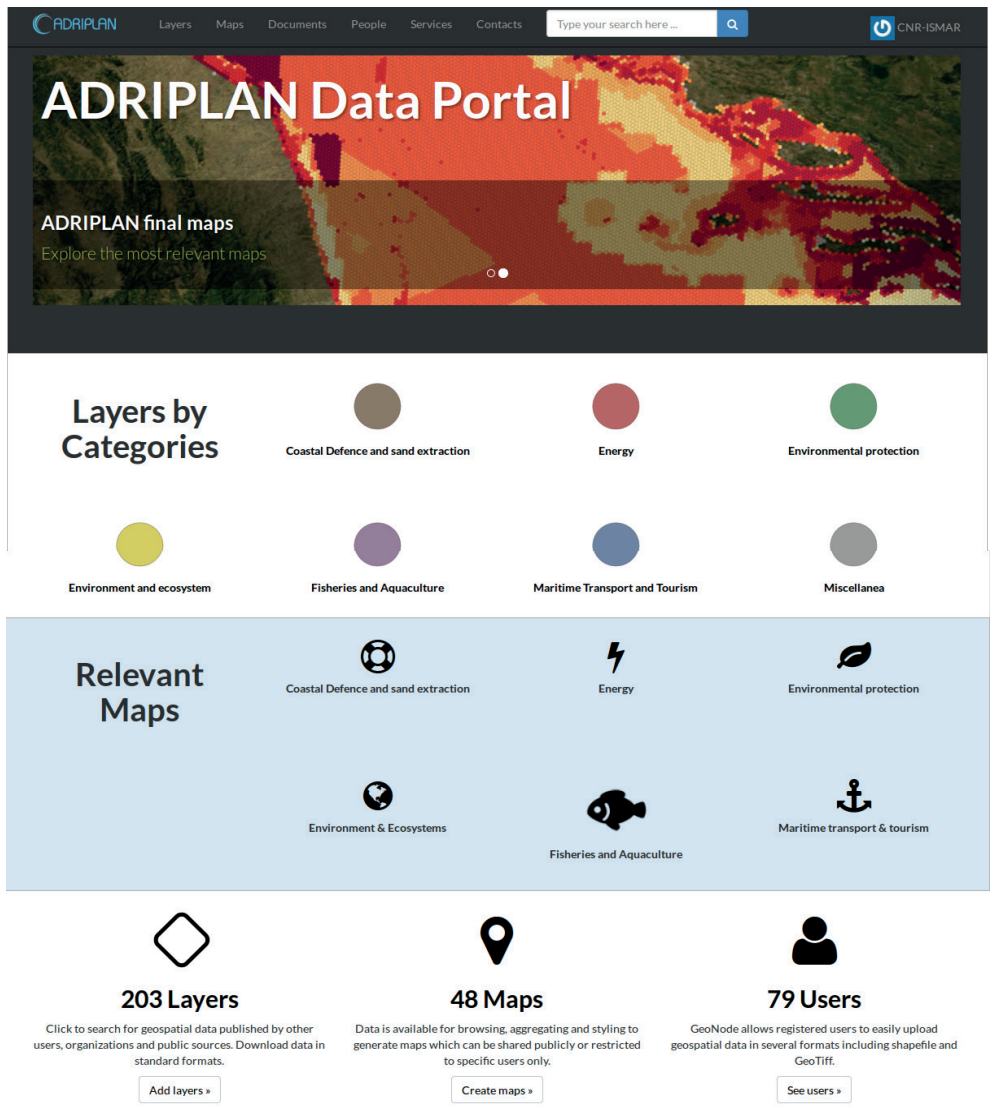


Figure A-1: Home page of the ADRIPLAN Data Portal

It is a modern portal making discoverable and accessible hundreds of data related to Maritime Spatial Planning in the Adriatic and Ionian region. It uses open source software to share data in a standard way to permit a full interoperability with devices and software used by all the users. It allows to all registered users to view the data on the portal and to upload new datasets or compose new maps based on custom needs.

Its creation started at the beginning of the project and went on during the entire project following various steps of implementation, supporting the various phases of the project.

The portal was presented and opened for registration to the public during the final conference on July 2015 in Venice.

Features

The ADRIPLAN Data Portal aims to create an easy to use portal both for technical (experts in geographical data) and generic (local and regional administrators, citizens) users.

The most relevant features of the portal are:

- Discover and view information (layers and maps);
- Managing permission of users and groups for view, download, manage data etc.;
- Search by specific text;
- Filter the results (e.g. by category or data type);
- Download data and metadata;
- Edit various information about the layer;
- Map Viewer;
- Upload (with permissions) geographic data, documents;
- Compose new maps with data in ADRIPLAN portal or from external sources.

Implementation

The ADRIPLAN Data Portal has been built using GeoNode (http://geonode.org), a web-based application and platform (promoted by the World Bank) facilitating creation, sharing and collaborative use of geospatial data and deploying of spatial data infrastructures (SDI). It builds on various open source components including Django, GeoServer, pycsw, OpenLayers, PostGIS and GeoExt, reorganizing and giving them a unified access and it is designed to be extended and modified as for ADRIPLAN needs.

Development

The ADRIPLAN Data Portal is not simply an instance of a GeoNode installation, but it contains some new customizations specifically developed during the project to meet some needs emerged during the process of implementation of the portal, both from users' requirements and from technical improvement.

In particular, the customizations of GeoNode portal focused on:

- homepage: to immediately find the most relevant features
- search and filter tools: to better respond to project requirements
- development of new tools (see the Boxes on MSP Tool in the section 2.4 for more information)

- a quick guide[7]: to introduce users to portal features and to standard services of portal.

As already mentioned, all the software used in the portal is free and open source, as well as the developments produced during the project. To openly share the output of the project, the tools and the customizations developed for the project will be available on a GitHub repository at https://github.com/CNR-ISMAR/adriplan.

In addition to that, to contribute to the development of the GeoNode project, CNR hosted the "GeoNode code sprint 2015"[8], where users and developers sat together to make the final release of the version 2.4 of GeoNode. The code sprint took place in Venice from the 2nd to the 4th of February 2015 in CNR-ISMAR headquarters.

Data

More than 200 layers were divided in categories to facilitate the discovery of the data from the users:

- Coastal Defence and Sand Extraction
- Energy
- Environmental Protection
- Environment and Ecosystems
- Fisheries and Aquaculture
- Maritime Transport and Tourism
- Miscellanea

The discovery of data is available also through keywords, geographical extent, data sources and data type. These filters can be joined to improve discovering.

All the data were collected from ADRIPLAN partners and are described with metadata. The data compose 6 relevant maps (one for each categories) plus more then 40 maps prepared by the partners for project or personal reasons.

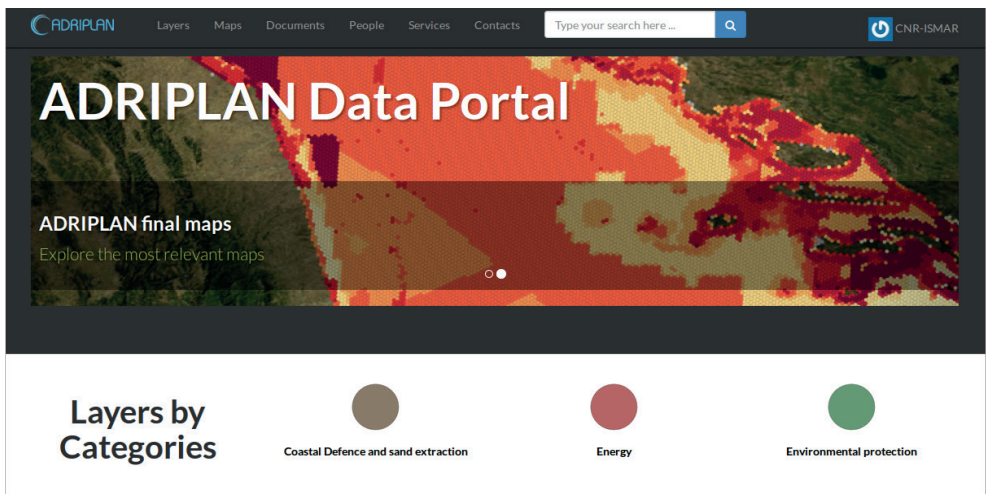
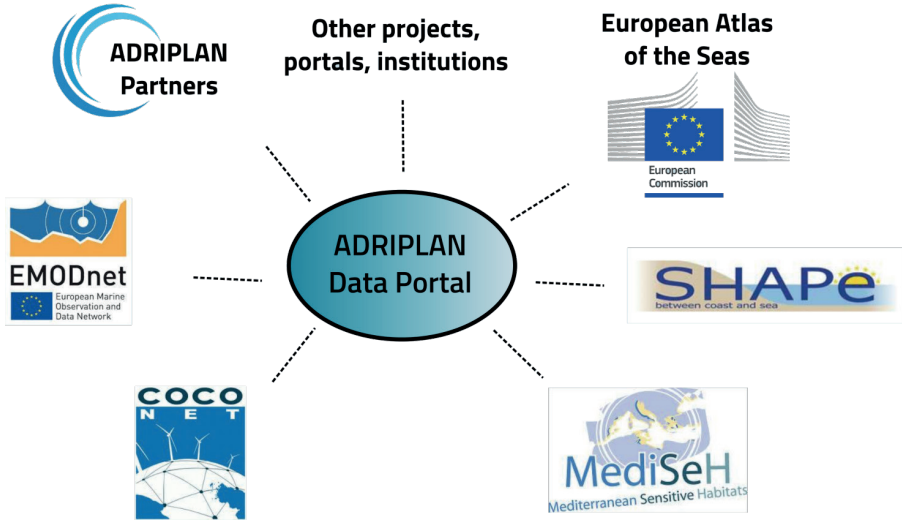


Figure A-2: Explore layers.

[7] http://data.adriplan.eu/documents/3283
[8] http://geonode.org/code_sprint_2015.html

6.4 Data sources and policies

The ADRIPLAN portal allows to reach an effective interoperability using standard services (OGC, INSPIRE) to collect data from external project like CoCoNet, MAREA-MEDISEH, SHAPE etc. and to share ADRIPLAN data.



- Data collection focused on MSP relevant layers
- Data from Project Partners and other Administrations
- Capitalization of existing information
- Existing portals (e.g. European Atlas of the Seas, EEA, SeaDataNet, EMODNET)
- Past end/or on-going projects (e.g. SHAPE, MAREA-MEDISEH, CoCoNet)
- Data Policy: give appropriate credits to the originators through metadata
- Be Open: Creative Commons Attribution licence (http://creativecommons.org/licenses/by/4.0/) for ADRIPLAN products

MSP tools

The MSP tools were developed to help the planning phase and to better understand the conflicts in the sea area. They were built to be managed totally inside the web interface, both for configuration and the execution. The results is a layer that show a spatial index and a set of graphics showing statistical informations.

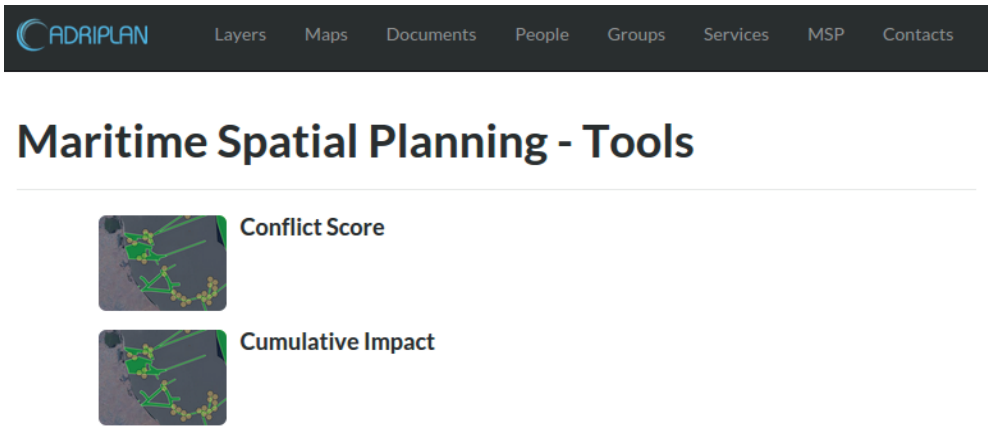


Figure A-3: MSP Tools

In the settings is possible to set the area of interest, the layers, the grid resolution, the time scale, vertical scale and spatial scale that provide the result of the spatial index.

Moving from data inventory, to integration within the ADRIPLAN methodology, to supporting tool for MSP planning.

The new two tools, better described in chapter 4.2 and 5 are:

1. Conflict Score: Tool to calculate the direct spatial Conflict Score based on COEXIST

2. Cumulative Impact: Tool to calculate the Cumulative Impact

They are focused not only on the duration of the project, but also possible future reuse within the Adriatic-Ionian Region or even outside.

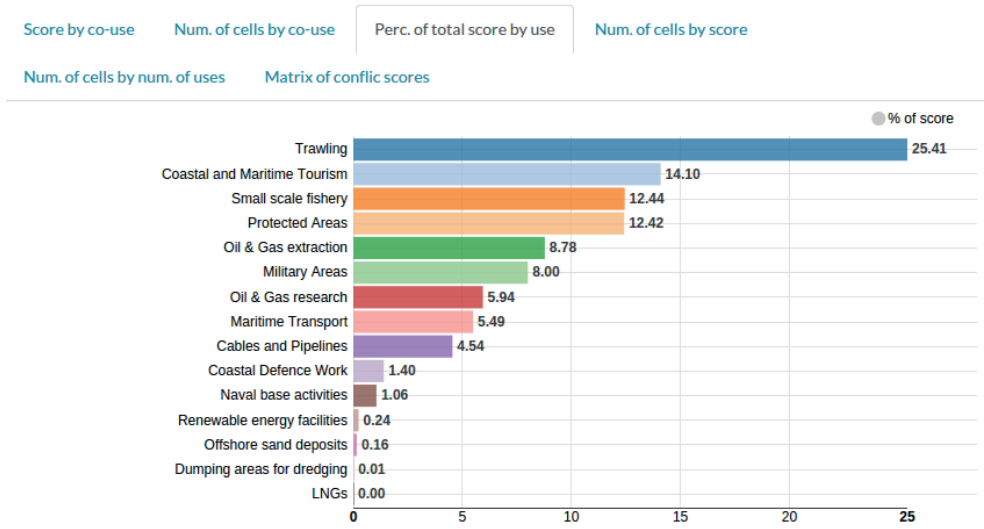


Figure A-4: Graphics derived from MSP Tools.

ADRIPLAN

European Commission

ISBN 978-88-941335-4-7