Supporting maritime spatial Planning in the Eastern Mediterranean (SUPREME)

How to perform analysis of land-sea interactions, combining MSP and ICZM in the considered project area

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Table of Contents

List of Acronyms

CAMP	Coastal Area Management Programme
CBA	Cost-Benefit Analysis
CISD	Croatian Institute for Spatial Development
COP	Conference of the Parties
CORILA	Consorzio per il coordinamento delle ricerche inerenti al sistema lagunare di Venezia
DPSIR	Drivers, Pressures, State, Impact and Response
EcAp	Ecosystem Approach
EC DG MARE	European Commission Directorate General "Maritime Affairs and Fisheries"
ESRI	Environmental Systems Research Institute
EU	European Union
GIS	Geographic Information Systems
GRID	GeoReference Interactions Database
HNS	Hazardous and Noxious Substances
ICZM	Integrated Coastal Zone Management
IMSP	Integrated Maritime/Marine Spatial Planning
Km	Kilometre
LSI	Land Sea Interactions
MARSPLAN-BS	Cross-Border Maritime Spatial Plan for the Black-Sea – Romania and Bulgaria
MPA	Marine Protected Area
MSP	Maritime/Marine Spatial Planning
MSSD	Mediterranean Strategy for Sustainable Development
Mt	Metric ton
NAPA	North Adriatic Port Association
NKUA	National and Kapodistriako University of Athens
NTUA	National Technical University of Athens
PAP/RAC	Priority Actions Programme/ Regional Activity Centre
PPTR	Puglia regional landscape plan
RRC Koper	Regionalni Razvojni Center Koper
SCI	Sites of Community Importance
SDG	Sustainable Development Goal
SEA	Strategic Environmental Assessment
SPA/BD	Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean
TAP	Trans Adriatic Pipeline
UCH	Underwater Cultural Heritage
UN Environment /MAP	United Nations Environment Programme/ Mediterranean Action Plan
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UTH	University of Thessaly

List of Figures

List of Tables

List of Boxes

Foreword

The preparation of this document complements the parallel activity and preparation of the document *"Relationship between LSI and ICZM"*, undertaken within the framework of **SIMWESTMED** project.

Performing and finalisation of these outputs was undertaken in a synergic way, for the overall benefit of SUPREME and SIMWESTMED project partners.

1. Introduction

The term “land-sea interactions” (LSI) is usually used in the context of planning and management of marine and coastal areas. The interactions between the terrestrial and marine areas may include, for example, the outflow of contaminants from a terrestrial agricultural area to a freshwater body, which is in contact with the coastal waters, as well as the laying of a submarine cable in the intertidal area to connect an offshore wind farm to the national power grid.

Most of the activities taking place in the marine environment also have a terrestrial component or connection. The coherence and integration between the planning of marine and terrestrial spaces are important and should be achieved through consistency of policies, plans and decisions.

Almost all maritime uses require ground support installations. Some uses, mostly on the ground (for example, beach tourism, water-front, ports), extend their domain also at the sea. These interactions should be identified and mapped, in order to assess their cumulative impacts and potential conflicts and synergies.

With the rapid expansion of maritime economy these connections are becoming more and more relevant. In fact, significant increase in maritime activities have already determined relevant consequences on land and future trends of the sectors that are expected to cause additional impacts. For example, hydrocarbon exploration projects and associated drilling activity have become more and more common in the Mediterranean in recent years, and several new gas pipelines, such as the Trans-Adriatic Pipeline (TAP) or the projected pipeline between Cyprus and Greece, are planned to respond to the need for an increased gas supply to Europe. Also, shipping is expected to increase in the Mediterranean Basin, both in number of routes and traffic intensity, for example due to the doubling of the Suez Canal. Particularly, a significant increase in tanker traffic is expected in the Eastern Mediterranean Sea due to new export routes for crude oil from the Caspian region, the development of new pipelines bypassing the Bosphorus, and the expansion of current pipeline capacity. Oil transport is set to rise to 750 Mt by 2025, with 6,700 tankers/year likely to navigate, unless the implementation of renewable energy policies succeeds in scaling down this scenario. Fast growth rates in cruise tourism have been observed in recent years and this sector is likely to continue to increase significantly in the future, driven by a growing European market demand. While past growth for the tourism sector was concentrated in the north-western Mediterranean Sea, future growth will be experienced throughout the Mediterranean Basin with rapid growth forecast for Croatia, Greece, and Morocco, and for areas with a wealth of biodiversity (Piante & Ody, 2015).

Being aware of these trends and of the above-mentioned interlinks, the land-sea interactions and related processes constitute one of the three core themes **of the Mid-Term Strategy 2016-2021 of UN Environment/MAP** adopted with Decision IG. 22/1 (COP 19, Athens, Greece, 2016), and correspond to the **first objective** of the Mediterranean Strategy for Sustainable Development (MSSD) 2016-2025, adopted with Decision IG 22/2 (COP 19, Athens, Greece, 2016) and to the **Sustainable Development Goals 14** (*Conserve and sustainably use the oceans, seas and marine resources for sustainable* *development*) **and 15** (*Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss*). Indeed, the goals of „Life below water" (SDG 14) and „Life on land" (SDG 15) are strictly interconnected though LSIs. For example, the need to halt and invert the deterioration of coastal waters due to pollution and eutrophication is a key issue for SDG 14. SDG 14 also deals with challenges related to fisheries management and marine protected areas; these activities represent some of the key elements of LSI, as illustrated in the next chapter. As all maritime activities have impacts on land and particularly on coastal areas, LSI analysis and sustainable management are key to achieve SDG 15 goals as well (protection of key biodiversity areas, halting of biodiversity loss, also through halting wildlife poaching and trafficking). Indeed, knowing better the LSI and taking them in due consideration during planning and management in sea and coastal areas contributes considerably to the achievement of these SDGs.

Considering the elements above, LSI analysis shall be understood as an important component in the preparation of a coastal and/or marine plan. Anyway, LSI itself is not a new discipline, nor represents an additional requirement for coastal or marine planning activity. In the context of maritime spatial planning (MSP), the analysis of land-sea interactions is expected to inform the planning process through the identification of the key elements linking the land and marine components of the coast that need to be taken into account when planning the sea space, i.e. LSI problems to be addressed and opportunities to be exploited. The same applies to land-use planning, where LSI analysis is part of ICZM. Overall, LSI analysis aims to provide the needed information for a coherent land-marine planning across the coast interface.

This document aims to provide a methodological guideline for LSI analysis within MSP, also exploring how such analysis can be embedded in the wider ICZM context. In this perspective, this document intends to support MSP planners with a possible operative framework for the LSI analysis, identifying specific actions to be carried out in close connections with the maritime spatial planning process. Finally, with specific regard to addressing the MSP Directive requirements, the ultimate scope of this document is to provide some guidance on how to (re)organise topics, information and effort, including those eventually already available from formal or informal processes (e.g. ICZM).

In addition to this introduction, the document includes other six chapters. Based on the analysis of the available literature, chapter 2 provides the description of some key concepts for LSI analysis, including its definition (section 2.1). Chapter 3 illustrates examples of LSI definitions included in the national legislation and of interactions considered particularly relevant in the countries participating to the SUPREME project. Chapter 4 represents the core content of this document: it introduces and describes in detail (14 steps) a methodological approach to perform LSI analysis in the context of the plan preparation process. Chapter 5 provides the wider framework where LSI analysis is integrated within a planning process and highlights links specifically with MSP. Finally, chapter 6 provides some reflections on LSI analysis coming from the pilot cases implemented by SIMWESTMED project.

2. Concept

2.1 Definitions of LSI

Despite its high relevance, a unique definition and conceptualization of LSI has not yet been established or formalized in literature (see the list of references and the other literature consulted at the end of the document). In addition, the full picture of the process and the interactions system involve, beyond land and sea, also the air component (Mourmouris, 2017; Burns, 2017). However, for methodological issues and since the Directive 2014/89/EU on MSP is referring specifically to LSI, for the purposes of the current project focus is put on interactions between land and sea.

The EU Directive 2014/89/EU on Maritime Spatial Planning specifies that the planning process should take into account land-sea interactions and promote the collaboration between Member States. Without providing a definition, the Directive makes several references to the concept of LSI in:

- Art. 1, referring to the subject of the Directive;
- Art. 4, which refers to the development and implementation of maritime spatial planning. Paragraph 2 provides that, during the entire MSP process, the Member States shall take account of land-sea interactions; Paragraph 5 states that, when drawing up the maritime spatial planning, Member States shall take into account the peculiarities of the marine regions, the related activities and present and future uses and their effects on the environment, as well as natural resources, and land-sea interactions.
- Art. 6, Paragraph 2 (a), according which one of the minimum requirements for the maritime spatial planning is that Member States take into account land-sea interactions;
- Art. 7, Paragraph 1 ("Land-sea interactions"), which describes the nature of the LSI and the relationships with the other formal or informal processes, such as integrated coastal zone management.
- LSI is also referred to in recitals 9, 16 and 18 of the MSP Directive.

General Framework for LSI developed by EC DG MARE describes "*LSI as a complex phenomenon that involves both natural processes across the land-sea interface, as well as the impact of socio-economic human activities that take place in the coastal zone*" (EC DG MARE, 2017).

Although the **ICZM Protocol** of the Barcelona Convention does not expressly include a LSI definition, this can be indirectly derived from article 2 through the interpretation of the given definitions of "coastal zone" and "integrated coastal zone management". ICZM is defined (art 2, lett. f) as a "*dynamic process for the sustainable management and use of coastal zones, taking into account at the same time the fragility of coastal ecosystems and landscapes, the diversity of activities and uses, their interactions, the maritime orientation of certain activities and uses and their impact on both the marine and land parts*". Furthermore, the coastal zone is "*the geomorphologic area either side of the seashore in which the interaction between the marine and land parts occurs in the form of complex ecological and resource systems made up of biotic and abiotic components coexisting and interacting with human communities and relevant socio-economic activities*" (art 2, lett. e). The analysis of the interactions between land and marine components of the coast is therefore a key element of the ICZM process and includes ecological processes crossing the coastline delimitation, interactions among land and sea-based socio-economic activities and between human communities.

Table 1: Land-sea Interactions according to the conceptualization proposed by the CAMP Italy project (2017)

SEA-LAND INTERACTION *Economic activities / natural phenomena at "sea" interacting with "land"*	**LAND-SEA INTERACTION** *Economic activities / natural phenomena at "land" interacting with "sea"*
SPECIFIC HUMAN ACTIVITIES ▪ Aquaculture in seawater ▪ Fishing ▪ Mining activities from seabed (including sand and marine aggregates mining) ▪ Industry (systems, including off-shore desalination, CO_2 capture and storage) ▪ Energy industry (offshore /oil and gas] energy, offshore renewable energy [wind, waves, surge/) ▪ Infrastructures (ports, civi! works of marine / coastal engineering /artificial reefs, breakwaters, etc./) ▪ Submarine cables and pipelines ▪ Maritime activities in general, including dredging and storage of materials ▪ Maritime transport (maritime traffic, commercial, including ferries) ▪ Tourism and cruise boat ▪ Recreation and Sports ▪ Biotechnology ▪ Marine Protected Areas (MPA), Biological Protection Zones (BPZ) (and in general 'area based management tools, including marine protected areas') ▪ Defence and security	SPECIFIC HUMAN ACTIVITIES ▪ Coastal and lagoon Aquaculture ▪ River and lagoon fishing ▪ Natural resource use (water abstraction, removal of aggregates /quarries/) ▪ Farming and livestock farming ▪ Industry (food, manufacturing, on-shore plant, including desalination plant, CO2 capture and storage) ▪ Energy industry (onshore energy /oil and gas/, onshore renewable energy /wind, sun, geothermal/) ▪ Infrastructures (river ports, including dredging activities, engineering work, including dam, bridges, remediation activities, railways and roads) Port activity ▪ Transports (river transport, road and rail transportation) ▪ Tourism, Sports and Recreation activities (i.e. bathing stations, touristic facilities) ▪ Biotechnology ▪ Natural Protected Areas (Nature reserves, National Parks, Regional Parks, etc., on-shore or with offshore boundaries) ▪ Defence and security
GENERAL HUMAN ACTIVITIES ▪ Waste (marine litter)	GENERAL HUMAN ACTIVITIES ▪ Urban plants (including pollution of water bodies that collect waste water) ▪ Waste ▪ Services network (i.e. sewage systems)
NATURAL ▪ Extreme events (storms, heavy tides, tsunami) ▪ Sea Level Rise (global and local) ▪ Risks to coastal areas (coastal erosion, marine flooding and saline intrusion) ▪ Algae bloom ▪ Volcanic and tectonic activities	NATURAL ▪ Soil erosion (leaching, wind action) ▪ Natural subsidence ▪ Hydrogeological instability (including landslides) ▪ Transport od river sediments ▪ Flooding ▪ Volcanic and tectonic activities

The analysis of consulted literature and the available definitions of LSI – in particular those provided by the Italian Decree on MSP (Legislative Decree 201/2016)[1] and CAMP Italy project – highlight the double direction of LSI, **land toward sea** and **sea toward land**. Table 1 above provides an example developed by the CAMP Italy project of both marine and terrestrial human activities and natural phenomena that have or might have interaction across the coast border, divided in sea-land interactions and land-sea interactions.

Analysed literature also points out two major interactions occurring between land and sea. These have been also taken in consideration in the "Conceptual Framework for MSP in the Mediterranean" adopted in December 2017 by the Ordinary Meeting of the Contracting Parties to the Barcelona Convention (UN Environment-MAP PAP/RAC, 2017)'. These are:

- Interactions related to **land-sea natural processes**. Implications of such processes on coastal environment and on coastal socio-economic aspects shall be identified and assessed considering their dynamic nature, in order to include them into the planning and management processes. At the same time, human activities can interfere with natural processes. The analysis of the expected impacts of land and marine activities should include the evaluation of their effects on LSI natural processes and the potential consequent effects on natural resources and ecosystem services.
- Interactions among **land and sea uses and activities**. Almost all maritime uses need support installations on land (such as the ports for shipping, marinas for yachting or grid connections for offshore wind farms), while several uses existing mostly on the land part (e.g., tourism, recreational activities, land-based transport, etc.) expand their activities to the sea as well. These interactions shall be identified and mapped, assessing their cumulative impacts, benefits and potential conflicts and synergies, from the point of view of their environmental, social and economic implications (UN Environment-MAP PAP/RAC & University of Thessaly, 2015).

  Possible land-sea interactions of some typical maritime sectors are described in the brochure prepared by Shipman et al. (2018) for the Directorate General for the Environment of the European Commission. These guidelines consider the following sectors: aquaculture, desalination, fisheries, marine cables & pipelines, minerals & mining, ports & shipping, tourism & coastal recreation, offshore wind energy. Main LSI relevant for each sector are identified, key data, potential analytical tools and mitigation management are suggested, together with stakeholders' categories to be involved and possible management options.

The management of LSI should take into account the interactions of **planning processes and plans** for land and sea areas. It is important to ensure that legal, administrative, consultation and technical processes are coordinated (and hopefully linked) to avoid unnecessary duplications, incoherence, conflicts, waste of resources and/or excessive demand of stakeholders' efforts. The challenge is to plan and manage inshore and offshore activities in harmonized manner considering the functional integrity of the land-sea continuum. This also implies allocation of land space (and related infrastructure and services) to some maritime activities and/or the allocation of maritime space to some land-based activities. Finally, the achievement of this coherence also requires alignment/integration of the different approaches, methodologies and tools applied respectively on land and at sea.

[1] Available at: http://www.gazzettaufficiale.it/eli/id/2016/11/07/16G00215/sg%20; accessed in September 2018.

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

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

Based on these, European maritime and coastal regions were categorised in five categories (Figure 1 and Table 2) according to the intensity of LSI: from European core, where land-sea interactions are at their higher intensity to Wilderness Regions where land-sea interactions are at their least intensity, also considering the intermediate levels represented by Regional hubs, Transition areas and Rural areas.

According to the referred assessment (Figure 1), Eastern Mediterranean can mainly be considered as area of transitional LSI intensity, with medium environmental pressures and more narrowly or localised concentration of maritime economy. Exception is the Italian coastal area in the Adriatic and Ionian Seas that is part of a regional hub characterised by strong land-sea interactions, high maritime activities and employment (although less than the European Core ones), but also significant environmental pressures. Finally, the southern rim of the Eastern Mediterranean is categorised as a rural area, with low environmental pressure but also low level of maritime-related activities and employment, dominated by primary production and tourism.

More elaborated analysis of the LSI concepts that are the basis for the methodological guidance on how to perform LSI analysis is given in the complementary document, prepared under the SIMWESTMED project.

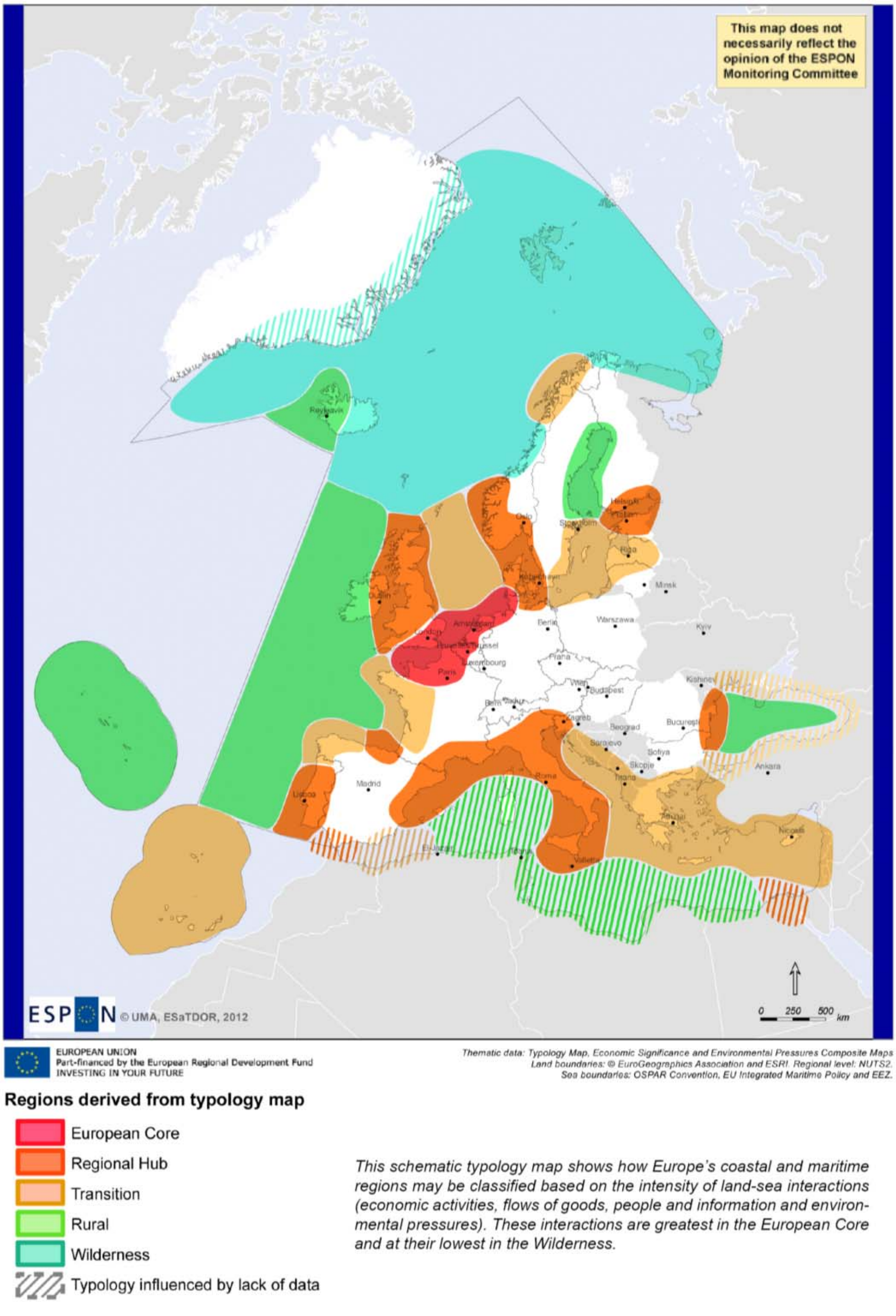


Figure 1: Classification of maritime and coastal regions according to the intensity of LSI. Source: ESPON and University of Liverpool (2013).

Table 2: Typologies of maritime and coastal regions according to LSI intensity and their main characteristics. Source: ESPON and University of Liverpool (2013).

	EUROPEAN CORE	REGIONAL HUB	TRANSITION	RURAL	WILDERNESS
Economic Significance	Greatest concentration of maritime employment/ high strategic economic importance.	High maritime employment, significant economic importance.	More localised concentrations of maritime employment/ more dependent upon a limited number of strategic industries.	Low levels of maritime related employment, economy dominated by primary production and tourist sectors.	Very low and intermittent levels of maritime employment, limited direct economic importance.
Flows	Great international connectivity, global hinterland.	Nationally significant and some international connections, European scale hinterland.	Nationally and regionally significant connections and hinterland.	Limited connectivity, local/ regional hinterland with some more significant sectors/ seasonal extensions.	Remote areas, limited connectivity. Very small local hinterland, some extensions.
Environmental Pressures	High environmental pressure associated with human uses.	Significant environmental pressures.	Medium environmental pressures.	Low environmental pressure.	Limited environmental pressure.
Land-Sea Interactions	**Very high**	**High**	**Medium**	**Low**	**Very low**

3. Land-sea interaction at the national level

3.1 National approaches to LSI

At the national level, a definition of LSI is provided by different national legislations, mainly related to transposition of the European Directive on MSP. Information provided below is derived from relevant SUPREME Deliverables.

The transposition of MSP EU Directive in the **Italian legislation** is given by the Decree 201/2016. Herein, in the article 3, LSI is intended as the "interactions in which terrestrial natural phenomena or human activities have an impact on the marine environment, resources and activities and interactions in which marine natural phenomena or human activities have an impact on the terrestrial environment, resources and activities". Building on this concept, the Guidelines for maritime spatial planning (Decree of the Presidency of the Council of Ministries of 1st December 2017) include several references to the need for the identification of the areas relevant in terms of land-sea interactions and provide a list of elements and factors to be considered in order to identify such areas:

- relevant river basins according to their identification under the provisions of the Water Framework Directive (Decree 152/2006);
- terrestrial and marine protected areas (including Sites of Community Importance – SCI, sanitary protection zones – SPZ and Natura 2000 network);
- UNESCO sites;
- coastal areas with high landscape/seascape value;
- areas with important coastal marine infrastructures (e.g. ports).

The transposition of MSP EU Directive in the **Croatian legislation** is given by the Physical Planning Act (Official Gazette 153/13, 65/17). Section 4.2 of the Act, defines the Protected (Marine) Coastal Area (PCA) (Art. 45-49.f) as a zone of special State interest, encompassing the area of coastal cities and municipalities (including territorial sea). Within that zone, and in order to ensure protection and sustainability of development and planning, restricted area covering 1,000 m wide continental belt (both on terrestrial part and islands) and 300 m wide sea belt, measured from the coastline, is established. In addition, land-sea interactions are explicitly addressed as part of Art. 8, 49.b.1, 49.c of the Act, being one of the key principles of spatial planning.

Slovenian Spatial Planning Act (Official Gazette, 61/17), addresses marine spatial planning, thus transposing MSP Directive in the **Slovenian legislation**. The Act states (Art. 23) that planning of marine uses at sea shall follow the same approach as planning on the land. The Act also requires preparation of marine strategy.

LSI is considered in the **Greek** Special Frameworks for Spatial Planning covering specific sectors, including aquaculture, tourism, industry and renewable energy. These include provisions for the coastal and marine aspects of each sector. The EU MSP Directive has been transposed into the Greek legal system by the Law 4546 (GG 101/A/12-June-2018).

3.2 LSI examples in SUPREME countries

Country fiches (CORILA, 2017; CISD, 2018; NTUA, UTH and NKUA, 2018; RRC, 2018) and comparative LSI overview (NTUA and UTH, 2017) prepared under the SUPREME project provide a complete picture of relevant LSIs at national level, according to the common format decided for the project. The following most relevant and common challenges with regard to LSI in the SUPREME area have been identified in the SUPREME country fiches:

- coastal erosion;
- climate change impacts and disaster risk reduction;
- proper planning and management of connections between land and sea-borne transportation;
- coastal urbanisation and littoralization;
- booming of coastal tourism;
- land-based impacts to marine environment as eutrophication and pollutant contamination along hot spot areas;
- degradation/transformation of land-sea transition system as coastal lagoons and deltas;
- difficulties in establishing a proper protection of vulnerable and high values coastal-marine systems;
- limited connection between coastal-marine and rural development; etc.

A complete catalogue of interactions recognized at country level and their detailed description is included in the country fiches (CORILA, 2017; CISD, 2018; NTUA, UTH and NKUA, 2018; RRC, 2018). Below some examples are provided for indicative purposes to illustrate the variety of interactions analysed in the SUPREME project study area.

Coastal erosion represents a relevant LSI for Italy: a large part of the coastal zone is subjected to a strong recession due to erosion events: between 1960 and 2012 the 23% of the coast (1,534 km) resulted to be subjected to erosion, with an overall recession of 92 km^2; the 19% of the coast (1,306 km) results to be increasing its surface, with an overall gain of 57 km^2. Despite the numerous human protection actions to stabilize the coastline this phenomenon is still impacting the coast, especially along the sandy littoral as in all the Adriatic regions, and where marine flooding events can develop as in Calabria region.

The main reasons of coastal erosion are not only related to natural phenomena as the rising of sea level and/or the erosion action by hydrodynamic forces, but also to human activities that attend on coastal equilibrium sometimes changing its unstable geo-morphological equilibrium (Cantasano et al., 2017).

The impacts of coastal erosion on natural resources and ecosystem services are loss of habitats, with consequent environmental fragmentation, and loss of biodiversity, as well as of landscaping and environmental heritage. The impact on human activities is mainly on tourism development but it can also affect fishery, transport infrastructure and physical restructuring of coastline.

Coastal defence from erosion in Italy is regulated by several directives and laws that origin from different levels of governance, as described in detail in the Italian country fiche (CORILA, 2017).

Figure 2: Coastal erosion along the Italian coast.
Source: (ISPRA, 2017)

Among land-sea interactions from human activities **maritime transport is very relevant for Italy**. The Adriatic-Ionian area is most characterised by traffic linked to the movement of passengers and trucks and trailers in ferries of the ro-pax type. Several central European and landlocked countries depend heavily on the northern Adriatic ports for their imports. Five Northern Adriatic ports (Koper, Ravenna, Rijeka, Venice, and Trieste) have gathered considerable importance within the logistical platform of the North Adriatic Port Association (NAPA). Factors such as marine pollution from maritime transport, marine noise or the introduction of invasive species through ballast waters seriously affect marine and coastal biodiversity, tourism and fishing activities are relevant for this interaction. The major environmental impact of the transport sector in the Adriatic is represented by the potential accidents and the consequent oil spills. In addition, conflicts for space may arise with other sectors like aquaculture and fisheries. Conflicting interests may also occur with the development of offshore energy installations such as wind farms or oil and gas rigs, which may increase the risks of accidents (CORILA, 2017).

Submarine cables and pipelines also represent a relevant LSI for Italy: most important pipelines in the AIR area are located offshore central Italy and connect offshore gas production platforms with coastal power plants. The main project for the region is the TAP (Trans Adriatic Pipeline), based on an agreement signed in 2013 among Italy, Greece and Albania. The TAP will cross the entire territory of Greece and Albania from east to west all the way to the Adriatic Sea coast, landing in the southern part of Apulia Region. Impacts on natural resources can be various and are connected mainly to damages of the infrastructures. As an example, the Trans Adriatic cross-border gas pipeline, which will come ashore in San Foca, in the municipality of Melendugno, will pass only a few kilometres from the Cesine (IT9150032) and Alimini (IT9150011) SCIs, which are characterised by *Quercus spinosa* (oak) forests and undergrowth on land and Posidonia beds and migratory fish and cetaceans at sea. Furthermore, the Puglia regional landscape plan (PPTR), which seeks to protect the fragile ecological balance of the dunes, explicitly prohibits the construction of gas pipelines. Major impacts on human activities can be with trawl fisheries, coastal tourism, renewable energy (offshore) and sand extraction (CORILA, 2017).

Risks to coastal areas (coastal erosion, marine flooding, and saline intrusion) represent important, natural LSI for Slovenia. In the Slovenian coastal area, three areas (Izola, Koper and Piran) were defined as Areas of Significant Impacts of Floods according to the Floods Directive (Directive 2007/60/EC). On two of these areas (Izola and Piran) marine flooding is the main risk source, while in the area of Koper flood risk is a result of both marine and river flooding. Natural coastal erosion processes on the Slovenian coast have been significantly altered, since only 23% of the coastline remains in natural state. An important part of the natural coastline represents the flysch cliffs at Piran, Strunjan and Debeli rtič (RRC, 2018).

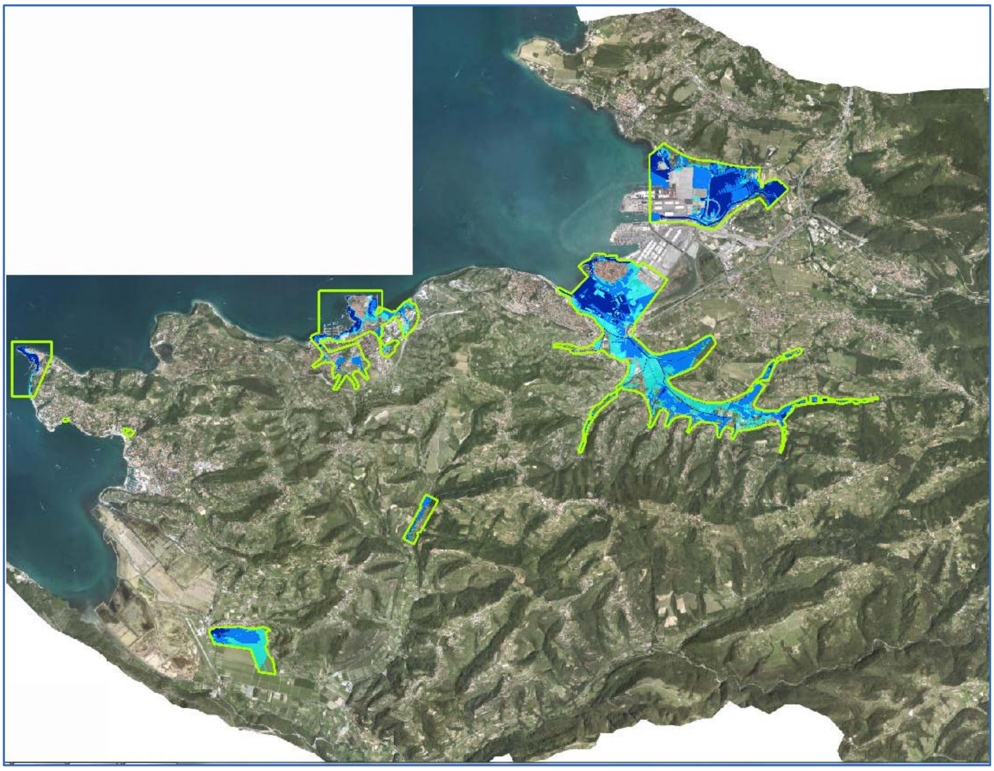


Figure 3: Map of areas with 10-, 100-, and 500-year floods on Slovenian coast – integral map of flood risk. Source: (Altas voda, 2015)

Abstraction of seawater for human uses is a relevant LSI for Slovenia. Some of the water is used for spas, some for the production of heat, technological, and other reasons (such as fire water). Abstraction of seawater can be detrimental to both ecosystem services provision and natural ecosystem functioning, however due to heavily regulated usage of the water abstractions in Slovenia, it is ensured that the impacts on the ecosystem level remain negligible. Since the water is used for a variety of economically profitable sectors (tourism, energy production, technology) its abstraction is beneficial to human society, as it supports jobs, as well as recreational activities. Water abstraction is regulated by granting of permits and rights for the use of sea water, which is under jurisdiction of the Slovenian Water Agency and monitored by the Environment Agency of Slovenia. Geographically, this activity is distributed along the Slovenian coast, see the following Figure 4 (RRC, 2018).

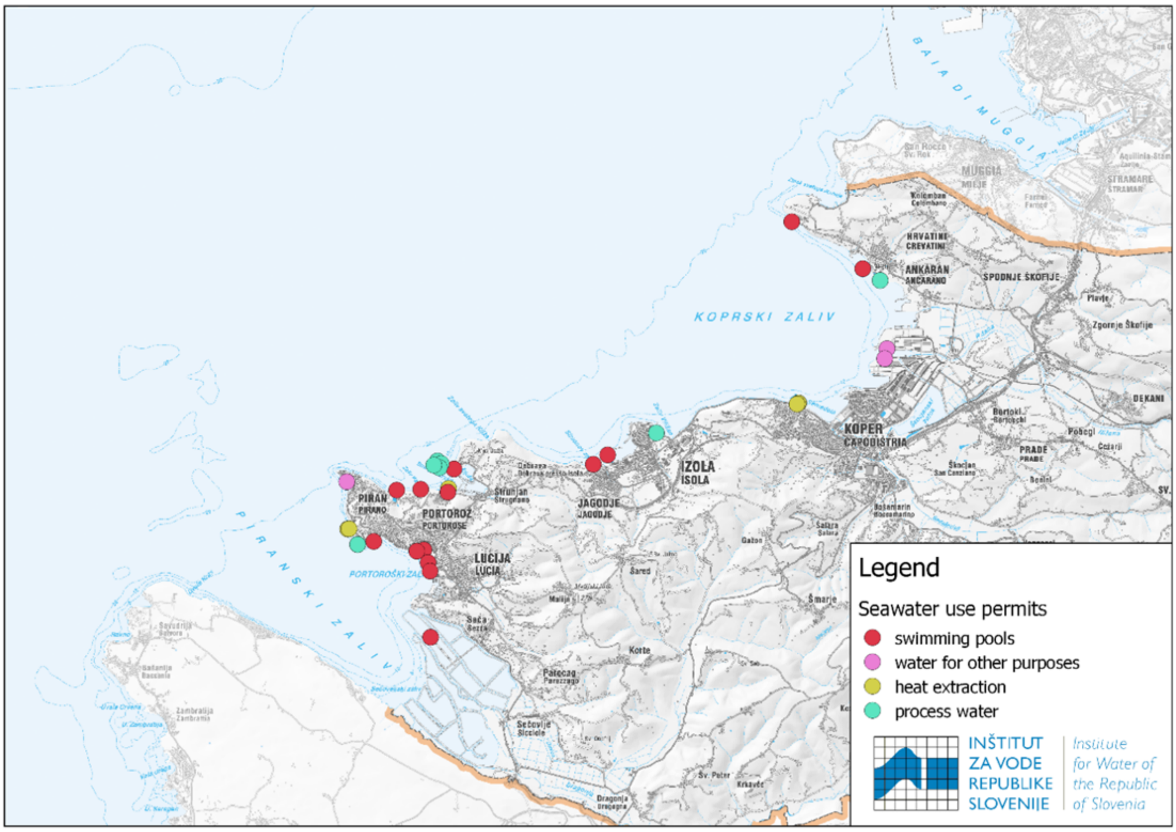


Figure 4: Seawater use permits in Slovenia.
Source: prepared by IzVRS; data source: Atlas okolja, 2017.

Hydrogeological instability is a characteristic of Croatia due to the karstic nature of the coast and the underwater. There are significant areas under flysch where landslides are common risk. Flysch in Adriatic part of Croatia is widespread in Istria, Kvarner region, on some bigger islands as Rab, Hvar, etc., Ravni Kotari, Makarska littoral and southern from Dubrovnik in Konavle littoral. These phenomena determine negative LSI due to the risk of earthquakes, tsunamis, remodelling of watercourses, floods connected with barriers caused by remodelling (upstream and downstream), dislocation of river and stream beds, new risks of potential landslides, changes in relief and consequently in habitats (CISD, 2018).

The strong growth of tourism and particularly the increased number **of cruise ships represent a relevant LSI for Croatia** determined by human activities. Tourism development and growth is visible along the entire coast, while the arrival of cruise ships primarily refers to the largest seaside towns such as Dubrovnik, Split and Rijeka.

Negative impacts on the environment are related to the pollution of the sea and sea bottom in nautical anchors, sea pollution along coastline, chemical pollution, waste and wastewater discharge, oil outbreaks, underwater noise and so on. The expansion of nautical infrastructure affects the local loss of marine flora and fauna. Cruise tourism destinations have problems with resolving the issue of large amounts of generated waste (approximately 4,400 kg of waste per day per ship), while the particular problem is the discharge of ballast water through which invasive species are transported. Negative impact is also seen through the spread of invasive species by nautical vessels and pollution of the sea by discharges from nautical vessels. Excessive use of marine space for tourism can lead to a reduction in biodiversity and attractiveness of the area, as well as reduction of overall space capacity. Positive impacts are related with socioeconomic development by increasing the number and diversity of jobs, as well as diversification of tourism and complementary activities. Sea makes it possible to develop bathing tourism and is a main reason for tourist arrivals in Croatia (CISD, 2018).

Related also with the previous one, **expansion of port infrastructure, construction of breakwaters, construction of road transport infrastructure, for connecting islands (bridges), infrastructure construction in general represent together another relevant LSI for Croatia**. Negative impact on the environment is evident in the degradation of the natural landscape, in damaging the submarine habitat (and thus the marine flora and fauna), the collapse of the coast and the coastal sea floor, etc. The expansion of the port infrastructure often results in the expansion of artificial cover (concrete, asphalt) degrading natural coastline and all related elements of the marine and land ecosystem. Construction of roads and road embankments along the coast often destroys valuable marine habitats nearby. Positive impacts of increased number of port infrastructures are related to the development of maritime traffic and maritime activities (fisheries). Positive impact of the construction of breakwaters is visible in increasing the safety of coastal dwellers. The construction of road infrastructure, primarily bridges, is positive for socioeconomic revitalization of islands (CISD, 2018).

Due to its extensive coastal zone, **marine flooding represents an important LSI for Greece related to national processes** in most parts of its coastal territory. The impacts of marine (coastal) flooding on natural resources and ecosystem services are identified in salinization of coastal aquifers, accelerated coastal erosion, intrusion of salt water in estuaries and river systems, degradation of coastal wetlands, deterioration of flora and mobilization of soil pollutants and other phenomena. The impacts on human activities are represented by increased danger of floods and thus, human loss, destruction of coastal settlements, protection structures and other structures, malfunctions in tourism and transports, risk for the coastal historic and cultural monuments, etc.

Aquaculture is a relevant LSI for Greece, having increased substantially during the past 30 years. Finfish farming is usually an intensive industry that involves an addition of solids and nutrients to the marine environment, and is recognised as potentially causing environmental degradation through these inputs. The escaping of exotic species, transmission and control of disease, and control of predatory species are also areas of concern in this type of aquaculture. In contrast, shellfish farming usually results in a net removal of nutrients from the water column, and is generally considered to cause less environmental damage. Nevertheless, shellfish production can cause a build-up of organic material on the seabed below as a result of particulate fallout from the shellfish or from the altered hydrodynamics around the farm. Aquaculture increases pressure on wild fish species; as practiced today, in intensive aquaculture the high concentration of animals means parasites and diseases spread easily. Massive use of antibiotics and vaccines and introduction of exotic species, are still relevant issues. The sector faces various challenges regarding social, environmental and economic sustainability, which can affect the positive prospects of the activity (NTUA, UTH and NKUA, 2018).

Also, **oil spills play an important role as LSI for Greece**: while major oil spills can have extreme impacts on the marine environment, also frequent smaller spills and discharges can exert significant pressures and must be considered appropriately. These can derive from ship traffic, pipelines or platforms for oil and gas exploration or be related to other marine activities, such as e.g. construction of wind energy platforms. Chemical substances potentially being spilled at sea are referred to as “Hazardous and Noxious Substances (HNS)”. They are substances other than oil which, if introduced into the marine environment can create hazards to human health, harm living resources and marine life, damage amenities, or interfere with other uses of the sea (NTUA, UTH and NKUA, 2018).

4. Proposals for performing LSI within MSP

The analysis carried out for the initial assessment and the country fiches preparation in the framework of the SUPREME projects provides some overall relevant elements on how LSI can be approached within MSP, what are the challenges and what are the most common interactions across the Eastern-Mediterranean countries.

Firstly, a one-size-fits-all approach to address LSI issues within MSP was highlighted not to be appropriate when considering different contexts. The approach to be used not only depends on the specific characteristics of the area, but also on the scale of analysis.

Interactions between land and sea might involve complex relations among environmental, socio-economic and governance elements. Categorization of LSI elements can help in structuring problems understanding; however an integrated perspective is required to address all aspects of LSI.

Institutional fragmentation between (and within) land and sea is another big challenge. This challenge is further exacerbated by the often-existing mismatch between administrative boundaries and the scale of natural and socio-economic LSI processes.

All these points require increased capacity building, education and knowledge transfer on LSI to stakeholders, including land and sea planners. In addition, the following operative elements have emerged as relevant in the discussion on how to deal with LSI at case study level:

- Two typologies of LSI interactions should be considered: interactions due to natural processes and interactions among land and sea-based activities.
- Influence of LSI on planning processes and plans for land and sea areas as well as relations between land and sea communities should be taken into account.
- Temporal dynamic of interactions should be considered. This is particularly relevant when dealing with natural processes across the land-sea interface.
- Criteria to define the scale and geographic scope of the analysis (see section 2.3) should be considered, weighting them according to their relative importance in the specific study area.
- Independently to the specific approached scale, link to a sea-basin scale approach should be taken, as a number of LSI issues have a clear wide-transboundary dimension.
- Linking to the more detailed analysis, identifying the specific hot-spot areas for LSI (e.g. major port infrastructures, river input, coastal nursery habitat, etc.) is also needed.
- LSI analysis should be based on the best available information, transparently highlight current gaps.

4.1 Methodological guideline to perform LSI within an MSP process

Building on the elements identified above and emerged throughout the discussion among the partners of the SUPREME and SIMWESTMED projects, the scope of this section is to suggest a methodological guideline to account for LSI in the MSP process. The methodological guideline is intended to support integrated planning and management of inshore and offshore activities in harmonized manner, considering the functional integrity of land-sea continuum. The proposed methodological guideline capitalizes the experience of the report on Initial Assessment prepared under the SUPREME projects.

The methodological guideline foresees the compilation of a catalogue of interactions, populated with semi-quantitative and quantitative information (also externally associated). The use of a GIS as mapping tool can support the analysis, particularly its advanced phases.

The methodological guideline consists of a step-wise, tiered process considering (Figure 5):

- an initial and more general stocktaking phase (PART A), followed by
- an in-depth analysis about most relevant interactions (PART B), and by
- a final phase (PART C) aiming at informing the planning process about key outcomes from LSI analysis.

PART A and PART B of the **step-wise process** are proposed as two different levels of analysis according to a tiered approach. PART A is intended to be a preliminary analysis phase, aiming at identifying most relevant elements for LSI, and considering, in principle, all known land-sea interactions in the area. PART B represents a focused analysis phase, to be carried out only for the most important interactions, selected through PHASE A. These interactions are those relevant for MSP key issues, identified by the planning process. Given this approach, some steps in PART B represent a deepening of the analysis carried out thorough corresponding steps in PART A.

The **tiered approach** was introduced to ease the application of the methodological guideline both to contexts where the planning process is just in a preliminary phase and knowledge and information are still to be collected and to contexts where the planning process is more advanced. In this second case the guideline could be applied starting directly from PART B or using PART A to re-organized available knowledge, data and materials according to the needs of the in-depth analysis. The tiered approach provides flexibility to the methodological guideline, which is considered useful to both organize available knowledge on LSI and gather new information in a structured framework, avoiding duplication of effort.

Since **LSI analysis is embedded within the process of preparation of an MSP plan**, the proposed LSI steps are clearly linked to some of the typical MSP phases, as highlighted in the following paragraphs and illustrated in chapter 5. Some of the proposed LSI steps consistently overlaps with corresponding MSP ones, and shall therefore implemented together also to avoid duplication of effort and optimize timing. The opportunity to streamline LSI analysis within the process of plan making is highlighted also by Shipman et al., (2018) where links are identified with all the phases of MSP: scoping, assessment, analysis and plan making.

Within the process of plan preparation **LSI analysis should be undertaken in two distinct phases**: 1) in the stocktaking and analysis phase, where the existing and potential interactions are identified based on the present conditions of the territory and the already planned developments); 2) after scenarios identification, where new interactions could emerge (or disappear) due to the planning choices (see the left arrow pointing to PART B in Figure 5).

Active engagement of stakeholders is a key component of the proposed methodological guideline, and it is specifically foreseen in selecting the key LSI interactions (at the interface between PART 1 and PART 2, is Step 8) on the basis of a preliminarily compiled long-catalogue. As for the overall methodological guideline, it is essential that stakeholder engagement in LSI analysis is integrated as much as possible with the process of stakeholder involvement foreseen by MSP.

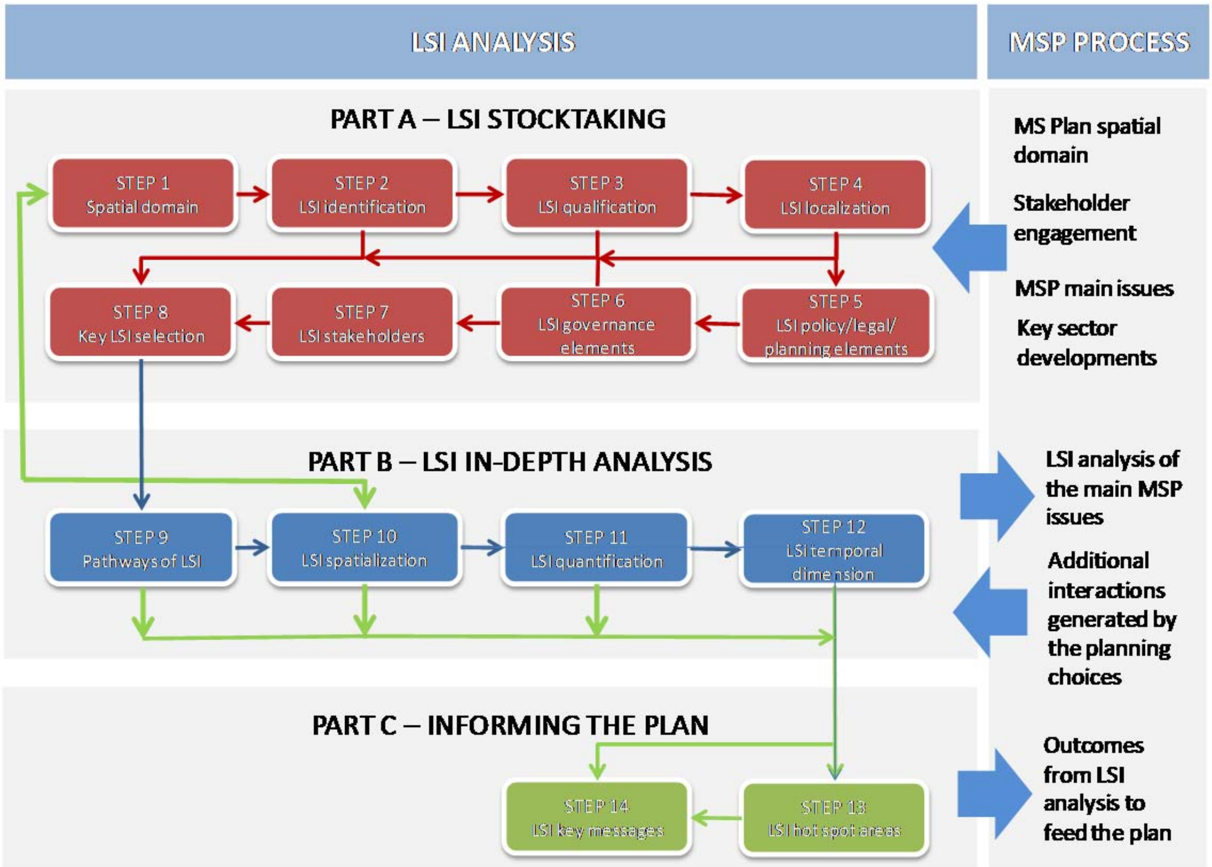


Figure 5: Step-by-step methodological guideline to account for LSI in MSP

The methodological guideline steps are described below. For the various steps, examples are provided of some experiences and tools available across Europe.

In order to provide operational support to LSI analysis in the pilot cases of SUPREME and SIMWESTMED project, a structured table was prepared according to the steps of the methodological guidance and made available to the project partners as editable file (see Annex 1), to be compiled during the analysis.

PART A:
LSI INTERACTION STOCKTAKING

Step 1: Define the spatial domain

The geographic scope of LSI analysis is case-specific and related to the specific MSP context in which LSI analysis is included. As such, the geographic scope of LSI analysis depends firstly from the spatial domain of the maritime plan the LSI analysis is linked to.

LSI analysis is generally applied to the entire MSP area and also aims to identify LSI hot-spots which can be examined in a second iteration of a more detailed MSP-LSI analysis. However, the methodology is flexible enough to be implemented only in already known LSI hot-spots.

In relation to the planning domain, LSI geographical scope has to consider the territorial context, the natural processes involved and the human activities occurring at land-sea interface. These elements define the so-called "functional scope" of the analysis. As a consequence of considering such elements, **the spatial domain of LSI analysis can be larger than the maritime planning domain**.

However, being the scale related to the planning domain, the spatial domain of LSI can be limited to local areas, or focussed on sub-national planning territories, or encompass the entire coastal national territory. For example, if the MSP plan considers the entire country, the LSI analysis is also at this scale. On the contrary, in cases where the MSP process focuses on a specific zone (e.g. with high conflicts and synergies) the LSI analysis is also focussed there. This indeed might even result from identification of a LSI hot-spot from a preliminary large scale analysis.

The extension of the maritime plan, the portion of coast involved and its characteristics, relevant processes and activities are used to define the geographical scope of LSI. Natural and anthropogenic processes landwards are considered to the extent their management is relevant for the conditions of the marine areas and maritime activities.

This step is needed at the beginning of the process to set the boundaries of analysis but – since the spatial domain has to consider the relevant matrix of interactions – this step should be retaken after having developed an in-depth spatial analysis of each key LSI interaction (step 10).

A number of criteria can be identified to delimitate the area of LSI analysis:

- Scale of the plan: continental, regional, sub-regional, national, sub-national, local;
- Coast characteristics: hydrography, geomorphology, bathymetry, etc.;
- Administrative boundaries on the land component of the coastal area;
- Maritime boundaries defined according to national laws and international conventions.

How much the scope of LSI analysis should be extended landwards is to be determined on a case base. In fact, the "functional scope" of LSI depends on physical characteristics, human activities and natural and anthropogenic processes, as well as on the governance aspects. As a guiding principle it can be considered that the landwards limit of the analysis has to be always related to the scope and needs of the maritime plan. Conditions and process taking place on land should be considered only to the extent they are relevant for maritime activities to be planned. For example, the designation of large sea areas to marine renewable energy development would need checking of availability of grid and infrastructures on the coast, and further landwards, for energy distribution. In the case of a river flowing into the sea, environmental conditions, human activities and processes taking place in the drainage basin should be considered only if directly influencing the activities to be planned at sea (e.g. determining conditions that allow/do not allow to carry out marine aquaculture).

Finally, relevant implications of political, socio-economic and environmental conditions at broader (regional, sub-regional) scale should also be taken into account when defining the spatial domain for the LSI analysis. These larger scale conditions could be relevant. For example, for the Mediterranean this analysis might not be limited to the European aspects but also consider interactions at a regional scale. In fact, some important management solutions cannot be implemented by individual countries but at regional scale. Therefore, additional, broader criteria could be taken into considerations:

- Relevant socio-economic processes, outside the plan area, that are (can be) drivers of change: e.g. socio-economic and geopolitical conditions in the area can influence the typology / intensity of maritime transport, determining the flows of people and goods across the land-sea interface;
- Natural process outside the plan area that can be relevant for the LSI and the plan itself: e.g. the presence of big rivers and the characteristic of marine currents can contribute to bring pollution (including deposits or marine litter) to the plan area.

Step 2: Identify interactions

A catalogue of interactions, starting from the initial list indicated in table 1 (section 2.1), is compiled in this step, considering the double direction of LSI: 1) land towards sea and 2) sea towards land.

Both present and potential interactions are identified, the latter being derived from actions foreseen by the available planning instruments (see Step 5 – Identify key policy- legislation – planning aspects).

Interactions can refer to transfer of matter (e.g. water), goods (e.g. sand, oil, fish, etc.), people (e.g. through cruising), information (e.g. through environmental monitoring) across the land-sea interface. These flows can have environmental and/or economic and/or societal implications (ESPON and University of Liverpool, 2013; CAMP Italy, 2017):

- **Environmental Pressures and Impacts**: land and sea can determine positive or negative effects one to the other (e.g. the flow of freshwater from river basin can bring nutrients into coastal waters and ensure they remain productive; coastal water circulation can determine beach erosion; maritime traffic can determine impacts in ports areas due to pollution, traffic congestion, crowding of coastal cities, etc.).
- **Economic effects**: interactions coming from the natural processes or land/sea uses can generate (directly and/or indirectly) added values (as revenues) and/or costs to specific economic activities or economy in general (e.g. sea-level rise can cause flooding and loss of tourism/housing facilities leading to significant economic loss).
- **Societal effects**: societal added values (e.g. job creation, development of local communities, social cohesion) or negative impacts (e.g. loss of local activities, professions, traditions; tension with economic sectors) can be generated.

The space where interactions take place should also be considered: sea surface, water column, coastal / seabed soil, coastal / seabed sub-soil, aerial space (Mourmouris, 2017).

In addition, the temporal component of the interactions should be considered: they might change/appear/disappear during the year or on a longer scale.

As indicated in section 2.2, both interactions related with natural processes and with land and sea uses are relevant and are to be considered (UNEP-MAP PAP/RAC, 2017). The first refer, for example, to coastal erosion, transport of river sediments, flooding. The latter refer instead to pollution from landward activities, littering at sea, increased resuspension caused by dredging. Thus, the following structure is to be considered for the catalogue:

a) Interactions due to natural processes
   i) Land → Sea interactions
   ii) Sea → Land interactions
b) Interactions due to uses and activities
   iii) Land → Sea interactions
   iv) Sea → Land interactions

An indicative list of interactions, to be considered as a starting point for the compilation of the catalogue is reported in Table 1. A starting list of LSIs for the most typical maritime sectors is also identified by Shipman et al. (2018).

Step 3: Localize interactions

In this step information about the geographical location of interactions is included in the catalogue. The collection of the geographical location of interactions allows the preparation of a general map for the study area, by using existing map and a GIS software, identifying, at a first level of approximation, the geographical distribution of interactions.

The temporal component of the interactions should be considered also in this step: there location might vary during the year or on a longer scale.

Main areas of interaction can be evaluated already in this step and overlapping between areas of interaction will help identifying conflicts and synergies related with LSI. Mapping requires the use of GIS-Software (e.g. ESRI, Post-GIS, Mapviewer, R) and the collation and storage of some spatial data in a standardised geodatabase. This is intended to be a preliminary spatial analysis, with results easy to understand, at first glance. Results from this step will be capitalized in Step 10 where an in-depth spatial analysis of key interactions will be carried out.

Step 4: Describe and qualify interactions

In this step each interaction is shortly described in order to explain, from a technical point of view, its nature, what it is about and the reasons why the interaction exists. Each interaction is then evaluated and qualified as positive (+), negative (–) or neutral (0). For each interaction, description and qualification are done in relation to the three dimensions of sustainability (wherever pertinent):

a) Environmental: considering positive or negative effects on the coast or on the sea, respectively.
b) Economic: considering positive or negative economic effects related with the use of land and sea respectively, and human activities in general.
c) Societal: considering positive or negative societal implications of natural or use-related interaction.

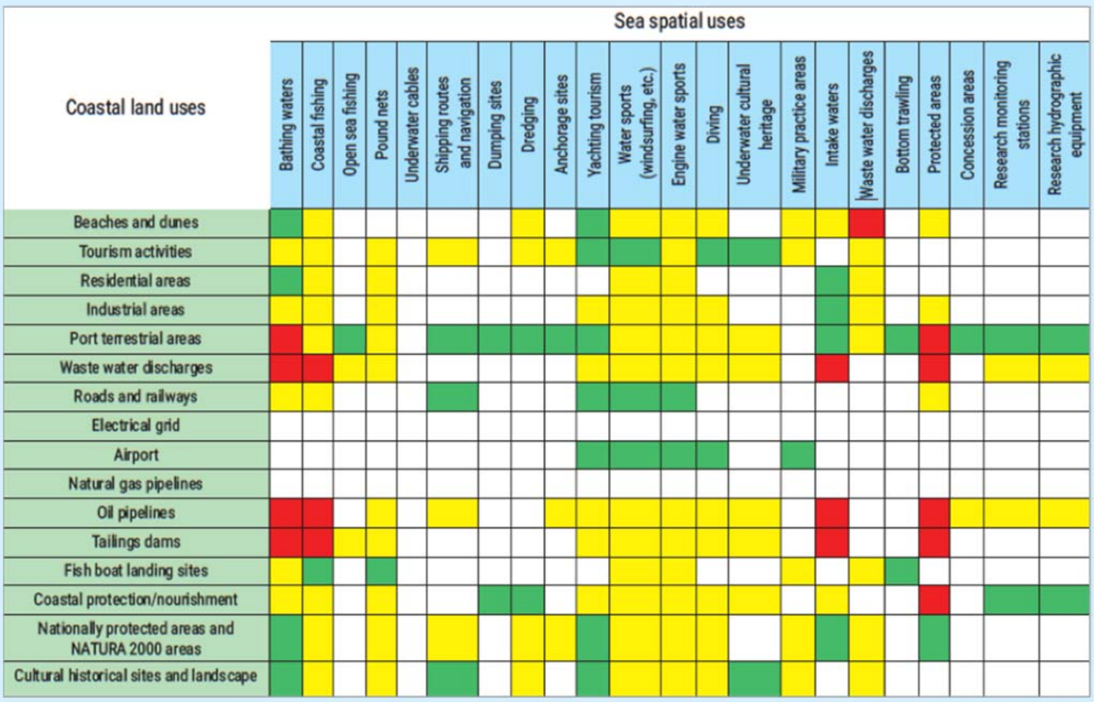
It is worth noting that considering these three dimensions of sustainability allows accounting for complexity of interaction matrix: in fact, the same interaction can have, for example, positive implications for economy and society but negative ones on environment. The complete picture of interactions is needed to inform the planning process. Again, temporal component should be considered also in this step, whenever relevant.

Short description and qualification for LSIs of the most typical maritime sectors, also according to the three categories indicated above, can be found in Shipman et al. (2018).

Box 1: Case study Burgas: Land-sea Interactions

Qualification of LSI interaction was done in the framework of the MARSPLAN-BS project, for the pilot Maritime Spatial Plan developed for the area of Burgas. Burgas is the fourth largest city in Bulgaria, located along the South Bulgarian Black Sea coast and one of the most important ports at the Black Sea with significant infrastructure for supporting the economic activities.

Following the analysis of the natural environment and environmental conditions, the urban development, existing economic activities, potential interests and land/sea uses along the coast and in the marine area of Burgas, a matrix showing the conflicts and synergies between different land/sea uses was produced. The latter is shown in the figure below: green colour are interactions without conflict and compatibilities between land and sea activities, and with environment; yellow colour indicates weak conflicts between land and sea uses and with coastal and marine environment; red colour indicates interactions with conflicts in the land-sea uses and environment; empty boxes denote to no interactions identified.



Sources and links:

- http://msp-platform.eu/sites/default/files/marsplan-bs-burgas_lsi.pdf
- http://marsplan.ro/en/
- http://msp-platform.eu/practices/case-study-burgas-land-sea-interactions

Step 5: Identify key policy – legislative – planning aspects

Aim of this step is providing a general overview of policy, legal and planning aspects. In this step the catalogue of interactions is integrated with main information on policy, legislative and planning instruments. This step is crucial, since there seems to be general concern across the EU for a lack of integration regarding the application of European legislation such as the MSP Directive, the Marine Strategy Framework Directive, as well as other international legal instruments in force in the MS, including European legislation and strategies (EC DG MARE, 2017). A fundamental outcome of this step is the identification of potential interactions, deriving from actions foreseen from the existing (sector or cross-cutting) plans. This step can either be undertaken here (PART A) or included in step 9 (PART B); in the latter case the policy, legislative and planning aspects will be considered only in relation with the key interactions selected in step 8.

Step 6: Identify key governance aspects

Aim of this step is providing an overview of main regulatory stakeholders. In this step – closely linked to the results from step 5 – the institutions engaged with interactions' topics / processes / sectors in the area are identified. This step can either be undertaken here (PART A) or included in step 9 – Pathways of interactions (PART B); in the latter case the governance aspects will be considered only in relation with the key interactions selected in step 8.

Step 7: Identify and engage stakeholders

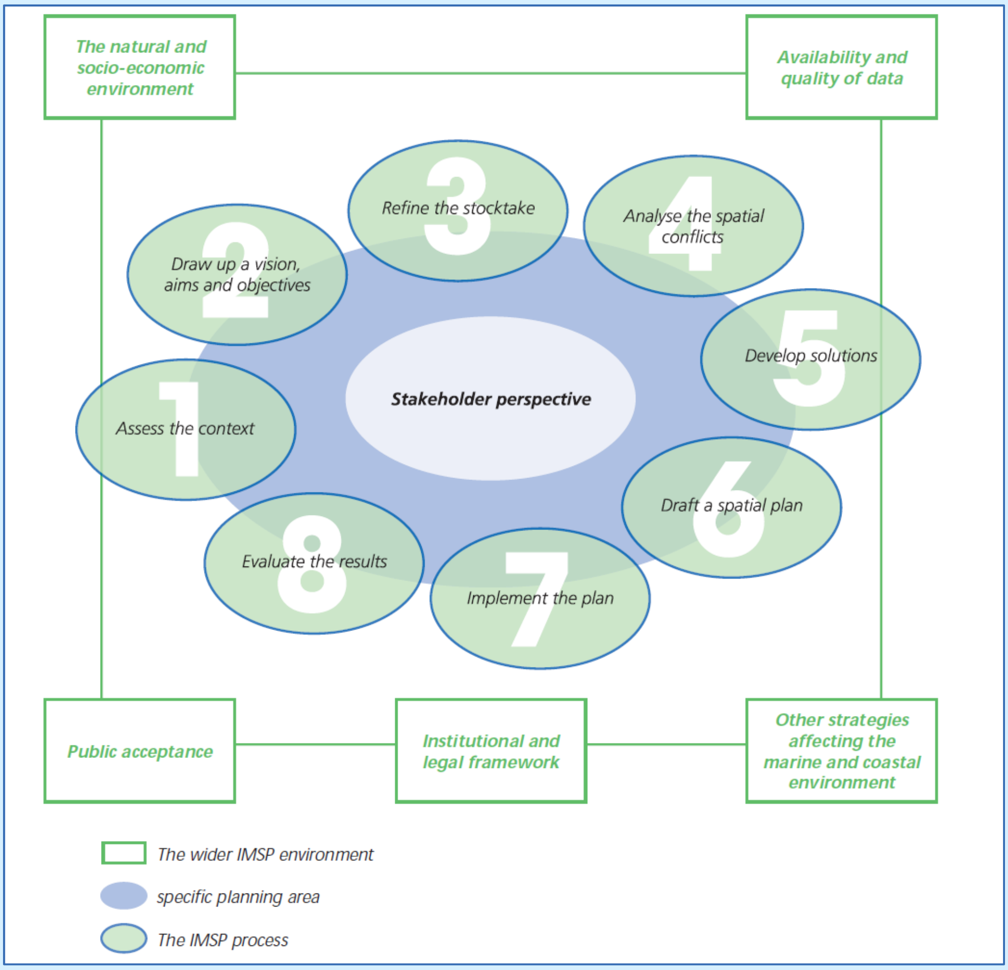
Stakeholder engagement for LSI analysis is to be integrated into the MSP overall process of engagement. This is not a separated process but a specific part of the MSP engagement process (see paragraph 5.1 – Figure 7 for a complete overview of the links between the steps of the LSI methodological guideline and the steps of the plan preparation).

The stakeholder engagement plan under the MSP process should foresee specific actions in order to address LSI issues. Some stakeholders involved in LSI can be the same ones involved in planning process (e.g. those with specific interests in the sea space) but others are to be engaged specifically for LSI (e.g. those with specific interests in the coastal area and inland territory in relation with the sea). Anyway, being always recommendable to stakeholders' effort, interactions on LSI relevant topics can be organized in parallel as part of those relevant for the overall MSP process. Nevertheless, a Stakeholder active role in discussing and selecting key LSI interaction is foreseen. Relevant stakeholders are identified, with reference to the interactions catalogue. Representatives of institutions engaged in the topics/sectors involved in the identified interactions, representative of academia with competence on of topics relevant for the interactions, actors of the governance systems and representatives from the civil society are identified. Brainstorming process can be applied to collect an exhaustive list of people/groups/institutions. They will then be structured according to the common procedures of stakeholder mapping.

Box 2: Stakeholder involvement in MSP

The experience on stakeholder involvement in MSP of the BaltSeaPlan project, as well as of other projects (e.g. BALANCE, PlanCoast) is summarized in the "Stakeholder involvement in MSP report" which can be useful also for LSI analysis specifically. This report aims to address the issue of stakeholder management in MSP by presenting and discussing the methods / tools and experience gained by BaltSeaPlan partners. It provides recommendations, guidance and inspiration for stakeholder management of MSP processes, while demonstrating that there is no "one-size-fits-all" approach or solution.

For example, it provides insight on finding the right timing and techniques to interact with stakeholders as well as an overview of possible techniques (e.g. Public hearings, Focus groups, Surveys, Interview, Workshops) and examples of their application.



The integrated MSP Process (PlanCoast, 2008)

Sources and links:

- BaltSeaPlan Report No 24 "Stakeholders Involvement in MSP"
- http://www.msp-platform.eu/practices/stakeholder-involvement-msp
- http://www.baltseaplan.eu/index.php?cmd=download&subcmd=downloads/2_BaltSeaPlan_24_final.pdf
- http://msp-platform.eu/practices/case-study-burgas-land-sea-interactions

The following categories of stakeholders can be considered (adapted from BaltSeaPlan, 2018):

- Stakeholders formally involved in the MSP process. These stakeholders are representatives from public institutions like ministries, regional or local authorities – depending on the scale of analysis. They are identified based on the analysis of relevant legislation and existing institutional framework and the assessment of political and administrative responsibilities for the area of analysis.
- Stakeholders linked to commercial and non-commercial activities in and around the project area. These stakeholders are identified on the basis of information collected in the catalogues of interactions, where relevant activities are identified.
- Stakeholders who contribute to the public and / or the scientific debate on all governance level, regarding the uses of the maritime and the coastal space: these stakeholders are also identified on the base of the stocktaking phase and additional focussed research within the area of analysis.

In this process stakeholders are expected to play an active role in discussing and selecting key interactions (step 8). Their role is therefore expected to be active and to take the form of “stakeholders as partners approach” (BaltSeaPlan, 2018) where the responsible entities for (MSP and) LSI analysis contribute to the analysis on equal terms.

Step 8: Select key interactions

Selection of key interactions represents the conclusive step of the first phase of LSI analysis. It is suggested to undertake this step through stakeholder engagement. The aim of this step is to prioritize interactions and select the most relevant ones to be considered for further steps. A stakeholder driven process is suggested in order to engage in LSI analysis people operating on land and sea, allowing exchange of experiences, views, knowledge and culture.

Discussing, prioritizing and selecting interactions require sharing of technical information and entering in the details of the selection process. It is therefore an activity to be carried out within relatively restricted groups. In view of these specific objectives, the following engagement techniques are suggested: interviews with key stakeholders, focus groups, local workshops. Number of interviews, number of focus groups to be arranged and their size (number of participants) and size of workshop is to be defined based on site-specific base.

For interactions prioritization the following methodology can be applied (two-steps process):

1. A catalogue of interactions a long-list is prepared based on desk research.
2. A first selection is done by interviewing key stakeholders and consulting within 1-2 focus groups. A short-list is thus prepared.
3. The shortlist is discussed, presented, amended and finally validated in a technical workshop.

Alternative approaches can be used for prioritization:

- Quantitative approach (scoring): each stakeholder assigns a quantitative score to each interaction, within a pre-defined scoring range.
- Semi-quantitative approach: each stakeholder selects her/his top relevant interactions within a maximum number of allowed preferences (e.g. three, five, seven).

Interactions can be prioritized as a whole, or separately, according to different criteria. In any case, links should be guaranteed between LSI analysis and the MSP process. The MSP relevant issues identified for the area by the planning process can be used to prioritize interactions: their relevance for each of the issue can be scored. If the maritime plan is addressing a strong emphasis on Blue Growth, interactions relevant for maritime sectors development should be selected in this step, by using appropriated prioritization criteria. Alternatively, according to a more general approach, the three dimensions of sustainability (environmental, economic, and societal) can be used as criteria for scoring.

Prioritization using a quantitative approach can be done according to the following steps:

1. Identification of prioritization criteria (e.g. each of the three dimensions of sustainability).

Interaction	Environmental priority	Economic priority	Societal priority

2. Scoring according to criteria: scoring metric is defined (e.g. High = 3, Medium = 2, Low = 1, Not Known). This step is undertaken by each stakeholder interviewed.

e.g. Stakeholder n. 1

Interaction	Environmental priority	Economic priority	Societal priority
INT-1	1	3	3
INT-2	2	1	3

3. Integration of scores from stakeholders: average score per interaction, per criteria is computed by averaging the scores from stakeholders (other metrics can be also used).

Average scores across stakeholders (results for stakeholder n.1, from previous box)

Interaction	Environmental priority	Economic priority	Societal priority
INT-1	2.1	2.8	2.6
INT-2	1.8	1.2	2.8

4. Integration of criteria: criteria can be integrated in order to make ranking of interactions more operational. Average score by criteria can be computed (other metrics can be also used). Alternatively, criteria can be also kept separated and separated rankings can be provided according to each of them. Key interactions to be evaluated in the following steps of analysis can selected by expert judgement (e.g. with a final Focus group).

Spatial specificity should also be taken into account in prioritization. When developing the analysis at country or regional (sub-country) scale, key interactions can be different in different sub-areas of the LSI analysis domain. Area-specific interactions are therefore identified. Next steps of this methodological guideline might in principle be focussed only on the interactions existing in the identified areas. If this is the case, step 13 in Phase 3 is not to be undertaken and the areas identified here represent already "hot spot of interactions".

Box 3: Analysis of conflict scores

The analyses of conflict scores is a tool prepared under the COEXIST project. It applies a mixture of expert judgment and numerical scoring to make the classification of potential interactions repeatable and more transparent than an expert judgment approach alone.

The calculation of conflict scores is organised in three steps:
- Definition of activities of interest;
- Setting spatial and temporal attributes of each activity;
- Applying rules to calculate the conflict score of activity.

The strength of this approach is that it is a transparent and reproducible approach to analyse expert knowledge. However, the only use of expert knowledge may be also seen as weakness. This is why it has been associated to data and information on spatial and temporal attributes. Another characteristic of this approach or tool is that extra costs for users and the level of software skills needed are quite low.

Sources and links:
- www.coexistproject.eu
- www.coexistproject.eu/images/COEXIST/Tools/ConflictScores_FINAL.pdf
- http://msp-platform.eu/practices/analysis-conflict-scores

PART B:
LSI INTERACTION IN-DEPTH ANALYSIS

This part of the LSI analysis is to be undertaken for the interactions identified as relevant via Part A. In case or more advanced planning contexts, where the aspects included in Part A are already available, practitioners should make sure the knowledge and data are already organized in a catalogue containing the elements indicated above (including e.g. localization, description and qualification of interactions).

Phase B should be undertaken also for the new catalogue of interactions emerging as result of the choices made in the planning process. New interactions might emerge from the planning decisions; other could disappear or change in nature. If this occurs, a second round of LSI analysis is needed.

Step 9: Pathways of interactions

In this step mechanisms behind each selected interaction are identified and described: they can relate to flows of matter (e.g. water discharged by a river system, pollutants transported by sea currents, but also landed fish, extracted oil – gas, sediments), flow of monetary values (e.g. revenues from economic sectors), flow of information (e.g. results from monitoring site at sea or on land).

Additionally, in this step, policy – legislative - planning aspect could be in-depth analysed: comments are included about synergies / reinforcement, conflicts / contradictions and / or gaps related to these aspects.

Moreover, governance-related aspects are also in-depth analysed: comments are also included about eventual uncertainty on responsibility or known weaknesses of the governance system. Also elements to be strengthened and improved are collected in the catalogue. The interaction catalogue is complemented with a list of relevant actors from the governance system.

The latter is a relevant element to be considered. In fact, the complex pattern of responsibilities between land and sea was identified as a key issue of concern in relation with LSI interactions. A diffuse uncertainty about who is responsible for what and whether the scale of governance related to LSI issues is fit for purpose has been claimed, together with the existence of a mismatch between administrative boundaries and the scale of natural and socio-economic LSI processes (EC DG MARE 2017).

Step 10: Spatialize interactions

The specific spatial domain of each interaction is identified and mapped. Spatial domain includes: the area where the interaction is generated (e.g. a point of waste water discharge located along the coast, the location of a wind mill at sea), the area exposed to impacts/benefits (e.g. the coastal area benefitting from revenues by small-scale fisheries, the marine ecosystems exposed to impacts of sand extraction from the seabed), the area in between (if pertinent).

Mapping of interactions can be finalized at evaluating cumulative impacts of interactions (on land and at sea), thus representing a valuable support to integrated planning of marine-coastal areas, aimed at reducing conflicts between different uses, efficient use of resources, protection of biodiversity and promotion of the principles of sustainable development (CAMP Italy, 2017).

For identifying and mapping the interactions, the following elements can be considered:

- Typology and extension of the LSI processes: widely diffused (e.g. flow of goods, large-scale transport or nutrient loads from large drainage basin) or spatially restricted (e.g. coastal erosion or local consumption of marine resources).
- Spatial and temporal distribution of human activities.
- Distribution of ecological elements: interfaces, ecological connections, ecological barriers.

Spatial information about key interactions is going to be used in step 14 for the identification of LSI hot-spot areas.

Box 4: Georeference Interactions Database

Georeference Interactions Database is a web-based flexible database, developed within the COEXIST project connected with a number of tools (stress level and conflict score analyses) to analyse marine activities and interactions (conflicts and synergies). GRID has a dedicated GIS application to analyse spatial distribution of present and future activities and interactions.

The Version GRID 1.2 allows performing the following types of analyses considering different possible scenarios:

- calculation of conflict scores;
- generation of matrices of interactions;
- plot of maps;
- evaluation of spatial interactions existing in a specific marine coastal area;
- calculation of asymmetric spatial overlaps;
- calculation of stress levels.

Sources and links:

- www.coexistproject.eu
- www.coexistproject.eu/images/COEXIST/Guidance_Document/Best%20practices%20guidelines_FINAL.pdf
- www.coexistproject.eu/images/COEXIST/Tools/GRID.pdf
- www.msp-platform.eu/practices/georeference-interactions-database

Step 11: Quantify interactions

In this step interactions are possibly quantified, based on available data and knowledge. This step corresponds to pressures / impacts analysis of negative interactions and to evaluation of positive impacts (i.e. benefits, added values) for positive interactions.

In this step results available from a variety of other policy and sector analysis can be capitalized: Water Framework Directive, Marine Strategy Framework Directive, and ICZM Protocol.

Quantitative information concerning pressure / impact / benefit indicators are included in the catalogue in a synthetic format. Based on the quantitative knowledge, each interaction is ultimately classified as:

- of Low intensity;
- of Medium intensity;
- of High intensity;
- of Very high intensity.

As for the entire methodological guideline, whenever pertinent, the interaction is qualified considering separately the three dimensions of sustainability (environmental, economic, societal). This classification is going to be used in step 14 for the identification of LSI hot-spot areas. The indicator(s) used to classify the interaction is also specified in the catalogue.

Box 5: Examples of indicators and tools to quantify interactions

Lots of different approaches and experiences are available from across Europe that can be capitalized in this step. For example, the PERSEUS project characterised the pressures on the coastal areas of the Mediterranean and Black Seas by preparing a comprehensive matrix based on an inventory of activities, pressures, impacts and ecosystem components. Expert opinions were used to weight and score pressures/impacts and identify priorities in the different areas. Simultaneously, a methodology was developed in order to build indicators related to some pressures in the coastal areas (fishing, aquaculture, sewage and river plumes, coastal artificialisation) of the SES using Very High Resolution (metric and sub-metric) satellite images.

In terms of tools available for pressures / impacts analysis the "DPSIR framework" (Drivers, Pressures, State, Impact and Response) was highlighted to be one with of the most suitable ones because it displays quite well the complexity of interlinks and interrelations in marine ecosystems. The "Qualitative Risk Analysis" (consequence X likelihood) method is also to be considered for risk and vulnerability assessment thanks to its simplicity and applicability by any end-users, devoicing specific scientific knowledge and technical expertise for its use.

Concerning tools for economic evaluation, the CBA Tool Kit – a user-friendly tool for Cost-Benefit-Analysis was indicated as one of the most convenient to be used. The COAST model supports stakeholders in planning and evaluating flooding and estimating their economic impact can also be considered.

Step 12: Analyse temporal dimension

In this step temporal dimension of interactions is analysed. Interactions are qualified as:

- Irrelevant temporal dimension.
- Temporal dimension relevant on the short term (e.g. on a cyclic base: daily, seasonal; on a non-cyclic base: inter-annual variability).
- Temporal dimension relevant on the long term (e.g. changes in environmental conditions along years; trends in sector development; changed climatic conditions).

In addition, interactions are evaluated under the future scenarios identified by the planning process.

PART C:
INFORM THE PLAN ABOUT LSI ANALYSIS OUTCOMES

Step 13: Identify LSI hot-spot areas

In this step hot-spot areas are identified within the larger area considered for LSI analysis. Hot spot areas are those areas with high intensity of key LSI. Outcomes from step 10 (spatialize interactions) and step 11 (quantify interactions) are considered to identify these areas.

Firstly, three distinct maps are prepared considering separately the three components of sustainability:

1) Hot spots for environmental interactions;
2) Hot spots for economic interactions; and
3) Hot spots for societal interactions Finally, an integrated map is produced combining the previous ones.

This step is not undertaken in the cases where area-specific interactions have been identified in step 8 and the following steps of the methodological guideline have been focussed only on the interactions existing in the identified areas. These already represent "hot spot of interactions".

Step 14: Identify key messages from LSI analysis

This final step is aimed at identifying **key message from LSI analysis to inform the planning process**. The possibility to involve stakeholders in selecting key messages is evaluated on a case base. Essential elements for identification of key message can include:

- Comments about synergies / conflicts / gaps derived from the analysis of policy, legislation and planning context, and of governance system.
- List of the most relevant LSIs in the planning area (max 10 interactions) with a short description of their nature (e.g. mechanisms, positive or negative, which dimension of sustainability most relevant).
- List of key stakeholders to be engaged in order to deal with most relevant LSI interactions.
- Localization of hot-spot area of LSI and their characteristics.
- Potential mitigation measures that might be applied to minimize negative impacts and maximise positive impacts can be suggested, together with options for addressing the LSI through plan making (Shipman et al., 2018).

5. Integrating LSI in spatial planning

This document aims to propose a methodological guideline for LSI analysis within the MSP process. However, results from the LSI analysis can inform and support not only maritime spatial planning, but a wider variety of planning contexts. According to the conceptual approach proposed in this document the entire process of accounting for LSI can be divided in three phases (as shown in the diagram of Figure 6):

1. Setting context and defining concept (as described in chapter 2);
2. Evaluating LSI (according to the proposed methodological guideline presented in chapter 4);
3. Incorporating LSI analysis outcomes into (coastal and maritime) plans (this chapter).

Figure 6: The phased process to account for LSI in planning contexts

Transferring of LSI analysis outcomes (key recommendations according to the last step in the proposed methodological guideline) represents the final and probably the most critical phase in the process of accounting for lands-sea interactions. In fact, given the heterogeneity of planning contexts, the timing and the ways to incorporate LSI outcomes may be different. When planning processes formally recognize LSI (like in the case of ICZM or MSP) this can be done within a clear scheme and governance. When LSI is not formalized as a step in the planning process informal mechanisms should be established.

However, LSI assessment shall be a key component of any process aiming to design a maritime spatial plan, as clearly required by the EU MSP Directive.

Figure 7 provides a snapshot representation about how the proposed methodological guideline for LSI analysis can be embedded into the MSP process.

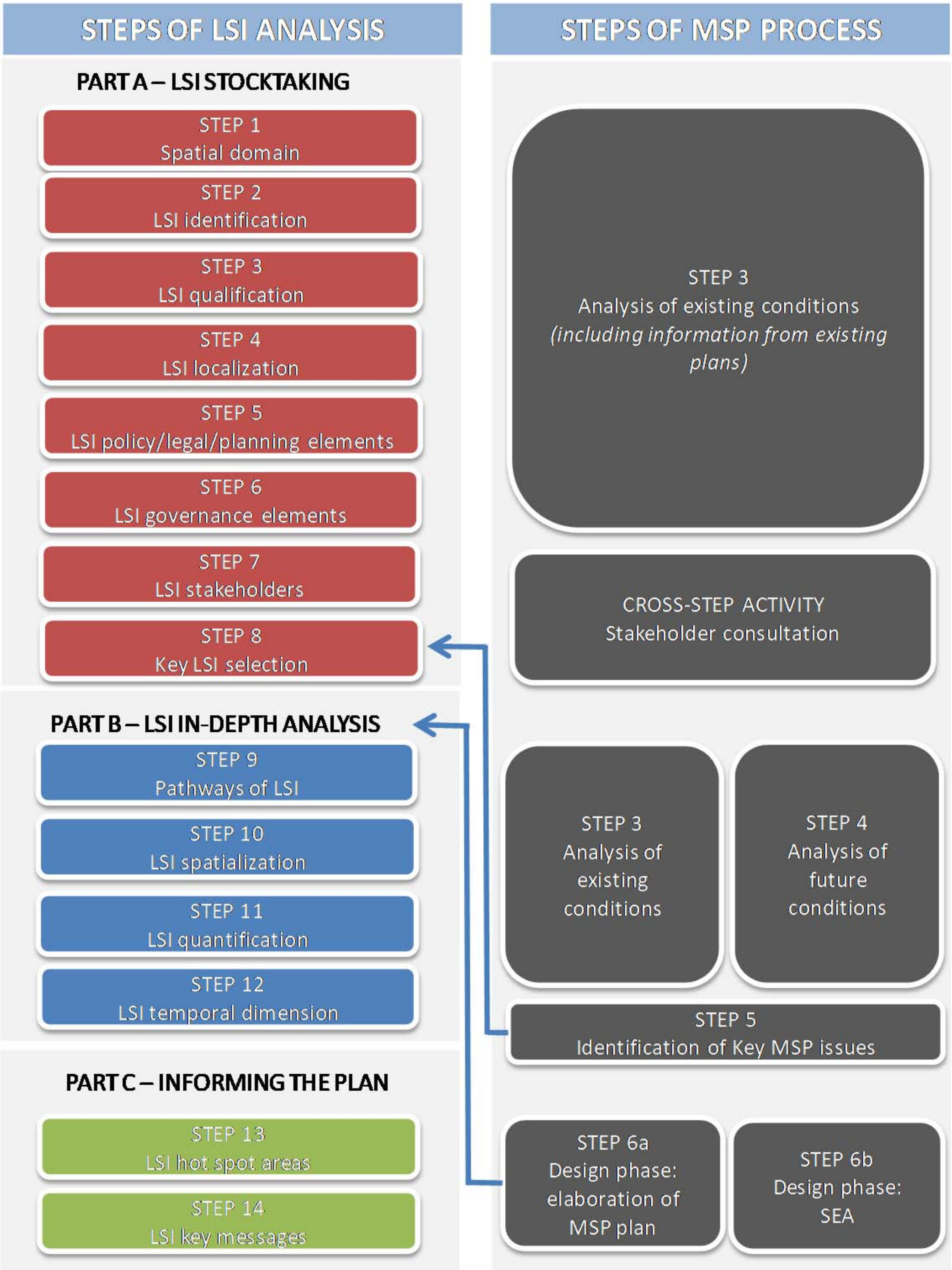


Figure 7: Links between steps of the proposed methodological guidelines for LSI analysis (chapter 4) and the steps for MSP implementation included in the "Conceptual Framework for MSP in the Mediterranean".

6. LSI in the case studies area

Interactions between land and sea have been investigated in the context of SUPREME case studies, some of which (at least in part) applied the methodological guideline for LSI analysis. In general, case study analysis confirmed the added value and usefulness of the proposed approach and its applicability. It also highlighted strengths and weakness and provided recommendations for its further evolution.

The **Northern Adriatic** case study applied Parts B and C (steps 9 to 14) of the methodological guideline for LSI analysis. As a general comment, it was stressed that the information required for the implementation of this guideline was too detailed, at least for some of the steps, for the case study context. A preliminary application was therefore developed, which indeed enabled to localize the main area and activities involved in LSI. This also allowed identifying methodological gaps and proposals for future ameliorations.

The LSI analysis focused on the sectors most relevant for the area: aquaculture, fisheries, tourism, offshore oil and gas, military use of coastal and marine areas. Detailed results of the analysis are described the case study report; tourism sector is considered here as an example to illustrate the performed analysis.

Typologies and pathways of interactions were firstly investigated (step 9). Coastal tourism is strongly related to LSI as it depends on the quality of the coastal and marine environment; at the same time it is a relevant pressure on the same environment it relies on. Rivers input of nutrients and contaminants in the bathing waters negatively interact with tourism activity, while tourism is source of pollution affecting coastal waters.

Fishing tourism (pescatourism) is one of the activities with the higher development potential in an LSI perspective, which can help improving synergies between the two involved sectors. In a wider LSI perspective, development of a combined offer involving sustainable and compatible activities at sea (e.g. pescatourism, diving, etc.) and on land (e.g. visit to museums, environmental research and marine species recovery centres, etc.) can be fostered in the area, sustainably exploiting its wide range of cultural and naturalistic sites. Touristic itineraries crossing the land-sea border could be supported, including some of the most important Italian wetlands (e.g. Venice and Caorle lagoons, Po Delta) and touching world famous art cities like Venice and smaller villages with historical maritime tradition (e.g. Caorle, Chioggia, Cesenatico, Cervia).

Tourism is widely distributed along the coastline of the case study area. High concentration of tourism-related LSIs can be found in the Po Delta, in Venice and Caorle lagoons and related settlements, as well as in the towns of Chioggia, Cesenatico and Cervia (step 10). For most of the considered sectors, the analysis highlighted the difficulty of quantify interactions (step 11), due limited availability of needed knowledge and data. This was also confirmed in the case of the tourism sector, in particular in relation to site-specific evaluation of socio-economic aspects and the LSI interactions related to environmental quality. The case study stressed that tourism-related LSI interactions show a strong temporal dynamic, linked to seasonality of the tourism activities.

Based on the results of the LSI analysis applied to all the four considered sectors, the Northern Adriatic case study identified LSI hot-spot areas (step 13), as reported in Figure 8 (note that boundaries of the highlighted areas are approximated and absolutely not exhaustive of all LSI). Area 1 refers to the whole land-sea interface of the case study area and is related with the LSIs derived by the presence of rivers and ports, which are located along the entire coastline. Area 2 refers to LSI between aquaculture and tourism activities. Area 3 refers to LSI related to subsidence processes along the coast due to the presence of offshore extraction platforms. Finally, area 4 refers the military area and the LSI interactions that origin from its presence, both from the environmental and socio-economic points of view.

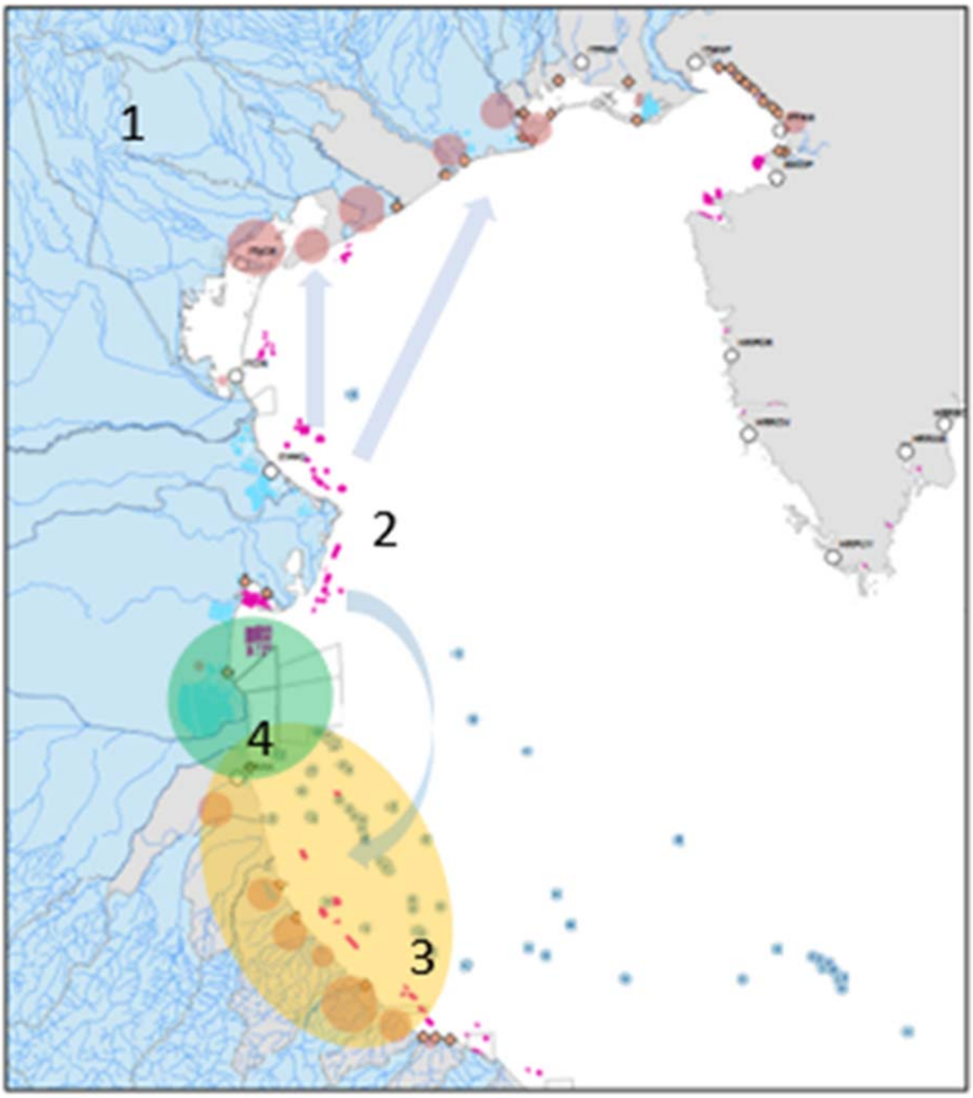


Figure 8: LSI hotspots identified in the Northern Adriatic case study. Source: (CORILA, 2018)

Based on the test of the LSI analysis performed in the Northern Adriatic case study, following conclusive remarks were provided:

- The geographic scale influences the LSI analysis in terms of selection of relevant formation, availability of needed information, depth of the analysis, type and entity of the (socio-economic, administrative and environmental) interactions identified. When applying the methodological guideline, the scale of analysis shall be clearly defined.
- A more advance definition of what is meant by land-sea interaction might be useful to better support the analysis and orient gathering of needed information. This would also help in better distinguishing the concept of LSI from those of conflicts and synergies among uses and between human uses and environment.
- Depending on the involved processes and sectors, land-sea interactions can be very different in terms of intensity and spatial domain. There is the need to develop in more details criteria and approaches to properly identify boundaries of the LSI analysis both landward and seaward. More research is needed on this issue and others (as for example the one considered in the previous point) to advance the understanding and framing of LSI topics.
- The performed LSI analysis highlighted that in the case study area there is not exhaustive information to assess the effect of land-sea natural processes on coastal and maritime activities. This understanding is considered highly important – and shall not be underestimated – to identify compensations measures or even anticipate negative interactions.
- Collaboration, co-production of knowledge and sharing of needs and priorities between maritime based and terrestrial planning communities are fundamental to pave the way toward the best practice of planning.

Within the SUPREME project, some of the steps of Part A of the methodological guideline were also tested in the **Dubrovnik-Neretva County** case study in Croatia. Steps 1 to 4 were implemented considering interactions due to both natural processes and human activities, which were categorised in terms of sea to land and land to sea interactions.

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

Referring to land to sea natural interactions the case study highlighted the role of spring and fall rainfall. They wash-off the surface portion of the soil transporting organic nutrients to the coastal waters, thus beneficially influencing the sea trophic levels.

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

Similarly also land to sea interactions are characterised by significant negative impacts. Most significant ones are those related to coastal tourism and aquaculture. Over decades, tourism has experienced continued growth and deepening diversification to become one of the fastest growing economic sectors in Croatia. However, the importance of coastal environmental components to support sustainable coastal tourism is still ignored. The resulting impact on coastal communities along with their physical, socio-economic and cultural environment is increasing, threatening space by overuse, causing sea pollution and directly affecting coastal habitats. Aquaculture (mariculture) is a traditional economic activity in Mali Ston bay in the Dubrovnik-Neretva County. Typically, aquaculture zones exclude other uses, bringing to spatial conflicts. Although shellfish farming is in general environmentally neutral, some typologies of aquaculture may lead to habitats damage, spreading of diseases and water pollution.

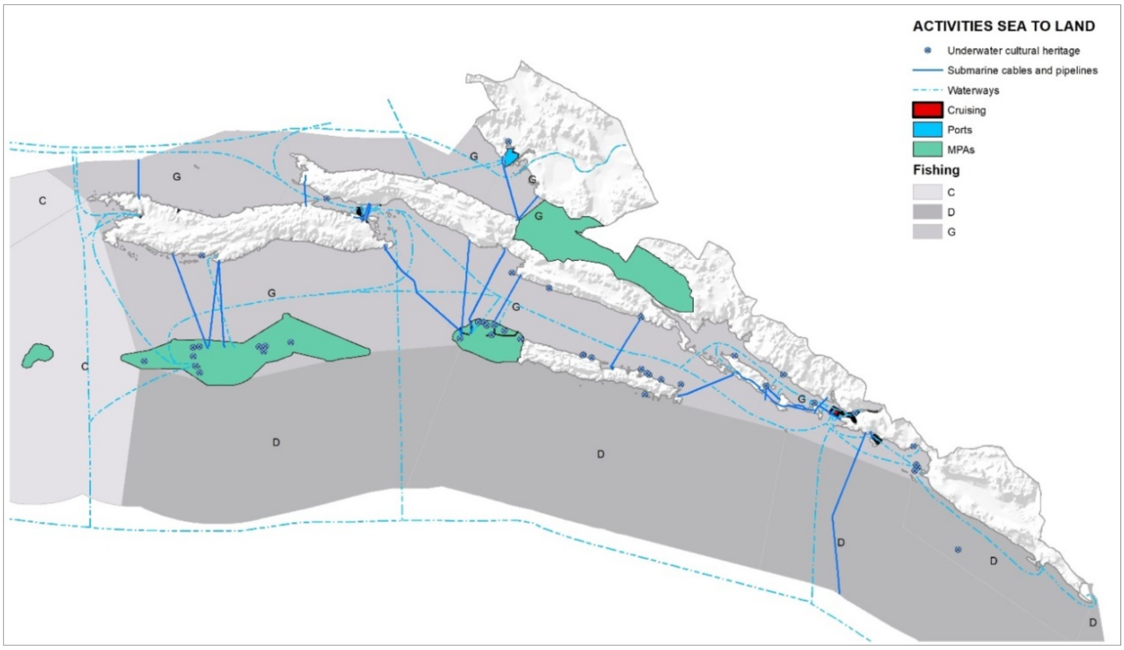


Figure 9: Sea to land interactions related to human activities in Dubrovnik-Neretva County. Source: (Glavor, H. et al., 2018)

Within the Dubrovnik-Neretva case study the geographic scope of LSIs (step 3) was analysed through GIS tools, relying on data provided from the County spatial plan. Localization of some interactions showed difficulties: for some LSIs was not feasible, while for others it emerged that localization is not univocal and therefore requires more detailed analysis when intensity is considered, making the analytical process more complex. For example the areas of Dubrovnik and Korčula are both heavily influenced by cruising tourism, but the intensity of influence on the first is much stronger. The LSI analysis was completed with the identification of key policy, planning and legislative aspects for the considered LSIs (step 5), as well as with the identification of responsible bodies (step 6).

The following conclusive remarks were derived from the implementation of the LSI analysis in the Dubrovnik-Neretva County. The application of the methodological guideline resulted useful for the identification and representation of current land-sea and sea-land interactions. Result of the analysis can serve as a basis for further planning of coastal and marine areas, including the integration of specific LSI-oriented measures in the plan. It is recommended that this kind of analysis is conducted in the initial phases of the plan development. Data availability and acquisition plays a very important role for the elaboration of coastal and marine plans, including therefore the analysis of LSIs. Data gaps shall be clearly highlighted, while effort should focus on data production, integration and public sharing.

The LSI analysis of the Dubrovnik-Neretva County case study also applied the structured table prepared according to the steps of the methodological guidance and reported in Annex 1. The same operational tool was tested in the two Greek case studies (Inner Ionian Sea – Corinthian Gulf and Myrtoon Sea/Peloponnese – Crete Passage) to structure the information required by steps 1 to 6. Information on processes involved in sea to land and land to sea interactions were summed-up in the first file sheet, as for example in the case of extreme storms and marine flooding events for both case studies. These processes can be responsible of infrastructure damage and negative impact on coastal tourism and protected areas.

Sea to land interactions related to human activities (e.g. aquaculture, fisheries, offshore oil and gas related activities, submarine cables and pipelines, dredging, recreational boating, cruising, maritime transport, protection of marine areas, defence and security, preservation of underwater cultural heritage, etc.) were categorised in the second sheet of the table. For example, for both cases interactions related to aquaculture were qualified as positive in relation to societal aspects (in terms of socio-economic benefits for coastal communities) and negative for environmental ones, due to visual impact and possible water pollution. Both cases also pointed out the potential negative impacts of unsustainable marine aquaculture development on coastal tourism. Marine litter is another issue that can be mentioned as example for both Greek case studies; although marine litter is mainly generated by land-based activities, the interaction occurs also in the other direction (sea to land), as this peculiar form of pollution can affect the coastal environment and human activities relying on its quality.

Finally, the analysis enabled to structure information on land to sea interaction related to human activities (e.g. coastal and lagoon aquaculture, river and lagoon fishing, water abstraction, agriculture and livestock farming, coastal industry, land-based energy production and delivering, port activities, transport, coastal tourism, coastal landfill, etc.). For example, for both Greek case studies coastal industry interactions with sea based activities were considered negative in the case of professional and recreational fisheries, aquaculture, maritime tourism and management of MPAs, while were identified as positive in the case of the maritime transport and energy sectors.

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PAP/RAC is established in 1977 in Split, Croatia, as a part of the UN Environment Mediterranean Action Plan (UN Environment/MAP). PAP/RAC’s mandate is to provide assistance to support Mediterranean countries in the implementation of the Barcelona Convention and its Protocols, and in particular of the Protocol on Integrated Coastal Zone Management in the Mediterranean. PAP/RAC is oriented towards carrying out the activities contributing to sustainable development of coastal zones and strengthening capacities for their implementation. Thereby, it co-operates with national, regional and local authorities, as well as with a large number of international organisations and institutions.

Following the emerging need to introduce MSP in the entire Mediterranean Region, the 20th Meeting of the Contracting Parties to the Barcelona Convention (COP 20, Tirana, Albania, 2017) adopted the *Conceptual Framework for Marine Spatial Planning.* Therefore, MSP was introduced within the Barcelona Convention System, as the main tool/process for the implementation of ICZM in the marine part of the coastal zone, thus contributing to the balance between environmental, social and economic dimensions of sustainable development.