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SUPREME

Supporting Maritime Spatial Planning in Eastern Mediterranean

CASE STUDY SLOVENIA

Report on the Case Study
(C.1.3.8. – Addressing MSP Implementation in Case Study Areas)

Koper, December 2018

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ABBREVIATIONS

AJPES – Slovenian Business Register

BWM Convention – Ballast Water Management Convention

EEZ – Exclusive Economic Zone

EMSA – European Maritime Safety Agency

EU – European Union

HVDC – High-voltage, direct-current

IzVRS – Institute for Water of the Republic of Slovenia

MARPOL – International Convention for the Prevention of Pollution from Ships

MKGP – Ministry of agriculture, forestry, and Food

MOP – Ministry of the Environment and Spatial Planning

MORS – Ministry of Defence of the Republic of Slovenia

MSFD – Marine Strategy Framework Directive

NUMO – Slovenian Programme of Measures under MSFD

RS – Republic of Slovenia

SDSS – Spatial Development Strategy of Slovenia

SURS – Statistical Office of Republic of Slovenia

UNEP-MAP – United Nations Environmental Programme-Mediterranean Action Plan (Barcelona Convention)

WFD – Water Framework Directive

INTRODUCTION

The Maritime Spatial Planning Case Study was implemented in the framework of the SUPREME project.

The SUPREME project has two key objectives:

- to support the implementation of maritime spatial planning (MSP) in the EU Member States within their marine waters in the eastern Mediterranean, including the Adriatic, Ionian, Aegean and Levantine Seas;
- to launch and carry out concrete and cross-border MSP initiatives of the Member States in the eastern Mediterranean.

The project involved competent authorities in charge of the MSP from four Member States (Croatia, Greece, Italy and Slovenia) of the eastern Mediterranean Sea and the UNEP/MAP Barcelona Convention.

Within the SUPREME project, some case studies were carried out, in which the partners tested the methodology, developed within the project, in their specific areas.

In the implementation of the case study, the Slovenian partner worked closely with the representatives of the Spatial Planning, Construction and Housing Directorate of the Ministry of the Environment and Spatial Planning (the body responsible for maritime spatial planning in Slovenia), who were also members of the Project Steering Committee. With their assistance, the project Terms of Reference were prepared and an external contractor engaged to implement the key tasks.

The Slovenian case study has some specifics arising from concrete circumstances and needs as regards the implementation of marine spatial planning, namely:

- to capture the entire area of the Slovenian sea, comprising the territorial waters and internal waters;
- to prepare the material in the form of expert bases to be used in the formal process of preparing the MSP, starting in 2019;
- to pay special attention to direct communication with local actors (fishermen, fish and shellfish farmers, business representatives, local community representatives and local branches of state administration).

The report is structured in several parts:

- relation to the spatial planning framework;
- analysis of the case study area;
- development of the vision and objectives (including the scenario development);
- results and recommendations for the MSP improvement.

The RRC Koper coordinated the case study project implementation and preparation of the final report (Slavko Mezek, B.Sc. Landscape Architecture and Vane Urh, B.A. Geography).

The institutions and individuals participating in the implementation of the case study are:

- Institute for Water of the Republic of Slovenia prepared the Country Fiche: Slovenia (Paragraph C). Authors: Sašo Gorjanc, M.Sc. Biodiversity, Conservation and Management; Helena Caserman, B.Sc. Biology, Gašper Zupančič, B.Sc. Civil Engineer).
- Marine Biology Station Piran (National Institute of Biology) contributed a part of the Country Fiche: Slovenia (Paragraph C.3 Marine environment). Authors: Martina Orlando-Bonaca, Ph.D. and Janja Francé, Ph.D.)

- Manca Plazar, Ph.D and Gregor Čok, Ph.D. interviewed the stakeholders, led the workshops and prepared the paragraphs D.1 – D.4. (Visioning, scenarios and objectives of MSP), as well as E.1 (Results of the case study).
- Lenča Humerca Šolar, M.Sc., Spatial Planning, Construction and Housing Directorate, Ministry of the Environment and Spatial Planning, contributed the paragraph H. Evaluation of the MSP process.

A. RELATION TO THE SPATIAL PLANNING FRAMEWORK

In Slovenia, the MSP Directive will be implemented in the framework of the Spatial Planning Act adopted in 2017 (OG No. 61/17 – ZUreP-2). The Spatial Planning Act requires the MSP plan to be prepared in the form of an action programme for the implementation of the Slovenian Spatial Development Strategy at sea. The latter is a strategic document which applies to both land and the sea. Currently, the Ministry of the Environment and Spatial Planning (MESP) is coordinating the preparation of a new Spatial Development Strategy of Slovenia 2050, which will define the broadest context and (sustainable) orientation, relevant also for MSP. The Spatial Planning, Construction and Housing Directorate within the Ministry of the Environment and Spatial Planning (MESP-SPCHD) has been designated as a competent authority for the MSP implementation.

The Terms of Reference (ToR) for the implementation of the Slovenian case study were coordinated with the representatives of the Ministry. The ToR was prepared during the final stage of the study dealing with the methodological basis for MSP implementation in Slovenia: "Development of the Process and Procedures for Integrated Maritime Spatial Planning" (Goličnik-Marušić, 2018). The purpose of the study is to contribute to the development of the process and procedures for MSP, define the contents and forms of MSP and design the monitoring scheme of MSP implementation.

In Slovenia, the MSP preparation process will begin in 2019. The Slovenian case study is designed as one of the expert bases for the MSP preparation, covering the entire area under the national jurisdiction, i.e. the entire territorial sea and internal waters. The study will mainly deal with spatial matters at the national level. This has consequently defined the stakeholders to be involved in the case study implementation process.

The main findings of the study on the "Development of the Process and Procedures for Integrated Maritime Spatial Planning", concerning the legislative framework for the implementation of MSP in Slovenia, are summarised below. The study provides a good insight into the hierarchy of spatial planning documents, as well as an insight into the allocation of competences between the national and local (regional) levels.

The basic law governing maritime spatial planning in the Republic of Slovenia is the Spatial Planning Act (ZUreP-2). In the introductory article, which defines the subject matter of the Act, the Directive 2014/89/EU of the European Parliament and the Council, establishing a framework for maritime spatial planning (OG No. 257 of 28 August 2014, p. 135), is transposed into the Slovenian law.

Maritime spatial planning or spatial planning at sea is governed by Article 23 and 67 of the ZUreP-2, which defines the content within the regulation at sea.

Articles 23 and 67 stipulate the following (cit.):

- The goal of the MSP is to promote growth and coexistence of activities and uses at sea so that sustainable development is achieved through examining the economic, environmental and social and safety aspects, while also taking into account the interaction and interdependence of land and sea.
- Regulation at sea is carried out mainly through spatial planning at sea, the purpose of which is to determine the types, extent, duration and areas of particular activities and uses at sea.
- Spatial planning at sea also contains guidelines for the preparation of inland spatial planning documents.

- An action programme shall be prepared and adopted for the implementation of the Strategy at sea. Its preparation shall be entrusted with the ministry and adopted by the Government. Participation of neighbouring countries shall be ensured during the drafting process. It must be consistent with the management plans adopted in accordance with the regulations governing the waters. The action programme for the implementation of the Strategy at sea shall be checked in terms of its compliance with the realities and needs in the area at least every ten years.

As defined by law, the strategic planning documents are the Spatial Development Strategy of Slovenia (Spatial Strategy), regional spatial plans and municipal spatial plans.

The Spatial Strategy is a fundamental strategic spatial document guiding the spatial development of the country which, in accordance with the Slovenian Development Strategy and in conjunction with other national development documents and development objectives of the EU, sets long-term strategic objectives and directions for the development of activities.

The Spatial Strategy sets out a vision of the country's spatial development with long-term goals and a long-term concept of priorities and guidelines for achieving the objectives of spatial development. The Spatial Strategy also determines the guidelines and bases for spatial planning at national, regional and municipal levels.

For the implementation of the Spatial Strategy, the ministry draws up an action programme that needs to be adopted by the Government. The action programme establishes and presents the priorities and actions needed to implement the medium-term Spatial Strategy in particular areas or activities, as well as guidelines for the preparation of spatial planning documents. The action programme may also address the regional spatial plan issues under the national jurisdiction.

In content and form, a Maritime Spatial Plan shall be prepared and adopted as an action programme for the implementation of the Spatial Development Strategy. The MESP-SPCHD is responsible for its preparation and the Government for its adoption. Participation of neighbouring countries has to be ensured during the preparation process. Moreover, it must be consistent with the management plans adopted in accordance with the water management regulations. The action programme for the Spatial Development Strategy implementation has to be checked in terms of compliance with the facts and needs of the area at least every ten years.

In the ToR for the preparation of MSP it is appropriate to define the issues of national, regional and local importance to reduce the likelihood of conflicts between the stakeholders in the preparation of spatial documents at lower territorial levels ("Development of the Process and Procedures for Integrated Maritime Spatial Planning", Goličnik-Marušić, 2018).

The conditions for maritime spatial planning are indirectly determined by the Water Act, Nature Conservation Act and Environment Protection Act, which emphasise the assessment of potential impacts of the Maritime Spatial Plan on the protection of water, nature and the environment.

The Water Act requires integration of water management plans with spatial planning documents. As required by law, the drafter of a spatial act (Maritime Spatial Plan) has to present protection and endangered areas that could have an effect on the protection, management and use of waters; comply with existing legal regimes (in the area of marine water land); select possible uses in compliance with defined limits or conditions; determine spatial interventions relating to the construction of water infrastructure provided for in water management plans.

The Nature Conservation Act requires an assessment of the acceptability of plans, programmes, projects, spatial or other documents and interventions in nature, as also that protected and impact areas shall be included in the national spatial plans. For any plan with a significant effect on a protected area, special protection area or a potentially special area of conservation, it is necessary to assess the acceptability of its impacts or consequences in relation to the conservation objectives in such areas.

The Environment Protection Act requires a comprehensive environmental impact assessment (cit.): "For the purpose of the implementation of the principles of sustainable development, integrity and prevention, a comprehensive environmental impact assessment shall be carried out within the procedure of drawing up a plan … the implementation of which is likely to have a substantial impact on the environment, in order to determine and evaluate impacts on the environment and the integration of the requirements of environmental protection, conservation of nature, protection of human health and cultural heritage into the plan, and a certificate shall be obtained from the Ministry on the acceptability of the implementation of the plan for the environment." During the process of MSP preparation, the Ministry of the Environment and Spatial Planning shall decide whether it is necessary to carry out a comprehensive environmental impact assessment.

A.1 RESPONSIBILITIES AND TASKS IN THE FIELD OF MARITIME SPATIAL PLANNING

The ZUreP-2 designates the Ministry of the Environment and Spatial Planning as a competent ministry in the field of spatial planning. Closer substantive, organizational and management integration of the environmental protection and spatial planning aspects remain a major challenge both at national and lower territorial levels.

The challenges and demands for a more effective planning and management of the country, including the maritime and hinterland spatial planning, are ever increasing.

Moreover, the ZUreP-2 provides general guidelines for the (spatial) planning of development at sea and, in Article 50, it defines the responsibilities in spatial planning of national and local importance.

Spatial planning of the port for international traffic and the associated port facilities, which regulation is directly linked to the marine space, is a national responsibility. Other spatial arrangements of national importance in the field of transport, energy, water and other infrastructure relate mainly to the marine hinterland and are functionally linked with the marine area through economic and other activities. Furthermore, Article 50 of the Act specifies that in the area of marine water land which is, under the Water Act, entirely owned by the State, all spatial arrangements are of national significance, with the exception of those specifically listed in paragraph 7 of the same Article.

Within this framework, the area of marine water land includes:

- ports intended for specific purposes, with up to 200 berths and associated port facilities and ports not intended for international transport and associated port facilities;
- floating piers of up to 50 metres in length and a maximum surface area of 100 m^2;
- bridging facilities such as footpaths and cycle paths;
- beaches and built shores;
- breakwaters not exceeding 7 m in width above sea level;
- municipal and energy infrastructure.

With these legal provisions, the State limits the scope of its competences in the field of maritime spatial planning in the area of marine water land and thus allows local communities to engage in maritime spatial planning of local significance in the area of marine water land independently or in the context of inter-municipal (regional) cooperation. Hence, the local communities are given the possibility (although limited) of spatial planning in the marine area or within the marine water land.

B. CASE STUDY WITHIN THE SPATIAL PLANNING FRAMEWORK

As already mentioned above, the ZUreP-2 provides that a Maritime Spatial Plan shall be prepared and adopted as an action programme for the implementation of the Spatial Development Strategy of Slovenia at sea.

The size of Slovenian territorial sea and internal waters is very limited. The territorial sea comprises 166.9 km^2, internal waters 64.3 km^2, in total 213.2 km^2.

The area is characterised by a high density of uses and great intensity of land-sea interactions since it is an urbanised coastal area and also one of the most important tourist destinations in the country.

These are the main reasons why the entire area of Slovenian territorial sea and internal waters has been designated as a case study area. Furthermore, the case study will be used as an expert basis for the preparation of Maritime Spatial Plan, which will be prepared for the same area.

In the hierarchy of spatial documents, the MSP is regarded as an action programme for the implementation of the Spatial Development Strategy of Slovenia at sea and as such it is superior to implementation plans at national and regional/local levels.

For these reasons, an alternative that the case study shall address a restricted zone along the coast, covering both the land and marine parts of a limited width, and deal mainly with the spatial arrangements within the jurisdiction of local communities, was abandoned.

C. ANALYSIS OF THE CASE STUDY AREA

C.1 INTRODUCTION

The report includes a general geographical, physical, and environmental overview of the Slovenian territorial sea and its human uses. The latter represent the core of this report, as they present an overview of the current state of all major and relevant economic sectors that are active in the Slovenian sea, their development objectives, current and future desired spatial planning situation, and any transboundary issues that the planners need to be aware of. Fishing, aquaculture, transport, tourism and nature conservation present the most significant human uses of the Slovenian territorial sea, which is why they are discussed in more detail than the rest of the human uses.

The intention of this report is to be used in the SUPREME project case study implementation: definition of vision, possible scenarios of future development, objectives and recommendations for MSP development. Beyond the project, the report could be also used as part of the official institutional MSP process that is due to start in 2019. The report is heavily founded on either the expert reports that were prepared in the second cycle of the Marine Strategy Framework Directive (MSFD, 2008/56/EC) and the relevant local, regional, and national spatial planning and development strategies and plans.

The case study analysis includes an overview of spatial statistical trends occurring in the sectors covered by Directive 2014/89/EU, which are the aquaculture, fisheries, maritime transport, military, nature and species conservation, scientific research, tourism and underwater cultural heritage.

In Slovenian territorial waters, some of the sectors/activities, listed in the Directive, are irrelevant, so they were not specifically addressed in the analytical work, namely, the exploitation of oil, gas and other energy resources, minerals and renewable energy sources, extraction of raw material and submarine cables and pipeline routes.

C.2 GENERAL OVERVIEW

C.2.1 Geographical and physical features

C.2.1.1 Bathymetry

Slovenian sea lies in the Gulf of Trieste in the Northern Adriatic. The Gulf is characterised by shallowness (average depth 21 m, maximum depth 35 m), with northern part being shallower than the south-eastern part. The Gulf has an approximately rectangular shape (approx. 20x20 km, Figure 1).

The bays on the Slovenian coast generally have comparatively steep slopes, which level off between 5 and 10 m depth. The coast is gradual only between Koper and Ankaran, and Portorož and Sečovlje (the river mouths of the Rižana and Dragonja Rivers). Elsewhere, flysch cliffs, made of sandstone and marl, are common.

In the western part of the Gulf, the sediments are composed of up to 70% carbonated skeletonnes of various organisms (e.g. snails, Foraminifera, and echinoderms). The surface sediment is clay silt with up to 30% carbonate, which is mainly sourced in the Soča River, and partly from flysch coast (Ogorelec et al., 1991). The thickness of Quaternary sediments varies between 30 and 250 m in the central part of the Gulf.

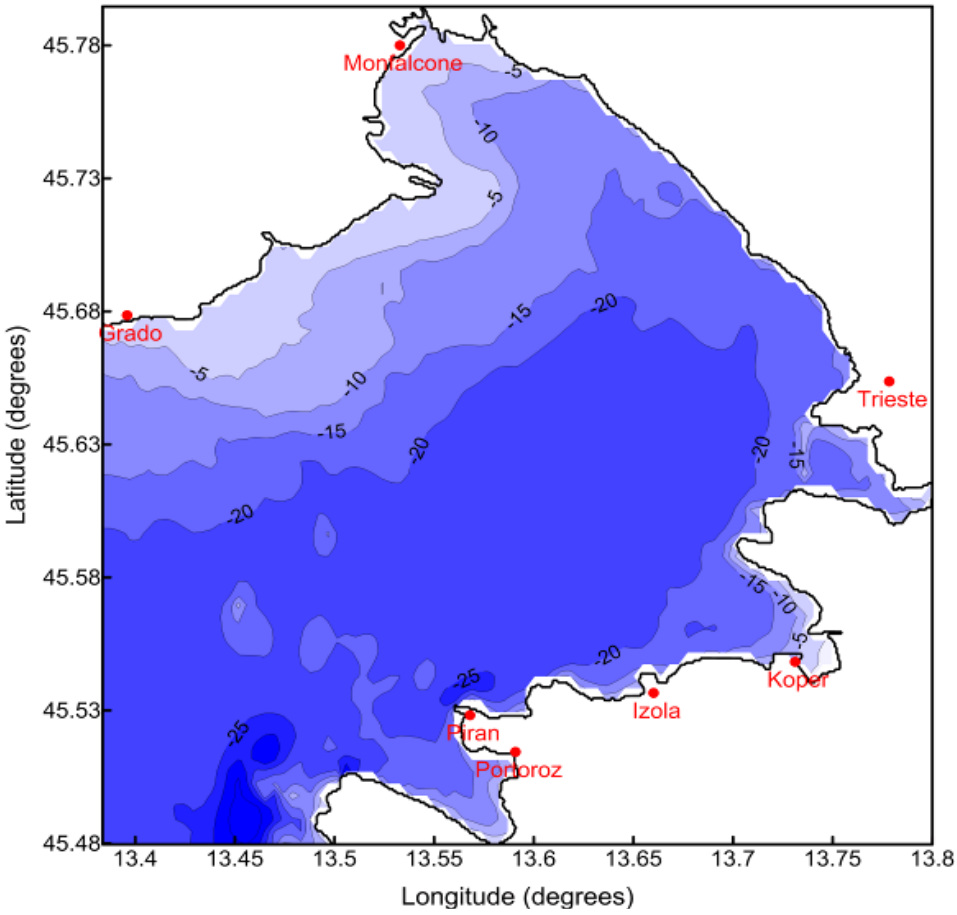


Figure 1: Bathymetry of the Gulf of Trieste (Source: digitalised Nautical map of the Gulf of Trieste, 1:80000).

C.2.1.2 Hydrology

The circulation in the Adriatic Sea is complex and composed of different currents, gyres, and jets, which alter their spatial variability with seasons. The general circulation is powered by the inflow of fresh water (especially the Po River), which causes lower salinity, heat losses, and surplus of water. Wind and heat have significant impacts on surface waters and can cause the creation of deep (dense) waters in the northern Adriatic, which have an effect on the seasonality of the circulation (Artegiani et al., 1997).

Wind, buoyancy fluxes, and general Adriatic circulation have the greatest bearing on the hydrology of the Gulf of Trieste (Bogunović and Malačič, 2009). Due to the shallowness and semi-enclosure of the Gulf, the effect of the meteorological features on the water body is significant (Raicich et al., 2013).

C.2.2 Marine delineations and jurisdictions

The marine and terrestrial border between the Republic of Slovenia and the Italian Republic is defined according to the Treaty of Osimo signed on 10 November 1975. The terrestrial and marine border between the Republic of Slovenia and the Republic of Croatia is grounded on the decision of the Permanent Court of Arbitration in The Hague (The Netherlands) made on 29 June 2017, according to the Arbitration agreement signed by both countries on 4 November 2009. Croatia continues to reject the final and binding award of the arbitration tribunal.

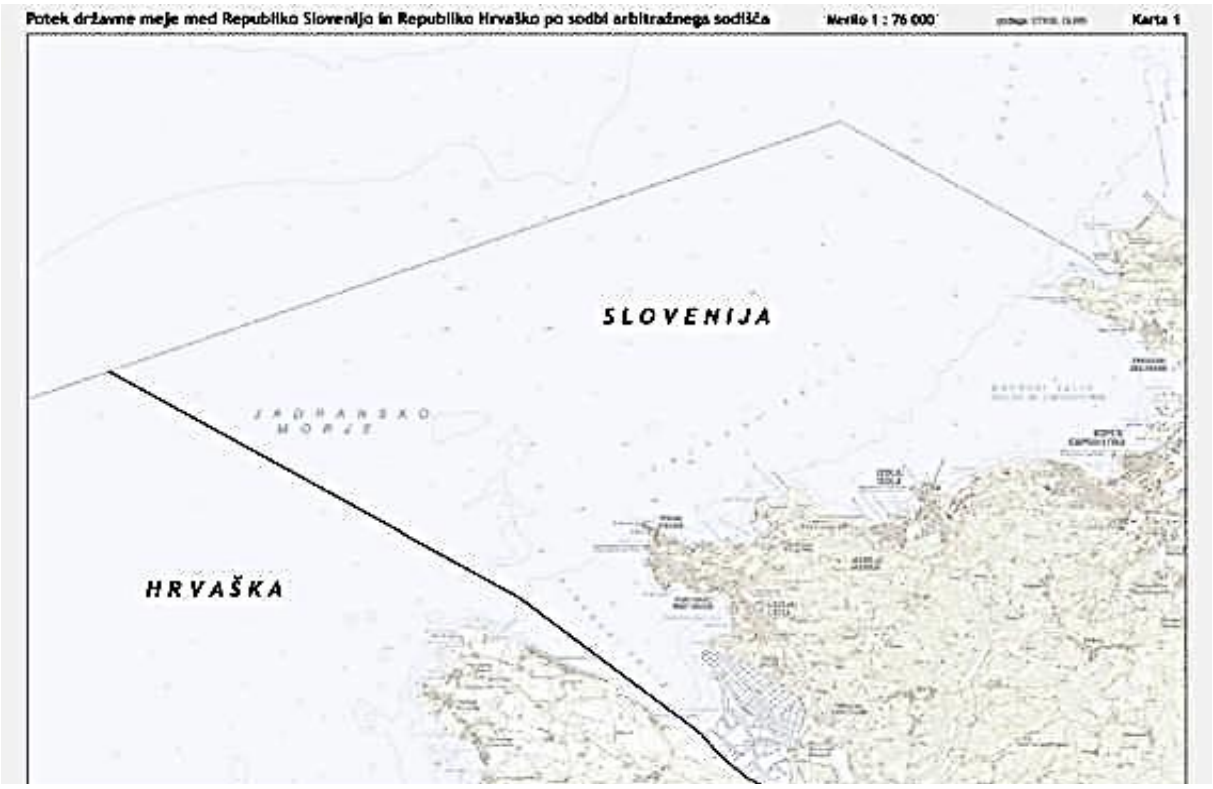


Figure 2: Slovenian territorial and internal waters: (as defined by the Final Award of the Permanent Court of Arbitration in The Hague (The Netherlands), 29 June 2017).

C.2.2.1 Internal waters

Article 5 of the Maritime Code (OG RS, Nos. 62/16 – official consolidated text and 41/17) defines the Slovenian internal waters as:

- Internal waters of the Republic of Slovenia include all ports, bays, and the anchorage area of the Port of Koper, that is delineated by the meridian 13° 40' east and parallel 45° 35' north.

C.2.2.2 Territorial waters

Article 13 of the Maritime code (OG RS, Nos 62/16 – official consolidated text and 41/17) defines Slovene territorial waters as:

- Territorial waters of the Republic of Slovenia are in the sea area that extends from the base line towards the open sea to the extents according to the international law or to the extents of the borderline defined by an international agreement.

C.3 MARINE ENVIRONMENT

Partners of the project prepared a Country fiche, following the guidelines provided by the activity coordinators. This part of the report is based on the Slovenia country fiche, prepared by Marine Biology Station, Piran (Authors: Martina Orlando, Janja France).

This chapter provides knowledge in relation to GES (Good Environmental Status – Marine Strategy Framework Directive) in the case study area in order to provide information for the MSP process, as well as identify any knowledge gaps.

In this section, priorities and concerns in relation to the state of the environment and the related anthropogenic pressures and concerns are highlighted.

The chapter has two parts:

1. structure, functions and processes of marine ecosystems and
2. anthropogenic pressures on the marine environment.

The first part, related to marine ecosystems, includes information on species (i.e. marine mammals, turtles, cephalopods, fish and shellfish and commercially exploited species), habitats (i.e. benthic habitats and their associated biological communities) and ecosystems, including food webs (i.e. particular physical, chemical and biological characteristics).

For each theme, a general overview is provided, including the distribution, status and trends, important areas and knowledge gaps.

The second part, related to anthropogenic pressures, encompasses the following themes:

- biological pressures (i.e. input or spread of non-indigenous species and disturbance of species due to human presence);
- physical pressures (i.e. physical disturbance to or loss of seabed substrate and changes to hydrological conditions); and
- substances, litter and energy (i.e. input of nutrients, organic matter, litter, sound or other forms of energy) – relevant qualitative descriptors to consider the indicators (5), (8), (9), (10) and (11).

C.3.1 Structure, functions and processes of marine ecosystems

(Source: Slovenian Official Reports for Initial Assessment and GES, National Reports)

(1) ***Biodiversity (D1)****:* Slovenia officially reported (area MAD-SI-AA-11) a good environmental status according to the Water Framework Directive (2000/60/EC) (Good Ecological Status) and a favourable status in relation to the Birds Directive (92/43/EEC) and the Habitats Directive (2009/147/EC).

Criteria 1.1-1.3: The species distribution, population size and the status of populations are in accordance with the baseline described in the initial assessment (2012) or in accordance with other directives. Threshold values: not reported.

Criteria 1.4-1.6: The extent and distribution of habitats are under natural conditions. Habitats provide living space for all functional groups in accordance with natural conditions. The diversity within functional groups is maintained. Rare and threatened habitats are properly protected and preserved. Threshold values: see Section 2.1.2 Habitats.

Development status: Further development is needed (expected to be operational by 2018, if adopted). The assessment of the status should be carried out at the level of the Northern Adriatic, in cooperation with other countries.

(2) ***Food webs (D4)*****:** Slovenia officially reported (area MAD-SI-AA-11 that the structure and functions of the ecosystem and feeding levels are maintained at the level that prevails in natural conditions.

Criteria 4.2: Good condition, according to indicator 4.2.1, is achieved when the mass proportion of large fish (larger than the threshold LCUT) is greater than the threshold value. Threshold values: not reported.

Criteria 4.3: Good status, according to the abundance/distribution of the key trophic groups/species, is maintained at a level that prevails in natural conditions. Threshold values: good environmental status depends on the indicator 4.3.1 which describes the

annual geometric mean value of the mesozooplankton biomass. The status was assessed as good.

Development status: Further development is needed (expected to be operational by 2018, if adopted). Criteria for the evaluation should be prepared at the level of the Northern Adriatic, in cooperation with other countries.

C.3.1.1 Species (marine mammals, turtles, cephalopods, fish and shellfish, commercially exploited species) – relevant qualitative descriptors to consider: (1) and (3)

The following species/functional groups were considered in the Slovenian initial assessment:

(1) Cladocora caespitosa (Linnaeus, 1767) – the Mediterranean stony coral (area MAD-SI-AA-111)

Population distribution of species (1.1): The Mediterranean stony coral occurs in the coastal zone. The species may appear individually, sometimes forming facies, and there is an example of the solitary reef near Rt Ronek. Depth range: between 3 m and 8 m; near Rt Ronek, the colonies appear below 14 m of depth. The species spatial distribution is affected by the presence of hard substrata and appropriate hydrographic conditions. The vertical extent is influenced by the water transparency, since the solar light is indispensable for endosymbiontic Zooxanthellae. Methods used: scuba diving, visual inspection.

Population size of species (1.2): Due to the lack of appropriate data it is not possible to assess the coverage of the species.

Population condition of species (1.3): The status of the species is affected by various abiotic (temperature, currents, rate of sedimentation and resuspension) and biotic factors (bioeroders). Where the conditions are favourable, the status of the coral is stable, forming facies, and it can also create underwater reefs. In 2011, cases of coral bleaching were detected in the entire area, where the endosymbionts leave the tissues of polyps, which is irreversible in most cases. As a consequence of bleaching, the cases of partial and complete necrosis of colonies were registered.

Present pressures: Fisheries (mainly demersal nets), anchoring and urbanization, resulting in increasing rates of sedimentation and resuspension of sediments. Climate changes - the warming of the sea causes coral bleaching.

Information gaps and limitations: There is a lack of data for a proper assessment of the species status. There is an urgent need for a thorough research in order to get the relevant information.

*(2) Engraulis encrasicolus (Linnaeus, 1758) – European anchovy (area MAD-SI-AA-*2)

Population distribution of species (1.1): The distribution has not been addressed.

Population size of species (1.2): The population size has not been addressed.

Population condition of species (1.3): The stock assessment has been carried out. Method used: VPA with Laurec-Shepherd tuning; integrated catch analysis (ICA). The population condition is altered.

Present pressures: Fishing with purse seine and pelagic trawlers.

Information gaps and limitations: Not reported.

(3) Sardina pilchardus (Walbaum, 1792) – European pilchard (area MAD-SI-AA-2)

Population distribution of species (1.1): The distribution has not been addressed.

Population size of species (1.2): The population size has not been addressed.

Population condition of species (1.3): The stock assessment has been carried out. Method used: VPA with Laurec-Shepherd tuning; integrated catch analysis (ICA). The population condition is altered.

Present pressures: Fishing with purse seine and pelagic trawlers.

Information gaps and limitations: Not reported.

(4) Solea solea (Linnaeus, 1758) – Common sole (area MAD-SI-AA-2)
Population distribution of species (1.1): The distribution has not been addressed.

Population size of species (1.2): The population size has not been addressed.

Population condition of species (1.3): The stock assessment has been carried out. Method used: XSA, LCA – Pseudocohort analysis (VIT) Y/R; SURBA. The population condition is altered.

Present pressures: Fishing with trammel nets and beam trawls.

Information gaps and limitations: Not reported.

(5) Coastal fish (area MAD-SI-AA-111)
Condition (species composition, 1.6.1): Bony fishes are represented by more than 200 species, but for the majority of species there are no long-term data sets. To attempt an evaluation of the fish fauna in the coastal waters, the resident species were considered (Gobiidae, Blenniidae, Sparidae, Labridae, Serranidae and Mullidae). The minimum number of fish species and the lowest density of fish communities were recorded in the meadows of Posidonia oceanica and Cymodocea nodosa, while the number of species and the density increase on the rocky bottom with algal cover. Associations with Cystoseira spp. have proven to be the most important microhabitat type, where Labridae regularly live, feed and nest. Sampling: non-destructive visual diving methods. An assessment method, by which the density of Labridae is the main indicator of the status of the coastal fish community, was developed. If at least 25 specimens of Labridae are counted per 100 m2 of transect, the status of the community is good.

Relative abundance (1.6.2 and 4.3.1): The average density of the coastal fish community was 28 individuals/100 m^2 in C. nodosa meadows, 35 individuals/100m^2 on rocky substrata covered by algal turf, and 32 to 65 individuals/100m^2 in different successional stages of Cystoseira spp. associations. If at least 25 specimens of Labridae are counted per 100 m^2 of the transect, the status of the community is good.

Present pressures: Loss of suitable benthic habitats due to anthropogenic activities, such as the defragmentation of rocky substrata due to illegal harvesting of sea shells or the construction of various structures. Pollution sources from the mainland may also affect the status of the community.

Information gaps and limitations: The absence of a regular monitoring programme of coastal fish communities in the Slovenian sea. The available data were obtained through various projects, which have already expired.

(6) Pelagic Elasmobranchs fish and demersal Elasmobranchs fish (area MAD-SI-MS-1)
Condition (species composition, 1.6.1): In the Slovenian sea, less attention was paid to elasmobranches. Single data comes from the papers about fish harvesting in the Slovenian sea. The first list of cartilaginous fish fauna originated from the "Key to the Determination of

Vertebrates in Slovenia" (1999). Other publications dated after 2000, when different authors published the first data on the occurrence of the basking shark (Cetorhinus maximus) and the gray shark (Carcharhinus plumbeus), the appearance of pelagic stingray Pteroplatytrigon violacea, and the biological and ecological characteristics of bull ray (Pteromylaeus bovinus). In the last few years, albinism has been detected in marbled electric ray Torpedo marmorata and the feeding ecology of blackspotted smooth-hound (Mustelus punctulatus) were reported. So far, 34 species of cartilaginous fish were identified, of which 20 sharks and 14 rays. The number is very high for a shallow area. Method used: evaluation of data provided from catches by different fishing gear.

Relative abundance (1.6.2 and 4.3.1): No specific information on the population size is available for any of the identified species. It is true only for a few species that they were common species in the area at least a decade ago. Even catches of common species of sharks and rays are very modest and occasional today. For the period from 1982 to 2006 it was reported that cartilaginous fish represented only the 0.2% of the declared catch of all fish. In the period 1982-1992, the annual catch of cartilaginous fish ranged between 5 and 23 tonnes, while in the period from 1993 to 2006, it never exceeded 5 tonnes.

Present pressures: Fishing, both target and occasional. New constructions and pollution, particularly in breeding and whelping areas. This is a group of fish that has experienced a major decline in populations around the world.

Information gaps and limitations: The absence of a regular monitoring programme and therefore appropriate data.

(7) Demersal cephalopods (area MAD-SI-AA-11)

Condition (species composition, 1.6.1): The number of identified taxa of benthic cephalopods (Cephalopoda) in the period from 1995 to 2011 varied from a minimum value for five taxa in 2002, 2009 and 2010 to a peak for eight taxa in 1995. Trend: the number of identified taxa is falling. Swept area method.

Relative abundance (1.6.2 and 4.3.1): The average abundance of benthic cephalopods in the period from 1995 to 2011 varied from a peak of 2,816 individuals per km^2 in 2003 to a minimum value of 979 specimens per km^2 in 2008. Trend: the average abundance is declining.

Present pressures: Fishing with bottom trawls.

Information gaps and limitations: The natural status is unknown.

(8) Demersal Fish (area MAD-SI-AA-11)

Condition (species composition, 1.6.1): The number of identified taxa of demersal ray-finned fish (Actinopterygii) in the period from 1995 to 2011 varied from a minimum value of 36 taxa in 2008 to a peak of 52 taxa in 1999. Trend: the number of identified taxa was stable. Swept area method.

Relative abundance (1.6.2 and 4.3.1): The average abundance of demersal ray-finned fish in the period from 1995 to 2011 varied from a minimum value of 4,944 individuals per km^2 in 1997 to a maximum value of 24,999 individuals per km^2 in 2009. Trend: the average abundance was increasing.

Present pressures: Fishing with bottom trawls, and stabbed and trammel nets.

Information gaps and limitations: The natural status is unknown.

(9) Demersal Elasmobranchs fish (area MAD-SI-MS-11)

Condition (species composition, 1.6.1): The number of identified taxa of demersal cartilaginous fish (Elasmobranchii) in the period from 1995 to 2011 varied from a minimum value of zero taxa in 2008 to a peak of 3 taxa in years 1995, 1996 and 1999. Trend: the number of identified taxa was decreasing. Swept area method.

Relative abundance (1.6.2 and 4.3.1): The average abundance of demersal cartilaginous fish (Elasmobranchii) in the period from 1995 to 2011 varied from a peak of 347 individuals per km^2 in 1998 to a minimum value of zero individuals per km^2 in 2008. Trend: the average abundance was declining.

Present pressures: Fishing with bottom trawls, and stabbed and trammel nets.

Information gaps and limitations: The natural status is unknown.

C.3.1.2 Habitats (i.e. benthic habitats and their associated biological communities) - relevant qualitative descriptors to consider: (1) and (6)

The following benthic habitats were considered in the initial assessment:

(1) Habitat type: ShallRock – Shallow sublittoral rock and biogenic reef (area MAD-SI-AA-11)

Habitat distribution (1.4): Benthic communities of animals and algae that inhabit hard bottom in coastal and deeper areas. In the Slovenian sea it is unevenly distributed along the rocky coast, with the exception of areas where there is a sedimentary bottom. The biocoenosis of photophilic algae, dominated by species of the genus Cystoseira (depth from 1 m to 5 m), and precoralligenous formations of the coralligenous biocoenosis (depth from 4 m to 12 m) are dominant. From 1 to 12 m in depth.

Habitat extent (1.5): Approximately 10 km of the coastline. The size of the habitat is currently not decreasing.

Habitat condition (1.6, 6.2): Substrata: boulders, rocks and stones. In the biocoenosis of photophilic algae in the upper infralittoral belt, the vegetation of large brown algae from the genus Cystoseira dominates (climax stage in the succession of the biocoenosis of photophilic algae). The anthropogenic eutrophication causes the displacement from climax communities to the dominance of opportunistic, nitrophilous species. For the assessment of the status of infralittoral macrophytes, the Ecological Evaluation Index continuous formula (EEI-c) has been used from 2006 onwards. In overall, the status of macrophytes is good. To assess the status of benthic habitat types in the rocky infralittoral belt, an index (IHT) was developed, which is based on the combined assessment of three factors, namely: vegetation cover, spatial heterogeneity and density of Labridae. The status of infralittoral habitat types is overall good. The status of coastal resident bony fish communities was estimated as good. Precoralligenous formations are common on the rocky bottom below 4 m in depth. The precoralligenous is the initial stage of the coralligenous biocoenosis that may gradually develop into the climax stage of coralligenous formations. In the Slovenian sea, the precoralligenous formations are found in Fiesa and within the Rt Madona Natural Monument. Their status was assessed as good.

Present pressures: Fisheries (fixed nets), the impact of selective extraction of species (e.g. defragmentation of rocks because of illegal harvesting of date mussels), changes in the structure of sea bottom and changes of the water regime due to the construction of, for example, piers, and inputs from the mainland.

Information gaps and limitations: Irregular measurements and poor datasets.

(2) Habitat type: ShallMxdSed – Shallow sublittoral mixed sediment (area MAD-SI-AA-11)
Habitat distribution (1.4): It is unevenly spread in the Slovenian Sea. It includes the biocoenosis of superficial muddy sands in sheltered waters, the euryhaline and eurythermal biocoenosis, seagrass meadows of Posidonia oceanica, the biocoenosis of well calibrated and fine-grained sands, the biocenosis of the coastal detritic bottom and the biocoenosis of the muddy detritic bottom. From 1 m to 30 m in depth.

Habitat extent (1.5): The greater part of the Gulf of Trieste. The size of the habitat is currently not decreasing.

Habitat condition (1.6 and 6.2): Substrata: mud, sand and detritus. It includes the community of the invertebrates of sedimentary bottom. For all sampling sites, the M-AMBI index (multivariate AMBI) was calculated. The overall status of the invertebrates of sedimentary bottom, at a depth of 7 to 10 m, was estimated as good. Among marine seagrasses, C. nodosa forms the largest and deepest meadows, present almost everywhere where there is a sedimentary bottom, at a depth ranging from 0.5 m to 10 m. For the assessment of the status of Cymodocea meadows, the new MediSkew index was used. The status of five Cymodocea meadows was evaluated as good. The status of the P. oceanica meadow was assessed as good by evaluating the density of shoots. The status of invertebrates of circalittoral sedimentary bottoms (depth 14 to 22 m) cannot even be described and assessed, because there is not enough data.

Present pressures: Fisheries (static and bottom trawls), shipping (anchoring, resuspension of sediment and nutrients and deepening of the waterways). The status of these habitats is also affected by the inputs from the mainland.

Information gaps and limitations: For C. nodosa meadows data were obtained only in 2009 and 2010. For circalittoral biocoenosis the first relevant information were obtained in 2010 and 2011. The data set should be upgraded in the coming years.

(3) Habitat type: LitSed – Littoral sediment (area MAD-SI-AA-111)
Habitat distribution (1.4): It covers the biocoenosis of the mediolittoral detritic bottom that consists of angiosperms in brackish waters of inlets, shoals, abandoned salt facilities and estuaries. In the Slovenian sea, it is unevenly distributed.

Habitat extent (1.5): Up to 2 km of the coastline. The extension of the habitat is declining due to new constructions along the coastline.

Habitat condition (1.6, 6.2): Mudflats and sandflats may be covered with coatings of algae, angiosperms and cyanobacteria. Data for the invertebrates' communities are from 2009, when the sampling was carried out for the development of a methodology for the evaluation of hydromorphological alterations of the coastline based on benthic invertebrates, in accordance with the requirements of the Water Framework Directive. Data analysis is not yet complete. The Status was assessed as not good.

Present pressures: New constructions along the coastline (consequently also increased sedimentation), walking/swimming, changes in the water regime (water retention), illegal extraction of some species (e.g. Upogebia pusilla), used as fishing bait.

Information gaps and limitations: Irregular measurements and poor datasets. New data have to be obtained about mediolittoral communities for the final stage of the development of the

methodology for the evaluation of hydromorphological alterations of the coastline on the basis of benthic invertebrates.

(4) Habitat type: ShallMxdSed – Shallow sublittoral mixed sediment (area MAD-SI-AA-111)
Habitat distribution (1.4): Posidonia oceanica meadow. In the Gulf of Trieste only one meadow of P. oceanica is present near the road that leads from Žusterna (Koper) towards Izola, where it grows in the form of larger or smaller "islands".

Habitat extent (1.5): According to older records, Posidonia meadows were largely distributed in many areas in the Gulf of Trieste. After the year 1960 there was an extensive degradation. The first mapping of the only meadow in the Slovenian sea in 1993 showed that the meadow was about 1 km long and extends in a depth range from 0.5 to 4 m (50 m from the shore). The meadow covers an area of approximately 0.64 hectares.

Habitat condition (1.6, 6.2): In recent years, a mild spread of this meadow was observed, even if Posidonia meadows significantly decreased in the last three decades. According to the classification of marine meadows (Giraud, 1977), this Posidonia meadow could be considered among the meadows of the Category II – dense meadows with a density of shoots per m^2 between 400 and 700 (Lipej et al., 2007). The overall status of the meadow was assessed as good.

Present pressures: Maritime transport (anchoring, resuspension of sediment and organic matter due to the navigation and deepening of the waterways). Other pressures are walking/swimming and the impact of fisheries (static and bottom trawls). The status of the meadow could be affected also by leaching from the mainland.

Information gaps and Limitations: The granulometry of the sediment within the meadow is still unknown. The dataset should be upgraded in the nearby future.

(5) Habitat type: LitRock – Littoral rock and biogenic reef (area MAD-SI-AA-111)
Habitat distribution (1.4): Mediolittoral biocoenoses are defined by two horizons, namely the upper and the lower. The most important are the biocoenosis of the upper mediolittoral rocks and the biocoenosis of the lower mediolittoral rocks. These biocoenoses are well developed everywhere where the natural rocky coast is preserved and also on artificial rocky shores.

Habitat extent (1.5): At least 30 km in length along the coastline. The extent of biocoenoses is decreasing due to new constructions along the coastline.

Habitat condition (1.6 and 6.2): Substrata: boulders, rocks, stones, terraces and walls. The biodiversity in this belt is low due to the high natural stress (drainage, temperature fluctuations and fluctuations in salinity). The stress is greater in the upper mediolittoral belt. The increase of hydromorphological changes from natural to completely modified substrata has an impact on the composition and abundance of invertebrate communities. Benthic communities on the natural rocky coast are similar to those on the artificial rocky shore, but the community structure significantly changes on concrete walls. The number of species and the abundance are the highest on allochthonous rocks (medium hydromorphological alterations), and reduce both on concrete walls (high hydromorphological alterations) and on natural rocky substrata. To identify the diversity of habitat types, vertical linear transects were used, perpendicular to the coast. In 2008, benthic mediolittoral invertebrates were sampled by the use of a 20 cm x 20 cm metallic frame. To assess the ecological status of benthic

invertebrates and to evaluate hydromorphological alterations of the coastline, a new index was developed, called the benthic index for rocky shore (BIRS). The status was assessed as not good.

Present pressures: The extension of the habitat is declining, mainly due to new constructions along the coastline. Main pressures: walking/swimming, changes in the water regime (water retention) and increased sedimentation due to construction of various structures along the coastline and in the sea. In this habitat, illegal extraction of certain species used as fishing bait was observed.

Information gaps and limitations: Irregular measurements and poor dataset. New data about mediolittoral communities should be collected in order to complete the development of a methodology for the assessment of hydromorphological alterations of the coastline on the basis of benthic invertebrates.

C.3.1.3 Ecosystems, including food webs (i.e. particular physical, chemical, biological characteristics) – relevant qualitative descriptors to consider: (1) and (4)

According to article 8 of MSFD, Slovenia did not report about the ecosystem features.

According to article 9, Slovenia reported on Criteria 1.7.

GES description: The composition and relative proportions of the ecosystem components are in accordance with the natural conditions. Threshold values: not reported.

Development Status: Further development is needed (expected to be operational by 2018, if adopted). The assessment of the status should be carried out at the level of the Northern Adriatic, in cooperation with other countries.

C.3.2 Anthropogenic pressures on the marine environment

C.3.2.1 Biological (input or spread of non-indigenous species and disturbance of species due to human presence) – relevant qualitative descriptors to consider: (2) and (3)

(1) The non-indigenous species (D2) were considered in the Initial Assessment and in the definition of GES (area MAD-SI-AA-11)

Criteria 2.1: Slovenia reported that non-native species may be present and stabilized in such numbers and extensions that do not have negative impacts on native species and habitats. The environmental status was assessed as good.

Criteria 2.2: The impact of invasive alien species on the ecosystem is negligible.

Development Status: Further development needed (expected to be operational by 2018, if adopted). The assessment of the status should be carried out at the level of the Northern Adriatic, in cooperation with other countries.

Information gaps and limitations: The evaluation is based on random data and records. There is no systematic and continuous monitoring which would allow the interpretation of basic information on the population growth and trends in colonization. Until accurate data on the abundance and distribution of species is available, it will not be possible to define the status and consequences of NIS on native species and habitats with a high degree of reliability.

Table 1: List of non-indigenous species in Slovenian marine waters as reported in 2012.

Common name	Relevant predominant habitat	Invasive species	Abundance	Country/ area of origin	Means of arrival (NIS Pathway)	Date first recorded	Spatial distribution
Asparagopsis armata Harvey, 1955	ShallRock	Not invasive	Frequent	Australia	Culturing	1991	Unknown – not assessed
Bonnemaisonia hamifera Hariot, 1891	ShallRock	Not invasive	Rare	Pacific	Culturing	1995	Unknown – not assessed
Codium fragile subsp. fragile Suringar (Hariot), 1889	ShallRock	Not invasive	Frequent	Pacific	Shipping	1992	Unknown – not assessed
Mnemiopsis leidyi A. Agassiz, 1865	Water Column Habitats All	Not invasive	Rare	Black Sea	Shipping	1995	Unknown – not assessed
Beroe ovata sensu Mayer, 1912	Water Column Habitats All	Not invasive	Rare	Black sea	Shipping	1995	Unknown – not assessed
Balanus trigonus Darwin, 1854	ShallRock	Not invasive	Rare	Tropical seas	Shipping	2005	Unknown – not assessed
Bursatella leachii (Blainville, 1817)	ShallRock	Not invasive	Frequent	Red Sea	Altered Natural Flow	2001	Unknown – not assessed
Rapana venosa (Valenciennes, 1846)	ShallMxdSed	Not invasive	Rare	Japan	Shipping	1999	Unknown – not assessed
Anadara kagoshimensis (Tokunaga, 1906)	ShallMxdSed	Not invasive	Rare	Indo-Pacific	Shipping	1999	Unknown – not assessed
Anadara transversa (Say, 1822)	ShallMxdSed	Not invasive	Rare	Indo-Pacific	Shipping	2003	Unknown – not assessed
Crassostrea gigas (Thunberg, 1793)	LitRock	Invasive	Frequent	Japan	Culturing	1999	Unknown – not assessed
Venerupis philippinarum (A. Adams & Reeve, 1850)	ShallMxdSed	Not invasive	Frequent	Indo-Pacific	Culturing	1999	Unknown – not assessed
Arcuatula senhousia (Benson in Cantor, 1842)	ShallMxdSed	Invasive	Frequent	Indo-Pacific	Shipping	2005	Unknown – not assessed
Ficopomatus enigmaticus (Fauvel, 1923)	LitRock	Invasive	Frequent	Southern hemi-sphere	Shipping	1984	Unknown – not assessed
Terapon theraps Cuvier, 1829	ShallRock	Not invasive	Very rare	Indo-Pacific	Altered Natural Flow	2007	Unknown – not assessed
Gambusia holbrooki Girard, 1859	HabitatsOther	Invasive	Frequent	Central America	Biol. Control	1999	Unknown – not assessed

(2) Populations of all commercially exploited fish and shellfish (D3)
Criteria 3.1: Slovenia reported (area MAD-SI-AA-11) a good status according to the 3.1.1 indicator which is achieved when the following condition is fulfilled: the catch of all commercial species is sustainable (defined by a fishing mortality rate) and is lower than the target value in accordance with the sustainable use of the resource (Fmsy) or the exploitation rate (E = F/Z for small pelagic fish), where the degree of exploitation is E = 0.4 (Patterson, 1992). The good status according to 3.1.2 indicator is achieved when the relationship between catch and biomass index for all commercial species is stable or in decline for the data obtained from sampling with trawl nets.

Criteria 3.2 (area MAD-SI-AA-1): A good status according to 3.2.1 indicator is achieved when the spawning stock biomass (SSBMSY) is above the threshold. The good status according to 3.2.2 indicator is achieved when the biomass index for adults of all commercial species is stable or in decline for the data obtained from sampling with trawl nets.

Criteria 3.3 (area MAD-SI-AA-1): A good status according to 3.3.1 indicator is achieved when for all commercial species: x% rate of the fish that are larger than the average in the time when they reach sexual maturity is stable or rising, according to data obtained from sampling with trawl nets. The good status according to 3.3.3 indicator is achieved when for all commercial species: the 95th percentile of the fish length distribution observed in researches with vessel surveys is stable or rising, according to data obtained from sampling with trawl nets.

Development Status: Further development is needed (expected to be operational by 2018, if adopted). The 3.3.4 indicator cannot be used because the size of data at the time of the first sexual maturity (L50) is generally not available.

C.3.2.2 Physical (physical disturbance to or loss of seabed substrate, changes to hydrological conditions) – relevant qualitative descriptors to consider: (6) and (7)

(1) Sea-floor integrity (D6) (area MAD-SI-AA-11)
Criteria 6.1: Slovenia reported a good environmental status, achieved when there is no recorded significant physical damage on the sea bottom or losses due to construction in the areas with biogenic substrata (see the description of Cladocora caespitosa in Section 2.1). For areas with different substrata, the volume subjected to abrasion, other bottom damages and loss of natural areas should be less than the threshold value x% of the surface.

Criteria 6.2: The sea bottom is in good condition when it is at a level that ensures the protection of the natural structure, extension, distribution and ecosystem functions and when there are no long-term harmful effects on benthic communities. The benthic habitats considered are: LitSed, LitRock, ShallMxdSed, ShallRock and LitSed, all already described in Section 2.1: Structure, functions and processes of marine ecosystems. Other features that should be considered are the physical damage and physical loss. Physical damage: the main activities physically affecting the seafloor are fisheries (e.g. bottom trawling) and maritime traffic (especially big cargo ships and cruisers which affect soft bottom beneath and near the waterways and anchoring areas). The impact of smaller recreational vessels is mainly seen in the infralittoral belt as damage to seagrass meadows and rocky bottom. Urbanization, especially concrete constructions on the shore, and beach maintenance have negative impacts on the mediolittoral and upper infralittoral belt. Physical loss of the sea floor and the alteration of its structure are caused mainly by urbanization, i.e. constructions on the shore (concrete beaches, pears, harbours, roads and breakwaters). Mediolittoral and upper infralittoral belts are the most exposed coastal belts. The areas with sedimentary shores are

experiencing the highest degree of pressure (Koper and Piran Bays, Izola, Strunjan). It is still to determine the spatial extension and the depth range of the areas subtracted from the sea and the areas permanently altered.

Development Status: Further development is needed (expected to be operational by 2018, if adopted). Criteria for the evaluation should be prepared at the level of the Northern Adriatic, in cooperation with other countries.

(2) Permanent alteration of hydrographical conditions (D7) (area MAD-SI-AA-11)
Descriptor 7: Slovenia reported changes in hydrographical conditions which do not alter the environmental conditions (biodiversity loss, habitat degradation, harmful algae blooms and oxygen deficiency in bottom layers) or those changes are minimal. The benthic habitats considered are: LitSed, LitRock, ShallMxdSed, ShallRock and LitSed, all already described in Section 2.1. Other features that should be considered are the current velocity, changes in hydrology, nutrient enrichment (see D5) and the oxygen level (see D5).

Current velocity: The circulation of the Gulf of Trieste is significantly variable in its near-surface layer and extremely susceptible to the state in the atmosphere. It depends also on temperature and salinity, which in turn compose the 3D field of the density; the latter drives the thermohaline circulation during a period of stratified water column, from spring to autumn. If the density layers near the opening of the Gulf along the line connecting the towns of Piran (Slovenia) and Grado (Italy) are of a "bowl-like"' type, the circulation is cyclonic, while if the density layers are of a "dome-like" type, the circulation is anti-cyclonic or clockwise. Both circulation features could be present during nice weather from spring to autumn; moreover, also a combination of both features was found. The major "agent" that affects the circulation is wind. Two most frequent winds, bora (ENE) and scirocco (SE), steer the wind-driven circulation. Due to its wide-open boundary line, the circulation in the Gulf needs to be studied in a context of the circulation of the northern Adriatic area. During the southern scirocco wind the water mass enters the Gulf along its northern (Italian) coastline where it turns inside the Gulf. During that period, the water mass exists along the southern Slovenian coastline. During the bora wind the water mass leaves the Gulf in the northern part, while it enters the Gulf in the southern deeper part. Tides do not contribute to the overall circulation picture, the water mass oscillates back and forth with semidiurnal and diurnal periods with the excursion distance that hardly reaches 2 km. In the analysis measurements of the currents at the Vida coastal buoy(continuous measurements between 2002 and 2015) were considered, together with numerical simulations (Princeton Ocean Model) of the circulation of the Northern Adriatic, which were validated with the currents measured at the Vida buoy.

Changes in hydrology: The inner part of the Koper Bay (approx.. 4 km^2 of water surface) is the only part of the Slovenian sea that has considerably changed in terms of hydrological conditions. The changes are mainly due to the interventions in the past: construction of the port with its infrastructure, filling parts of the coastal sea and dredging. Dredged material was mostly deposited on land, but a part if it was deposited in the shallow parts of the coast near the Rižana River outflow. It is still unclear if the current system is affecting also the area in front of the bay and the port. The Slovenian sea is also subjected to intensified heating of water masses in spring and summer periods. A trend of temperature increase in the last 17 years was ~0.15 °C/year. The status was not assessed.

Development Status: Further development is needed (expected to be operational by 2018, if adopted). Criteria for the evaluation should be prepared at the level of the Northern Adriatic Sea, in cooperation with other countries.

C.3.2.3 Substances, litter and energy (i.e. input of nutrients, organic matter, litter, sound or other forms of energy) – relevant qualitative descriptors to consider: (5), (8), (9), (10) and (11)

(1) Eutrophication is insignificant (D5)

Discriptor 5: Slovenia reported that eutrophication due to human activities and its adverse effects, such as losses in biodiversity, ecosystem degradation, harmful algal blooms and oxygen deficiency in bottom waters layers, are insignificant.

Criteria 5.1 (area MAD-SI-AA-11): The status of the sea is good if the average annual concentration of nutrients in the seawater does not exceed the environmental quality standards for coastal waters, in accordance with the regulation that regulates the status of surface waters. Threshold values are the following: annual average concentrations of nutrients in the sea (in the process of adopting the regulation): total nitrogen (TN) 48.8 μmol/L, total phosphorus (TP) 1.4 μmol/L, Nitrate (NO3) 2.8 μmol/L, phosphate (PO4) 0.15 μmol/L. The Status was assessed as good.

Criteria 5.2 (area MAD-SI-AA-11): In the open waters the status is good when the eutrophication due to human activities does not cause harmful algal blooms. A good environmental status is reflected by the thresholds: the concentration of chlorophyll a: 1.50 μg/L. Good environmental status is also defined by the abundance of phytoplankton (IE index x%) and by the auxiliary parameter transparency (multi-annual average). The status was assessed as good.

Criteria 5.3 (area MAD-SI-AA-11): In open waters good environmental status is defined by the spatial and temporal distribution of the concentrations of dissolved oxygen in the bottom layer. Good environmental status constitutes a situation when the episodes of oxygen deprivation (hypoxia) in the bottom layer in time and space is so limited that it does not cause lasting damage to seabed habitats. Threshold values are not reported. The status was assessed as good.

Criteria 5.2 (area MAD-SI-AA-111): In coastal areas a good environmental status is defined by the macroalgal communities dominated by species of the Cystoseira genus. The threshold value for the good environmental status is determined by the value of the EEI-c index for macroalgae. The threshold value for the EEI-c is 5.84. The status was assessed as good.

Criteria 5.3 (area MAD-SI-AA-111): On the sedimentary bottom of the infralittoral belt the good environmental status is defined by the appropriate status of seagrass meadows. Threshold values are defined by the density of shoots of Posidonia oceanica (>500 per m2), and the absolute value of the MediSkew index (<0.4). The status was assessed as good.

Development status: Further development is needed (expected to be operational by 2018, if adopted). Criteria for the evaluation should be prepared at the level of the Northern Adriatic Sea, in cooperation with other countries.

(2) Concentrations of contaminants give no effects (D8)

Descriptor 8: Slovenia reported a good status of the marine environment with regard to the pollution generated as the concentration of pollutants does not cause harmful effects on organisms, populations, communities or ecosystems.

Criteria 8.1 (area MAD-SI-AA-11): For seawater environmental standards, the Regulation on the Status of Surface Waters (OG RS, No. 14/2009) should apply. Sediment environmental standards are not yet established. Certain seawater certain limits are defined in relevant directives and regulations. The criterion for sediment (until the implementation of the new

Directive) is that synthetic pollutants do not exceed the levels that can cause irreversible effects on organisms and that non-synthetic pollutants do not significantly differ from the natural values in the environment. Another criterion can also be a non-growing trend in the concentrations of pollutants. For organisms threshold values, the relevant EU regulations are in use. Threshold values: for sea water according to WFD (2000/60/EC), the Directive on Environmental Quality Standards (2008/105/EC), and the Regulation on the Status of Surface Waters (OG RS, Nos. 14/09, 98/10); for sediments the environmental standards are not yet established; for organisms according to the Commission Regulation (EC) No. 1881/2006 and Commission Regulation EU 1259/2011. The seawater status was assessed as not good due to the elevated concentrations of organotin compounds (TBTs). Other pollutants are within the regulatory limits.

Criteria 8.2 (area MAD-SI-AA-111): The status is based on the knowledge of BC (background concentrations), the criteria for the evaluation of the BAC (Background Assessment Criteria) and the EAC (Environmental Assessment Criteria). A fall below these values means a deterioration of the environment. The basal activities of each biomarker are determined just for some biomarkers according to the geographical region. Threshold values are not reported. The assessment of the status was descriptive. General stress in mussels was assessed along the Slovenian coast. The measured retention time of the stain was 20 min, which is relatively short, indicating that organisms are stressed by different pollutants.

Development Status: Further development is needed (expected to be operational by 2018, if adopted). It is necessary to introduce regular annual measurements of relevant biomarkers for monitoring (monitoring EAC values). Additional measurements are needed to accurately determine BAC levels (due to seasonal fluctuations). It is necessary to define benchmarks. Everything must be regionally reconciled with the neighbouring countries (at least at the level of the sub-region).

(3) Contaminants in seafood are below safe levels (D9) (area MAD-SI-AA-11)

Descriptor 9: Slovenia reported a good status of the marine environment in the sub-region with respect to the pollution of seafood, as the concentration of any pollutants in fish or shellfish for human consumption does not exceed the limits that are safe for human consumption according to the prescribed limit values (Commission Regulation (EC) No. 1881/2006 and No. 1259/2011 setting the maximum levels for certain contaminants in food). Compliance shall be demonstrated in samples of fish, fish products and shellfish in relation to catches in waters under national jurisdiction. Threshold values: Commission Regulation (EC) No. 1881/2006 and Commission Regulation 1259/2011 of the EU set limits. The status was not assessed.

Development Status: Further development is needed (expected to be operational by 2018, if adopted). A regular monitoring should start, because not enough data are available, only the results of individual measurements (exception made for some data in bivalves). Other organisms, which are important for human consumption, should be added to the analyses. It is necessary to define the benchmarks and harmonize them regionally.

(4) Marine litter (D10) (area MAD-SI-AA-11)

Descriptor 10: Slovenia reported that the quantities of litter in the marine environment are reduced and do not represent a threat to marine organisms at the level of individual specimens, either due to direct mortality or in the form of indirect effects, such as bioaccumulation in the food web. Litter in the marine environment does not endanger the human welfare and does not cause adverse economic effects on the economy and the activities of local coastal communities. Threshold values: due to the fact that the problem of marine

litter in Slovenia is poorly investigated. Due to a short history of analyses and identification of the quantities, types and origins of the litter, it is not possible to confidently say whether a good environmental status of the Slovenian sea will be achieved by 2020 in other ways than the desired decline trend of the quantity of litter in the marine environment. The indicators of whether there is an improvement made are a negative trend in litter quantities in the marine environment and the stabilization (not the increase) of microplastics quantities in the marine environment. The status on shores was assessed as not good, based on the analysis of 19 samplings; however, there is a decreasing trend in mass (kg) of litter on shores.

Limitations: There is no sufficient data. Sample analyses were slow and not accurate enough. There is a need to develop and test a common methodology, not just for the water surface, but also for seabed habitats.

Development status: Further development is needed (expected to be operational by 2018, if adopted). The most developed is the indicator of litter along the shoreline, which has the longest analysis of data. There was a pilot review of the floating litter. Sampling of microplastics was carried out in nine locations – surface areas of the Slovenian sea. An initial analysis of the presence of marine litter in the gastrointestinal tracts of sea turtles (Caretta caretta) was performed.

(5) Underwater Noise (D11) (area MAD-SI-AA-1)

Descriptor 11: Slovenia reported that a temporal and spatial distribution of impulse noise at high, low and mid frequency does not have significant adverse effects on marine organisms. Continuous low-frequency ambient noise has no significant adverse effects on marine organisms. Threshold values: not reported. Based on preliminary measurements in 2011, the level of continuous underwater noise in the Slovenian sea was assessed as high.

Limitations: Only preliminary measurements of underwater noise at several points at 5 and 10 m in depth were performed.

Development Status: Further development is needed (expected to be operational by 2018, if adopted.

C.4 MARITIME ACTIVITIES AND THEIR SOCIO-ECONOMIC TRENDS

C.4.1 Extraction of living resources

C.4.1.1 Fish and shellfish harvesting (professional, recreational)

(1) Statistical overview and development trends

Fishing is undertaken within the entire Slovenian sea, with restrictions in the Protected Areas (e.g. landscape parks of Strunjan, Sečovlje and Debeli rtič, and nature reserves such as Škocjanski zatok and Rt Madona) and fishing reserves (Portorož and Strunjan), shown in Figure 3. There are three fishing ports in Slovenia: Koper, Izola, and Piran. Since the Slovenian independence, the fishing area of the Slovenian fishermen has been significantly reduced, which has substantial impacts on the whole sector.

There were 169 professional fishermen in 2015 (SURS, 2017a), of which 63 were employed full-time, and the rest were part-time fishermen. Of those, 48 were employed and 76 were self-employed. Long-term trends do not indicate significant changes in the number of active people in the fishing industry, but there was a significant decrease of people employed full time since 2011, which indicates the reduction of the activity. A similar trend can be observed in reduction of the number and the tonnage of fishing vessels. In 2012, the capacity of Slovenian fishing vessels was 685.02 GT and 9,126.90 kW.

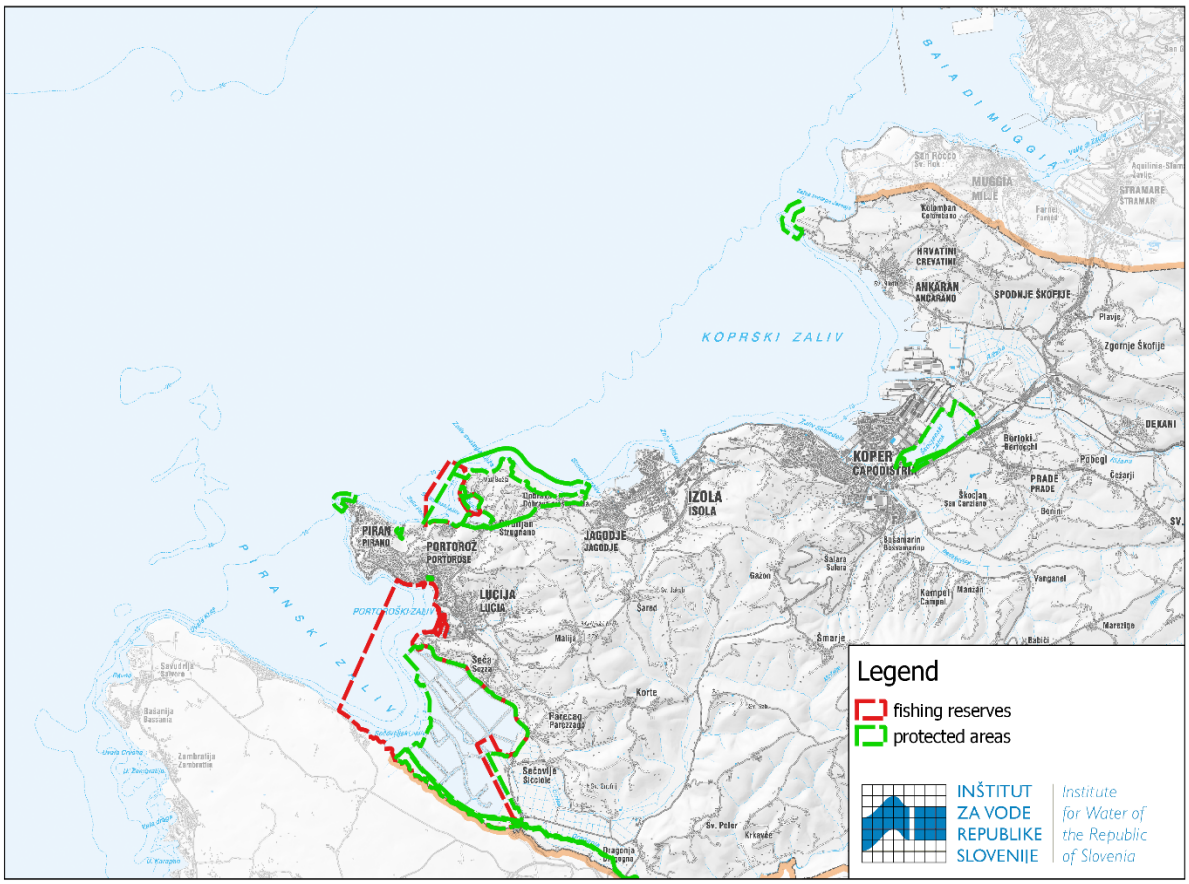


Figure 3: Fishing reserves and protected areas (prepared by IzVRS based on Kovačič et al., 2016).

Slovenian fishing fleet is composed of vessels, which have the average age of 36 years, with the oldest being 113 years old. More than half the vessels (52%) were built between 1970 and 1989. About 28% of all vessels were built before 1970, followed by 20% that have been built since 1990, and only one boat was finished after 2010. The fleet consists mostly of vessels up to 12 m in length (91%), which are active in the coastal fishing for benthic (white) fish. The most used equipment is the standing net. In 2012, 84 fishing vessels were active in Slovenia.

There is a falling trend in the amount of catch landed between 1990 and 2015, most of which is composed of fish. In 2015, 86% of catch was composed of fish, 13% of molluscs and 1% crabs. Even with sport fishing, there are decreasing trends in the weight of caught animals, which is also mainly comprised of fish species. Overall, due to the depletion of fish stocks, the Slovenian fishing industry is considered in crisis (Petelin, 2012). In 2009, the Slovenian fishermen landed 867 tonnes of fish, while 1,307 tonnes were cultivated in the Slovenian aquacultures (MKGP, 2011). In 2012, the catch was already down to about 317 tonnes of fresh fishing products, which was 56% less than in 2011. The socio-economic analysis (Kirn et al., 2018) expects the decreasing trend to continue in the future.

Fishing and aquaculture have little influence on the national Slovenian economy, as they only contribute 0.03% of all value added in the country. Fish and shellfish processing is the most profitable activity in this sector (Petelin, 2012).

(2) Development objectives and needs

The fishing sector is managed by the Directorate for Forestry, Hunting, and Fishing, within the Ministry of Agriculture, Forestry and Food. The following legislation regulates the fishing activities:

- Law on Marine Fishing (OG RS, No. 115/2006). In addition to economic and recreational fishing, it also regulates the aquaculture activities and designates the two fishing reserves.
- Decree on Designation of the Sea Fishing Area of the Republic of Slovenia (OG RS, No. 2/2006).
- Rulebook on changes and additions to the Rulebook on Detailed Labelling of Fishing Equipment and Ensuring of Sustainable Use of Fish (OG RS, No. 11/2010).
- Determined fishing corridor.
- Management Plan for marine Fisheries in Waters under the Jurisdiction of the Republic of Slovenia (July 2011).
- Plan on the Adaptation of Fishing Effort.
- National Strategic Plan for Development of Fishing.
- Operational Programme for Implementation of the European Maritime and Fisheries Fund for the Republic of Slovenia 2014-2020.

The Management Plan for marine Fisheries in Waters under the Jurisdiction of the Republic of Slovenia (July 2011) aims at aligning the fishing capacities and fishing opportunities, for which an excessive fishing effort was identified. Due to the majority of Slovenian marine fishing focussing on pelagic species, such as anchovy and sardine, which the international studies have found to be overfished in the Mediterranean Sea, the fishing effort in Slovenian sea needs to be adjusted as well (FAO-AdriaMed). The Programme aims to implement three foundational measures:

- decreasing the number of economic fishing permits;
- revision of the already granted economic fishing permits;
- decreasing the fishing effort with the implementation of a measure of permanent cessation of fishing activities and a measure of temporary cessation of fishing activities.

The issue of decreasing the levels of annual catch is problematical; the Ministry of the Agriculture, Forestry and Food (MKGP) judges that when the catch is lower than 100 tonnes/year, the situation will become truly alarming. The multifaceted importance of fishing is well recognised, not only in the economic terms, but also in its wider socio-cultural aspect (tradition, tourism, education, cultural heritage, identity, etc.). For example, the economic fishing is important for the coastal region (municipalities of Ankaran, Koper, Izola, and Piran), where a close entanglement of fishing with the life in the area is present, as also linked to tourism and catering industry.

A number of limitations to the fishing sector have been recognised by the fishing office Fornače (concession for implementation of public service of fishing consulting). Those include spatial restrictions (the limited Slovenian sea), largely outdated fishing fleet (none of the fishing boats has the capacity to reach international waters), seasonal issues, and fishing restrictions in the traffic separation scheme (for the maritime shipping transport to the Ports of Koper, Trieste, and Monfalcone). However, on the other hand, all coastal municipalities have well established and maintained fishing quays. Most of them have been recently renovated with EU funds. The fishing office further maintains that the fishing quotas in Slovenian sea could be increased, as there is enough potential.

There are currently three fishing ports in Slovenia: Koper, Izola, and Piran. The fishing community expressed the need for better land infrastructure, as currently only in Valdoltra the trucks can access the fishing quays, and even then in time of different events, that is impossible. Otherwise, vans must be used, which increases the time needed for relocations of

catch and involves more work. The Municipality of Izola also plans on extending their fishing port with planned quays along the main pier. In the framework of improving the fishing infrastructure, a designation of the area for refuelling for all vessels is needed. Additionally, the fishermen suggest establishing a better serviced port in the area of Žusterna.

Furthermore, the fishermen would like to get permission to use fishing nets also within the fishing reserves, to reduce the pressure on shellfish areas and other fishing boats and target gilt head breams there, which are also causing economic damage on shellfish cultivation sites.

(3) Transboundary issues

Preservation and management of fish stock: Low stocks of the main species of fishing interest are a major transboundary issue. Particularly because, even if Slovenia completely stopped fishing, the fishing stocks would continue to decline, due to the much larger fishing pressures of Italian and Croatian fishing fleets (Peterlin et al., 2016). For efficient and sustainable management of fishing resources, transboundary cooperation is vital.

Regimes of navigation in the traffic separation scheme: The fishermen wish for an exception for their fleet in the exclusive shipping lane area in traffic separation scheme, so they could fish also the flocks of fish (the Port of Koper maintains that this cannot be done). The traffic separation scheme was designated with an international agreement, between Slovenia and Italy (IMO-Sub-Committee on Safety of Navigation, 49/3/7, 2003), and therefore, any modifications to it represent a transboundary issue to be addressed.

C.4.1.2 Fish and shellfish processing

(1) Statistical overview and development trends

According to Slovenian Business Register (AJPES, 2017), seven companies work in fish and shellfish processing:

- CAVIAR Biosistem Ltd.,
- DELAMARIS KAL, Ltd.,
- Denis Cunja, sole proprietorship,
- GaMr Ltd.,
- POLŽI ZUPET Ltd.,
- RIBON MARTIN STARC sole proprietorship,
- VALENTIN OKUSI Ltd.

According to the SURS (2017a) temporary data, only 94 people were employed in those companies, a significant reduction from 293 in 2008.

The SURS reported that in 2012 those companies were producing:

- sea fish, frozen,
- fish fillets, frozen,
- processed or conserved anchovy, great anchovy and whitebaits, whole and in parts,
- processed or conserved mackerel, whole or in parts,
- other processed or conserved fish,
- frozen crabs; frozen flour, groats, or pellets from crabs, suitable for human consumption,
- molluscs, frozen, dried, salted and smoked.

Whereas for 2015, SURS (2017g) only reported the following products:

- processed or conserved mackerel, whole or in parts,
- other processed or conserved fish.

Unfortunately, the data on annual production is not available due to confidentiality legislation in place, which prevents analyses of production and trends. Nevertheless, the recent socio-

economic analysis (Kirn et al., 2018) found that trends in this economic sector have been decreasing in recent years, but foresee them to increase in the future.

(2) Spatial planning situation

All companies working on fish and shellfish processing are based inland, with only two being located within the river drainage area of the Adriatic Sea. The largest company for fish and shellfish processing, DELAMARIS, moved their production from the coastal location inland in 2010, freeing up the space for touristic purposes.

C.4.2 Extraction of non-living resources

Extraction of resources, such as gas, oil, or minerals is prohibited in the Slovenian territorial waters, in accordance with the Mining Act (OG RS, No. 14/14).

C.4.2.1 Extraction of salt

(1) Statistical overview and development trends

On the Slovenian coast there are still two active saltworks; Sečovlje and Strunjan. The extraction of salt is carried out in traditional, sustainable way, developed in the 15th century. Annually, two to four thousand tonnes of salt are produced, with potential to produce more, should there be higher demand.

Sečovlje and Strunjan saltworks are both protected nationally, as part of landscape parks, and under international policies and conventions, including the Ramsar Convention, Birds and Habitats Directives, Barcelona Convention, and part of Natura 2000 network.

The economic activity of salt extraction employed 117 people in 8 different companies in 2015 (SURS, 2017a). The trends between 2002 and 2009 show a general increase in the value added in the products and the number of employees, however, the number of employees have started to decrease in recent years (from 2012 onwards), while the number of companies has grown. While the sector has been stagnating in recent years, Kirn et al. (2018) expect it to grow in the future. However, no new spatial demands are expected.

(2) Development objectives and needs

Comprehensive conservation of traditional production of sea salt is included in visions and development goals in the marine area. The following conservation measures should be undertaken:

- conservation of the use of Sečovlje and Strunjan Salinas;
- encouraging activities and spatial development, which allow for conservation of traditional production of sea salt;
- ensuring the continued production of salt with the “Pag approach” in the museum part of the Sečovlje Salinas (Fontanigge area) and the “Ston approach”in all other areas of Sečovlje Salinas (Lera area) and at the Strunjan Salina;
- preservation of the specific knowledge, linked to traditional production of sea salt;
- prohibiting the activities and measures, which have a negative impact or threaten the traditional production of sea salt at Sečovlje and Strunjan.

C.4.2.2 Extraction of water

(1) Statistical overview and development trends

In Slovenia, the extractions of water are regulated with the system of water permits and rights. There were 31 permits for the use of sea water approved in 2015, for four different activities: pool bathing areas and other uses (e.g. fire water), water for the production of heat and water

for technological uses. The maximum approved annual extraction is 3,630,544 m^3, with the maximum momentary extraction of 1,266.42 L/s (Table 2).

(2) Development objectives and needs

The use of sea water for technological, heat production, and bathing activities is linked to different economic sectors, such as energy production, tourism, and industry. Therefore, it is generating economic benefits. However, it is difficult to estimate its value, since there are, for example, no available economic valuations for estimating higher willingness to pay to bathe in sea water pools, compared to regular pools.

The extractions of water, even heavily regulated as they are, do not currently present a significant spatial use of the marine area. This is not expected to change in the future.

Table 2: Number of water permits and users for four different activities, with maximum yearly and momentary extractions of water (Altas voda, 2015).

Activity	No of water permits	No of users	Maximum allowed yearly extraction	Maximum allowed momentary extraction
Pool bathing areas	18	13	265,540 m^3/year	339.2 L/s
Other uses	3	2	15,964 m^3/year	422.2 L/s
Water for production of heat	3	2	1,067,000 m^3/year	80.0 L/s
Water for technological uses	7	3	2,282,040 m^3/year	425.02 L/s

C.4.3 Cultivation of living resources

C.4.3.1 Aquaculture, including infrastructure

(1) Statistical overview and development trends

Aquaculture can be carried out only in predetermined areas in the Slovenian sea, according to the Rulebook on the Determination of Areas for Aquaculture (OG RS, No. 38/15). The areas have an areal of 1,180,000 m^2 (Sečovlje – 866,000 m^2, Strunjan-133,000 m^2 and Debeli rtič-180,000 m^2). In the areas there are currently 26 permits for the use of water, granted to seven different companies for aquaculture (25 permits for shellfish cultivation and one for fish (Figure 4). In Sečovlje, there are 14 parcels (260,000 m^2) intended for shellfish production and two (80,000 m^2) for fish. The water permits have been granted for 13 parcels for shellfish production (240,000 m^2) and one for fish (40,000 m^2). Strunjan has water permits granted for six shellfish aquaculture sites (99,000 m^2), while Debeli rtič area has three concessions granted in the area of 90,500 m^2.

In the Slovenian sea, predominantly only white fish (European bass) and Mediterranean mussels are cultivated, since gilt-head breams stopped being used in Slovenian aquaculture in 2006 (Petelin, 2012). Some production of warty venus clams is on the rise in the recent years. In the period between 2005 and 2010, the annual average production was 213 tonnes of mussels, and 37.7 tonnes of seabass (SURS, 2011).

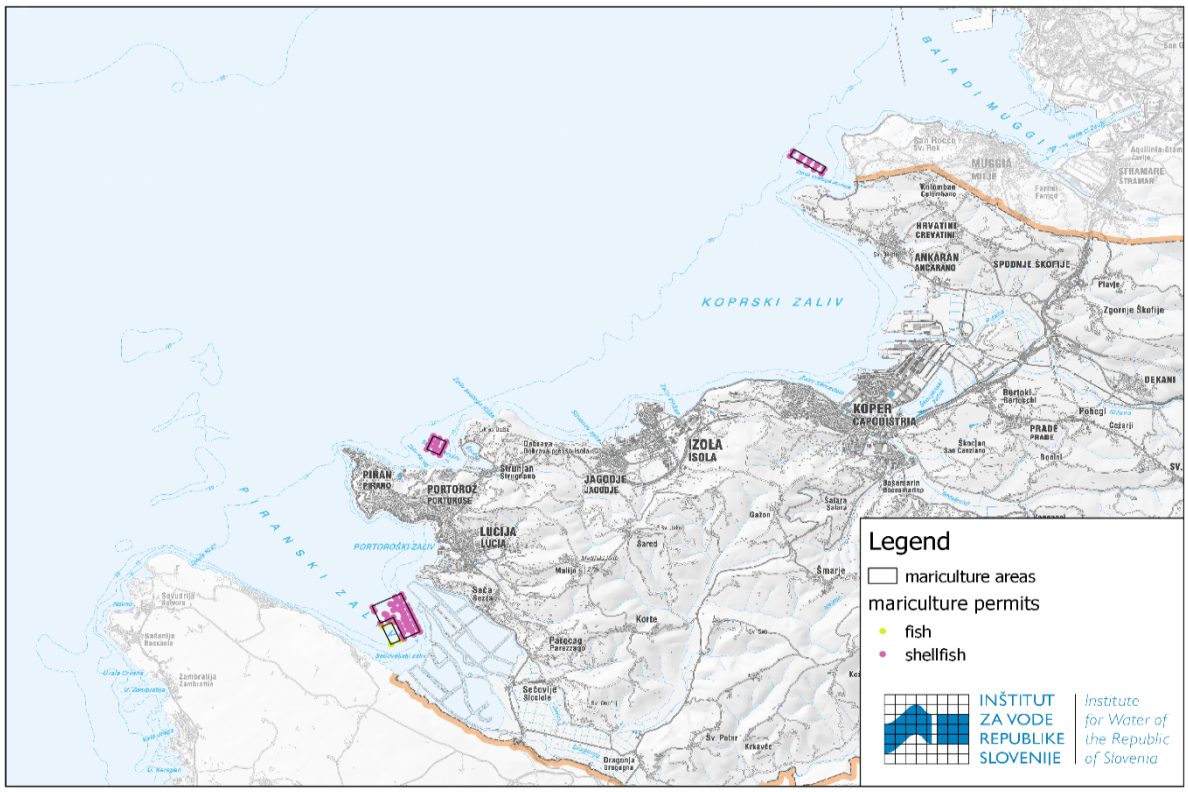


Figure 4: Officially designated areas for aquaculture and issued permits (prepared by IzVRS based on Atlas Okolja 2017).

According to SURS, the annual production of aquaculture products is growing, which is mostly on the account of the growth in cultivation of molluscs, while fish cultivation stagnates. However, according to the data of the Slovenian Water Agency, the maximum number of water permits on the predetermined areas for aquaculture has been granted, and the expansion of the areas has limited potential, which in turn limits the future growth of the aquaculture production. Similarly, the National Strategic Plan for Development of Aquaculture 2014-2020 reportsd that due to the intense use of the Slovenian coastal sea, the options for development of aquaculture are almost entirely exhausted. The expansion is possible in the areas where permits have already been granted; however, the areas are not yet entirely used (e.g. Sečovlje and Strunjan areas). Additionally, MKGP has commissioned a new study to identify potential new appropriate areas for aquaculture sites (results expected in 2019). Slovenian characteristic of this activity is that it is dominated by small family-run businesses, with few workers, and unpaid help from family members. It is expected that the growth of the field will continue, especially because the demand for sea products cannot be met by fishing only (Streftaris and Cotou, 2011). However, the opportunity for production increase is limited by the current size of officially designated aquaculture areas. The Slovenian Statistical Office had, in 2012, registered 39 employees in aquaculture, with only 28 employed full time. The growth in the sector is expected to continue in the future as well (Kirn et al, 2018).

(2) Development objectives and needs

The aquaculture sector is managed by the Directorate for Forestry, Hunting and Fishing within the Ministry for Agriculture, Forestry and Food. The following documents are related to the aquaculture activities:

- National Strategic Plan for the Development of Aquaculture in the Republic of Slovenia 2014-2020;

- Operational Programme for the Implementation of European Maritime and Fisheries Fund in the Republic of Slovenia 2014-2020.

The National Strategic Plan for the Development of Aquaculture in the Republic of Slovenia (2014-2020) encourages sustainable, competitive, and knowledge-based aquaculture in Slovenia (in line with the EU 2020 goals). However, it also requires that the EU and national policies in the fields of nature conservation, environment, use and management of waters, conservation of habitats, as well as the wellbeing of aquaculture animals, are upheld. Therefore, the aims are to:

- increase the production and self-sufficient supply with sea organisms (they must fit into natural environment of Slovenian waters, harmonised with ecosystem functions, and following the objectives of the Water Framework Directive and Marine Strategy Framework Directive);
- introduction and implementation of new technologies and species that may lead to positive economic effects;
- implementation of closed circuit units for the production of seafood;
- preserve and increase the number of working population in aquaculture;
- improve territorial cohesion;
- strengthen the sustainable aquaculture, including biodiversity.

The National Strategic Plan for the Development of Aquaculture (2014-2020) expects that the production of Mediterranean mussels on an annual level could rise to about 1,000 tonnes. This still allows for the preservation of the good status of the marine environment and exceeds the domestic demand. For fish aquaculture it is envisioned that if the additional water permits, within the already designated parcels, are exploited, the production could increase to 120 tonnes, which would represent about 40% of domestic demand.

An issue to be addressed is the frequent occurrence of gilt-head breams in the fishing reserve of Sečovlje where these fish often feed on the molluscs larvae and significantly reduce the shellfish production. In France, Spain, and Italy this problem has been addressed with the installation of special nets, which do not allow fish to access the shellfish sites. This option will have to be assessed and potentially applied in Slovenia as well.

Slovenia still has the potential for further development of competitive and sustainable aquaculture, for designation of new areas, objects or new techniques (Operational Programme for the Implementation of the European Maritime and Fisheries Fund in the Republic of Slovenia 2014-2020). Particularly, there are options to start cultivating other shellfish species in the already designated areas, for example oysters. Also, warty venus shellfish can be farmed further away from the coast; however, further research is needed on that topic. It would also be beneficial to try and find new areas for aquaculture, both in the coastal belt and further away from the coast in the territorial waters. This last suggestion has already been funded by the MKGP and results are expected in 2019.

Shellfish farming is currently very profitable and therefore growing. It is expected that given the traditional fishing practices are more and more difficult to survive with, the interest of a number of fishermen to work in aquaculture is strong, if there were possibilities for it. Currently, the main hindrance to the sector is the limited area of designated shellfish cultivation sites and inappropriate logistical infrastructure (loading of cargo on the trucks – no appropriate piers for that, can only use vans, problems with night-time noise).

The competent ministry also agrees that the locations for aquaculture should be expanded, based on the interest of the fishing and aquaculture sectors, provided that their location do not

clash with other actors in the marine area. This is recognised as a strategic economic sector, which has a wider importance for Slovenia, as part of the spatial entity of the Republic of Slovenia, beyond the economic significance. For this purpose a new study for determination of suitable new aquaculture sites has been commissioned. The study will start in January 2019 and will be concluded in 15 months. The results of this study should be incorporated into the maritime spatial plan for Slovenia.

The new or expanded aquaculture areas must take into account their impact on chemical and biological status of the environment, potential spatial conflicts with other marine uses (e.g. nautical tourism, bathers, underwater archaeology, etc.), their visual impact (particularly important for tourism), as well as logistical problems (spatial limitations for infrastructure on land, noise pollution, anchoring, waste management, etc.).

The Municipality of Piran plans, on the Seča peninsula, to supplement the existing aquaculture cultural service buildings, repair workshops for fishing boats and the fishing port and build a new building for aquaculture activities and a new extended fishing port.

(3) Transboundary issues

Aquaculture can have considerable environmental impacts due to anti-fouling paints on the fish cages, the introduction of extra nutrients into the system, and production of excessive amounts of detritus under the fish farms, which can locally affect the composition of the sediment. Due to high concentration of fish in a small space the likelihood of diseases occurring and spreading out of fish farms is also worth noting, as well as the precautionary addition of antibiotics into the marine system around the aquaculture plants. Nevertheless, these effects are usually highly localised, and due to heavily regulated locations designated for aquaculture in Slovenia, unlikely to have transboundary impacts.

C.4.4 Transport

C.4.4.1 Transport infrastructure

(1) Statistical overview and development of trends

The Northern Adriatic Sea, including the Slovenian sea, is an important traffic area. The most important actor in Slovenia is the Port of Koper, as a nexus of connections between shipping and terrestrial transport of cargo, while the ports at Piran and Izola play a minor role. The Slovenian coastal region is part of two pan-European corridors: Baltic-Adriatic and Mediterranean corridors. The Port of Koper is considered a key junction for both corridors. As such, it is of central importance to the Slovenian and even wider regional economy. Moreover, the Adriatic Sea is also one of European marine motorways. Also, the geographical position of the Slovenian coast is favourable, since the Gulf of Koper lies in the area where the Adriatic Sea reaches farthest into the industrially developed continental Europe and forms a natural transition of Central Europe into the Adriatic Sea (Kontić et al., 2008).

This sector is incredibly important from a social aspect, since it was directly responsible for providing almost 3,500 full-time jobs in 2011 (AJPES, 2011). Therefore, the maritime transport is worth 0.9% of the total value added in the Republic of Slovenia and employs 0.7% of all workforce in the country. Koper welcomes between 150 and 350 ships every month of the year, while the ports in Izola and Piran only welcome passenger ships, which spike in the tourist season, between April and October. The Piran port usually welcomes up to 180 ships during the peak season in July and August, while about 20 ships dock at Izola, with a much less prominent seasonal peak (SURS, 2017b).

A substantial part of the Slovenian coastline is urbanised with a dense public infrastructure. For example, the Municipality of Koper with its 303.2 km^2, includes 48.3 km of railways, 107.85 km of state roads and 487 km of local roads (Source: http://www.koper.si).

The sector has been growing until now and, according to Kirn et al., (2018), the growth is expected to develop further in the future.

(2) Development objectives and needs

Maritime transport infrastructure is regulated and will develop in accordance with a number of documents, with the main one being the Resolution on the National Programme on Maritime Development of the Republic of Slovenia (OG RS, No. 87/10). This document concludes the following:

- maritime economy in the Republic of Slovenia is very diverse and cannot be linked only with shipping;
- development of maritime activities should be sustainable and in a generally accepted way;
- activities, linked to maritime economy, should be aligned with all stakeholders active in the same space, or wish to become active in this space in the future;
- when assessing the economic importance of ports, a wider outlook is needed, which would also encompass all port activities needed for organization and implementation of maritime transport of cargo, and services linked to cargo.

The strategic goal of the document is the implementation of the concept of maritime motorways and the establishment of new intermodal logistical chains (with ports as nodes in the network), which need to be sustainable and commercially more effective than road transport. The Resolution argues that maritime spatial planning, related to shipping, can only be carried out with a confirmation of the state spatial plans for a comprehensive spatial development of the ports. Further development of the operational coast in the Port of Koper can be directed mainly towards the lengthening of Piers I and II and construction of Pier III, which will take into account also the border area between the port and the Ankaran coast, as well as the area of the military port.

The Port of Koper has been integrated into the TEN-T network as one of the key entry and exit ports of the comprehensive European network. Stimulating the development of maritime infrastructure is a key element in establishing trans-European multi-modal networks that ensure the undisturbed operations of the internal market and the strengthening of economic and social cohesion. Among the northern Adriatic ports, the Port of Koper has the best direct container links of the main global shipping companies from the Far East, as well as with feeder lines with hub ports of southern Mediterranean. The container transport is expected to increase in the future, especially towards 2020, when the upgrade of Pier I will allow the admittance of two container ships at once (Programme of the Development of Port of Koper).

In the field of maritime infrastructure development at the Port of Koper, approximately one third of the existing port infrastructure has been further developed in the past 20 years. Future measures related to investments in port infrastructure will mostly relate to the harmonization of activities to ensure the realisation of the objectives of the Republic of Slovenia and the concessionaire (Luka Koper Ltd.). These goals are:

- achieving maximum transhipment via the Port of Koper (18 million tonnes of goods were transhipped in 2013, the goal of the port is to increase that to 23,5 million tonnes by 2020, and 35 million tonnes of transhipments and 2 million TEU of container transports by 2030);

- container transport and vehicle transport are of strategic importance;
- transhipment of all types of goods and maintaining the multi-purpose role of the port;
- systematic market management and development of offer to create greater added value;
- establishment of closer and more efficient relations between all providers of logistical services;
- extending and modernizing port infrastructure capacities and providing for the appropriate integration of the port system in wider international infrastructural networks;
- care for sustainable development, environment protection and safety;
- use of economical, modern, and innovative technologies, where information and communication support is very important;
- cooperation between the concessionaire and the local community, including a socially responsible conduct.

The European TEN-T network further makes certain requirements in the field of maritime infrastructure that will also have to be taken into account at the Port of Koper:

- the port should be connected to railways, roads, and, if possible, to inland waterways;
- the port has at least one terminal open to all users under the same conditions;
- member States provide necessary equipment to assist the ships' environmental performance;
- to introduce SafeSeaNet network;
- to provide e-maritime services, including the single window.

Due to the falling prices of shipping, ships are becoming larger, but the port has not yet adjusted to this: the problems are the entry canals and pools, which are too shallow, and short piers. Increasing transhipment requires the prompt provision of suitable additional port infrastructure and better capacity of hinterland connections, especially rail, which is a bottleneck and a threat to the development of the port. The desired state of the Port of Koper is the following:

- uninterrupted entry of large ships directly into the Port of Koper;
- sufficient capacity of port infrastructure;
- sufficient capacity and quality of hinterland railway connections;
- Spatial Development Strategy of Slovenia states that the port should be developed as a priority, and in connection with other northern Adriatic ports and the hinterland or the European transport Corridors V and X. To improve transport connection between the towns in Slovenian Istria and other places in the northern Adriatic region, maritime passenger transport should be planned and promoted at Koper.

The Transport Development Strategy of the Republic of Slovenia until 2030 outlines the following measures to achieve the desired state:

- deepening of other entry canals and pools, extension and construction of piers and rearrangement of other port infrastructure;
- rearrangement of the railway network to facilitate the reception of expected cargos and delivery within an acceptable period;
- arrangement of a suitable road connection between the motorway network and the entrance to the port and arrangement of the road network in the Koper area;

- by 2020, investment will include the existing infrastructure. An important activity by 2020 is the deepening of the entry canal into Pool II, the extension of Pier I, and the acquisition of containers in the rear area;
- after 2020, two major investment projects will be carried out – the extension of Pier II and the construction of Pier III.

A part of the Port of Koper, which is functionally linked to the city, is intended for the arrangement of the main passenger terminal for national and international maritime passenger transport. The Resolution on National Programme of Maritime Development of the Republic of Slovenia outlines that the passenger terminal will include border controls and will house the Slovenian Maritime Administration, as well as other national maritime related offices. Additionally, the seafloor next to berths 1 and 1a will need to be deepened to at least 10 m depth, which will allow landing of larger passenger ships, up to 300 m in length. To stimulate national public and regular international passenger transport, the existing ports at Ankaran, Izola, Piran and Portorož are being developed and modernized. The ports at Piran and Izola could also include an upgrade for the international passenger transport of large tourist vessels.

The Programme of Development of the Port of Koper outlines the following points as the key for further development:

- the most important development focuses on container transports: maintain the top position among the Adriatic ports in the absolute transhipment, increase the market share among the northern Adriatic ports above 35%;
- accelerated increase in the transhipment of cars: achieve top position in the Mediterranean,
- locating new cargos for general goods, possibility of new products for distribution and value added logistics;
- keeping of strategic fuels (oil derivatives, coal) and acquiring alternative fuels.

The National Spatial Plan for Comprehensive Spatial Arrangement of the Port for International Transport at Koper was adopted in 2010. The plan encompasses both the developments within the area of the ports, as well as the related spatial arrangements of road, railway, maritime, communal, and energy infrastructure. The sea that is covered by the National Spatial Plan is the area of special use for port activities. The coast needs to be equipped with rubber protectors, ladders, and signalisation for safe landing of ships. The Plan allows for partial and temporal arrangements, which must be approved by the Slovenian Maritime Administration and the concessionaire. The Plan also outlines the following alterations of port infrastructure in the maritime areal:

- upgrade of Pier I – lengthening and widening of the pier;
- upgrade of Pier II – lengthening of the pier;
- construction of Pier III – for the needs of the Slovenian military, this pier will include the operational coast of 300 m length and 50 m width, where facilities, parking areas and a sea wall will be constructed;
- upgrade and maintenance of pools – all three pools need to be deepened;
- landing routes – in front of port pools, a turning areas for ships will be arranged.

The National Spatial Plan also includes provisions for the passenger terminal to be constructed. The Plan is to be implemented in stages, which allows the functioning of the port as a whole and does not restrict other development outlined in the Plan. The Port of Koper already holds a concession for a passenger terminal where a new construction permit for a new passenger terminal has already been granted. The terminal will improve on land

passenger facilities; however, an increased capacity for cruise ships is not expected. The ports at Ankaran, Izola, Piran, and Portorož might develop further as touristic ports where smaller ships could distribute tourists from the main cruise ship, which would be docked at Koper.

It is also expected that the ports of Koper, Izola, and Piran will further develop to cater to the needs of international passenger transport. The development of the ports other than Koper is expected to be linked to the development of cruise passenger terminal at Koper. The ports at Piran and Izola have the potential for meeting the demand of international passenger transport of larger touristic boats.

(3) Transboundary issues

Transboundary issues of the maintenance and construction of transport infrastructures are rare, as the activities are mostly carried out on land. Due to the limited extent of the Slovenian coastal and maritime areas, some noise, light, and fine particles pollution might affect also the neighbouring areas in Italy.

C.4.4.2 Shipping

(1) Statistical overview and development trends

The Port of Koper reported a growing amount of cargo traffic in the recent years, growing from 14,030,732 tonnes in 2006 to 22,010,653 tonnes in 2016, with projections for 2030 reaching 30,824,483 tonnes. There was a dip in 2009 due to the global economic crisis reducing the extent of shipping. The number of vessels entering the Port of Koper is a bit more variable, but despite the overall growing trend, it has been decreasing since 2008. This trend is linked to the increased capacity of ships. Since 2011, the Port of Koper also welcomes cruise ships with the number of passengers arriving yearly somewhere in the range between 57,000 and 80,000, with the trends being relatively stable.

The Port of Koper was directly employing 1,071 people in the business year 2016/2015, which is a 3% increase from the previous year. The economic activity of the Port is also growing, as their direct profitability of the capital was 13.9% in 2016, which is 27% higher than in the previous year (Luka Koper, 2017).

Cargo ships with the destinations to Koper, Trieste and Monfalcone use the Slovenian sea. About 2,000 ships a year sails into the Koper Cargo Port with more than 22 million tonnes of cargo, while 3,500 travel to Trieste with 47 million tonnes of cargo, while Monfalcone works with about 4 million tonnes of cargo on an annual basis (Peterlin et al., 2011;). The Port of Koper, alongside other northern Adriatic ports, is incredibly important for the landlocked central European countries (e.g. Austria, Hungary, Slovakia, Poland, Czech Republic, Bavaria (Kontić et al., 2008).

Due to high volume of shipping transport in the Gulf of Trieste, a two-way sailing system (Traffic Separation Scheme – TSS) for cargo ships is implemented and in the Gulf of Koper, a special area is designated for anchoring, while the ships wait for the entry into the Port (22.7 h on average).

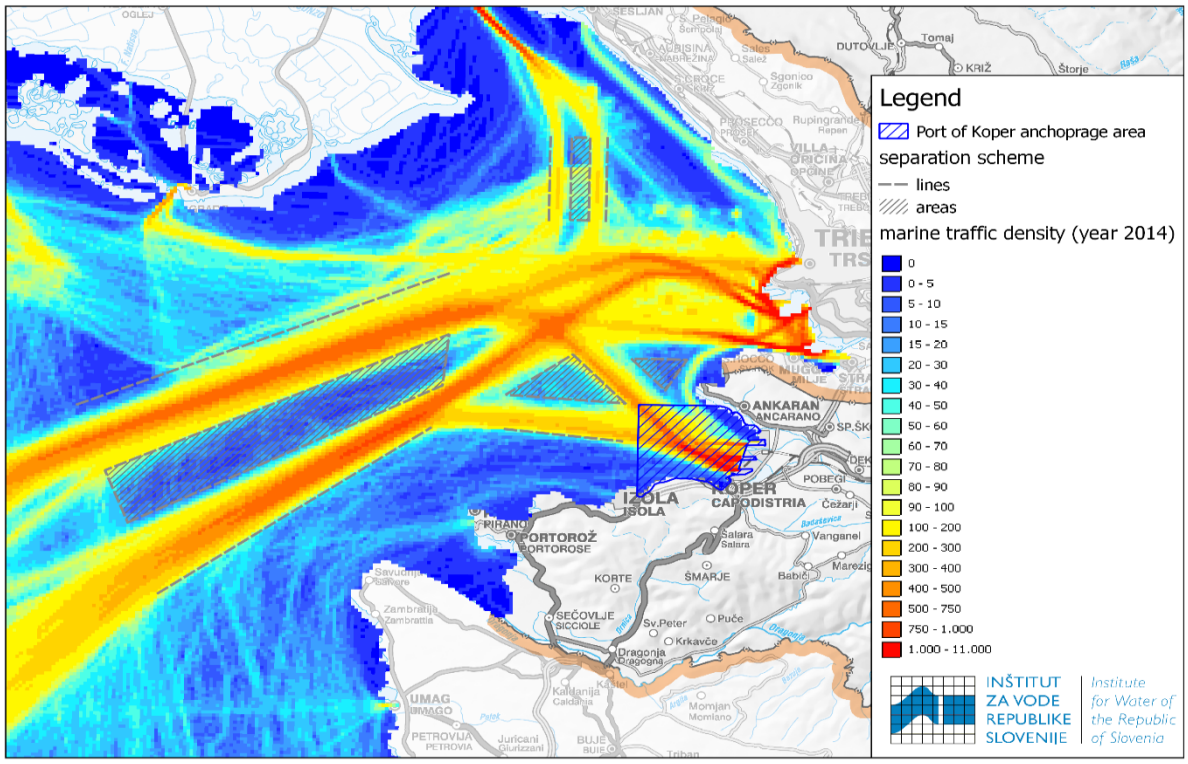


Figure 5: Shipping in the Gulf of Trieste (prepared by IzVRS, source of marine traffic density data: http://www.balmas.eu/23-misc/271-balmas-gis)

(2) Development objectives and needs

Maritime transport infrastructure is regulated and will develop in accordance with a number of documents, with the main one being the Resolution on the National Programme of Maritime Development of the Republic of Slovenia. The document concludes the following:

- maritime economy in the Republic of Slovenia is very diverse and cannot be linked only to shipping;
- the development of maritime activities should be sustainable and generally accepted;
- activities, linked to maritime economy, should be aligned with all stakeholders active in the same space, or wish to become active in the space in the future;
- when assessing the economic importance of ports a wider outlook is needed, which would also encompass all port activities needed for the organization and implementation of maritime transport of cargo, and services linked to cargo.

Development needs of the maritime transport sector were discussed with the representative of the Port of Koper (13.9.2018). According to the Port's business plan, the Port shall double its cargo traffic by 2030, or triple it in certain sectors (vehicles, containers). This prognosis does not necessitate also the doubling or tripling of the number of vessels entering the Port of Koper and by extension travelling through the Slovenian territorial waters, as the capacities of ships are growing. Therefore, the trends of increased cargo loads and lower number of ships have already been observed in isolated instances. For example, the Feeder ships have the capacity of 6,000-8,000 TEU, while the newer Panamax, New Panamax, and Post Panamax ships can have between 14,000-16,000 TEU and are longer than 30 m. The state-of-the-art trends in the shipbuilding are going towards longer and wider ships, while the draft remains optimal (approx. 17.6 m), which would not necessitate further deepening of the Bay of Koper. However, the pressure on benthic habitats is still expected to increase.

Sometimes the Shipping activities already overlap with other uses of the marine space, most commonly aquaculture and recreational/sport events (e.g. regattas). The overlaps are managed and coordinated through the Slovenian Maritime Administration. The growth in both aquaculture areas and the number of touristic/recreational events is expected in the future, which together with the growth in shipping and limited space available to use, might cause some conflicts in the future.

While the Port of Koper does not expect a substantial increase in the number of cruise ships entering the port, further development of the tourist ports in Ankaran, Izola, Piran and Portorož will increase the amount of maritime transports within the Slovenian waters, especially if Izola and Piran start receiving large international touristic ships in addition to smaller touristic boats, linked to the cruise ships, docked at Koper.

Extensions of the Marina of Izola are not planned, apart from the extension of the customs pier at Izola. However, the extension of the Marina Portorož has been envisioned, including the deepening of the entrance canals and the marine itself, while it is not yet clear how to dispose of the dredged material. The Municipality of Piran also wishes to extend both communal and day quays in the vicinity of the town of Piran, as demand already exceeds the number of existing spaces. This also includes a preparation of docking sites for cruise ships (either next to the larger pier in Piran, or in the area between Portorož and Bernardin).

The state-of the art logistics trends favour "just in time" planning, which aims to minimise the time each ship spends in the port or waits for entry (including anchoring). The pressure on marine benthic habitats can thus be reduced, as anchoring will only be done in exceptional circumstances. It is difficult to predict how the number of ships and instances of anchoring will develop in the future.

(3) Transboundary issues

Due to the high volume of shipping traffic in the area, a number of transboundary issues also result from it, such as marine litter, underwater noise, ballast waters and invasive alien species, and potential spills and marine pollution. Therefore, shipping can be classified as one of the main anthropogenic pressures on the marine environment. At the same time, because most of the mentioned issues are international, there are also some preventive international activities established to counter the worst effects. For Example, the Rescue Plan in the event of a pollution event is coordinated with Italy.

C.4.4.3 Shipbuilding

(1) Statistical overview and development trends

After Slovenian independence, the economic climate for shipbuilding has deteriorated and caused the number of employed workforce to fall by 75%. The SURS (2017a) temporary data indicated that 158 people were employed in shipbuilding in 2016, a slight increase from previous years, but a marked decrease from 791 in 2008. Shipbuilding only plays a minor part in the Slovenian economy. Nowadays, apart from the Shipyard Izola, there is an array of smaller companies, which are projecting, planning, and building recreational vessels (64 companies, according to SURS (2017a, temporary data in 2016). In 2009, shipbuilding and maintenance sector employed 520 people (AJPES, 2011).

The Shipyard Izola has a long history of servicing and repairing commercial vessels. The shipyard has 6,800 m^2 of covered working space at its disposal, one dry-dock, two slip-ways,

and berthing facilities (700 m). Additionally, the total area of the shipyard covers 40,000 m^2, and about 170 m of prime waterfront.

There are plans for expansion of the shipyard to accommodate the growing needs of the prestigious mega yacht industry. It is expected that since the European shipbuilding industry, largely, cannot compete with Asian markets, the development will continue in the recreational areas, as well as research and development.

Shipbuilding industry on the Slovenian coast also works in repair and maintenance of recreational vessels, where it employed 66 people in 97 companies in 2014 (SURS, 2017a).

(2) Development objectives and needs

The area in vicinity of the dockyard at Izola is also under development plans. The plans outline the designation of public spaces for touristic purposes, achieving the status of bathing waters and new locations for water sports. New short piers and closed thermal pools in the sea itself are also under consideration.

C.4.5 Physical restructuring of the coastline and seabed

C.4.5.1 Land claim

(1) Statistical overview and development trends

Physical restructuring of the coastline is considered as changes in the coastline or seabed, due to the creation of new areas from the sea, in the form of rip-raps and seawalls, as well as land claim with drying and construction of dams. In the Slovenian coastal region there were a few areas identified as claiming land from the sea (Figure 6). The areas of land claim, were defined in Peterlin et al., (2013), along with a percentage scores for how much the coastline has been modified in the process.

- Gulf of Koper area:
  - St. Catherine pier with communal quays (constructed shoreline),
  - Gulf Polje (constructed shoreline, partially surfaced),
  - Port of Koper – Pier II (surfaced coastline),
  - Port of Koper – Pier I (surfaced coastline),
  - Semedela road – the Badaševica River mouth with communal quays (surfaced coastline),
    - >50% modified.
- Žusterna to Podbelveder area:
  - The Lighthouse (surfaced coastline),
  - Beach Simonov zaliv (partially constructed and partially surfaced coastline),
    - >25% modified.
- Northern part of the Gulf of Piran area:
  - Bathing site at the Seča Peninsula (partially constructed, partially surfaced coastline),
  - Salinas,
    - >50% modified

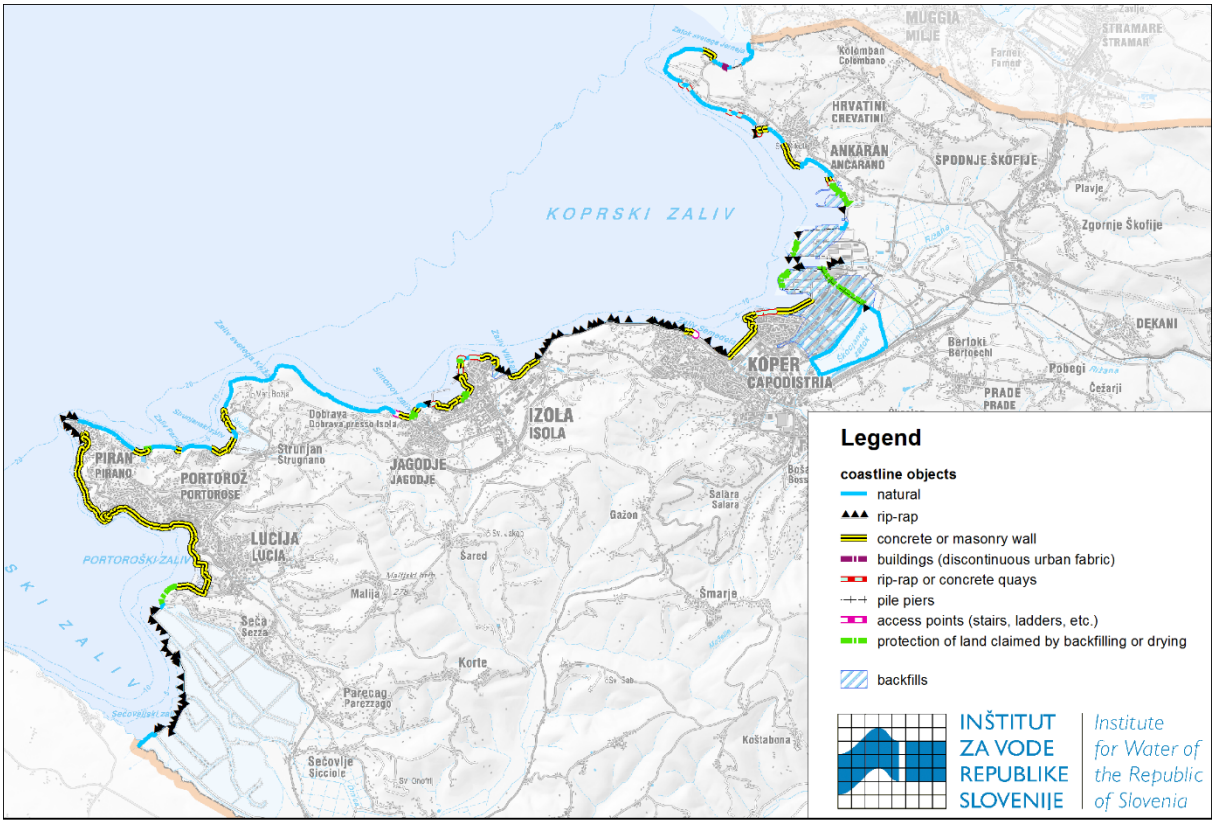


Figure 6: Coastal facilities and land claim (prepared by IzVRS based on: Peterlin et al., 2013).

(2) Development objectives and needs

The sea is recognised as having the national importance and is quite strictly protected from any development projects that could lower the quality and cause transboundary issues. The coastal line cannot be shortened, however some planning documents allow for its extension. The Slovenian coast is mostly urbanised, the natural coasts are conserved only in places where urban development was hampered by difficult terrain (e.g. under cliffs). These areas are now mostly protected within different natural parks (e.g. Strunjan and Debeli rtič Landscape Parks and Rt Madona Natural Monument).

In 2015, a new express road between Koper and Izola was built. This offered the opportunity to re-categorise the previous connection between these two cities that runs along the shore. Re-categorisation of the coastal road from national to local offers the municipalities of Koper and Izola a possibility to transform the 3 km long coastal area into an area of sustainable use, incorporating leisure activities and sustainable tourism with natural protection. The sea along this coastline hosts the northernmost meadow of *Posidonia oceanica* in the Mediterranean, which is also a Natura 2000 site. Currently, the area is closed for motorised traffic and plans for its developments are discussed.

The municipalities of Izola and Koper are planning a construction of an artificial island in the Viližan Bay, for the public use, where beach, recreation areas, and smaller piers and quays would be located. The island will be shaped in a way to also provide a coastal defence function. Larger objects on the island are not planned. The island is also planned in the Resolution on National Development Projects 2007-2023. The size of the island is planned to be approx. 3 ha.

C.4.5.2 Coastal defence and flood protection

(1) Statistical overview and development trends

A model of wave action and flood risk areas developed in 2014, in accordance with Directive 2007/60/ES (Đurovič et al., 2014,). At the same time, the Plan for Reducing the Flood Risk was also prepared, envisioning flood protection infrastructure for the area of the Adriatic rivers and the sea. Currently, there are no active flood-protection projects at sea. However, the Environment Agency of Slovenia is carrying out three projects for management of erosional damage, one at the right bank of the Drnica River (Municipality of Piran) and two on the Rižana River (Municipality of Koper). All of these can have an indirect effect on the marine environment (e.g. altered sedimentation; Altas voda, 2015). This sector has been stagnating recently, but Kirn et al. (2018) expect it to grow in the future.

(2) Development objectives and needs

The Municipalities of Izola and Koper are planning a construction of an artificial island in the Viližan Bay, for the public use, where beach, recreation areas, and smaller piers and quays would be located. The island will be shaped in a way to also provide coastal defence function. Larger objects on the island are not planned. The island is also planned in the Resolution on National Development Projects 2007-2023. The size of the island is planned to be 3 ha.

C.4.5.3 Restructuring of seabed morphology, including dredging and depositing of materials

(1) Statistical overview and development of trends

There is limited data on the scope and reasons for the surface abrasion. Reports of HARPHASEA and the researchers at the Marine Biology Station Piran have showed that the main causes of the changes in the seabed morphology are fishing and shipping transport. The consequences can be observed in the soft moving bed, as well as in the solid rock seabed underneath (Orlando Bonaca et al., 2011). The use of seafloor nets and pelagic nets, constitute the main fishing pressures, whereas, the shipping industry exerts the pressures by anchoring and the lifting of sediments when entering into ports. This sector has already been growing from 2010 onwards, and is also expected to further increase in the future (Kirn et al., 2018).

The Gulf of Koper was recognized as a strongly modified water body under the Water Framework Directive (2000/60/EC), because of the activities of shipping, anchoring and the Port of Koper (Kolman et al., 2008). Shipping routes cover 46.6% of the area of the Gulf (Perkovič et al., 2011). The main cause is dredging of the seafloor to deepen the entry canals into the port. Linked to that is the resuspension of sediment.

Due to the constant sedimentation of port canals, as a result of currents and the river mouth of the Rižana River, maintenance deepenings of the port are needed. Maintenance deepening of the canals is undertaken annually, with larger projects planned and undertaken every now and then to allow for the growth of the port (Francé et al., 2014). Recently, larger projects in the Port of Koper were undertaken between 2013 and 2015. In 2013, construction work on the expansion of the first pier and preparation for dredging of the first entry pool were made, which was followed by gradual dredging of the seafloor in 2014, to depths of -13 m, then -14 m and finishing at -15 m depth. All projects were finished by November 2015 (Luka Koper, 2016).

The anthropogenic effects on the seafloor are evident from the bathymetric data (e.g. Harpha SEA, 2014 a,b). According to Orlando Bonaca et al., (2013), the manoeuvres of vessels when

entering the port also affect the seafloor pressure levels, consequently having further impacts on the system.

(2) Development objectives and needs

In the period until 2030, no additional deepenings are planned, apart from the regular maintenance of the appropriate depth of canals. The management facilities for waste sediments could reach their limits without new locations or development of new technologies.

(3) Transboundary issues

The altered sedimentation and sediment resuspension can have widespread effects on the ecology of the Gulf of Koper, while the dredging and construction activities are also a major source of impulsive noise, which due to the underwater acoustics and the comparatively small size of the Slovenian sea, is a transboundary issue.

C.4.6 Production of energy

The Slovenian marine areal is not used for the production of renewable or non-renewable energy, with the exception of the use of water for heat extraction. The coastal region is bound to achieve at least 25% of energy usage from renewable energy sources; however, that will be sourced on land.

C.4.6.1 Transmission of electricity and communications (cables)

Currently, there are no underwater transmission cables for either electricity transfer or telecommunications. However, there are long-term plans for the establishment of underwater electric cable for the one way HDVC link between Slovenia and Italy with the 300-500 kV voltage. The project is currently in the study phase and if implemented, it could be laid after 2025 (ELES, 2016).

C.4.7 Tourism and leisure

Tourism is an important sector of Slovenian economy, which is expected to become a leading part of the Slovenian economy in the coming years (Government RS, 2011). This is in line with the World Tourist Organisation, which predicted 3% growth in tourism in Europe by 2020. The coastal municipalities cover about a fifth of all Slovenian tourism (SURS, 2011). Tourism creates around 2,800 full-time jobs in the coastal municipalities, most of those are in the hospitality industry (93%), followed by marinas (4%; AJPES, 2011). The latest population census from 2011 reported that 3,685 people worked in the hospitality sector in the Coastal-Karst Statistical Region, both full and part-time employment (SURS, 2011b). It is estimated that tourism in coastal municipalities is responsible for 0.45% of the total value added in Slovenia and employs 0.51% of the total workforce.

Tourism in the Slovenian coastal region is developing on par with the rise in the recognition of Istria as a quality destination and therefore goes hand in hand with the development of tourism in Croatian Istria as well. The coastal tourism in the EU has been growing for the past three decades, due to more vacation time, increased buying strength and better connections (Boteler et al., 2011).

C.4.7.1 Coastal tourism

(1) Statistical overview and development trends

In all four coastal municipalities there are 2,090 registered holiday apartments. In 2016, the coastal municipalities had 8,637 rooms offering together 24,938 beds (SURS, 2017c). The SURS (2017d) reported that in 2015 the Coastal-Karst Region noted 736,239 tourist arrivals

and 2,268,507 overnight stays. Tourism sector is growing; SURS (2017e) showed that in May 2017 there were 7% more tourist arrivals than in May 2016. However, the touristic demand is highly seasonal and unevenly distributed across the four municipalities.

The socio-economic analysis found that while the offer of tourist and recreational activities has been increasing in recent years and is expected to grow further, the tourism infrastructure sector has been decreasing and the trends are expected to stabilise in the future (Kirn et al., 2018).

The Coastal-Karst Region is one of the most important tourist destinations in the country. Slovenian Istria (four coastal municipalities and their hinterland) is a well-developed tourist area, offering quality accommodation and tourist infrastructure.

In 2016, there were 26,784 beds available in the Region, which is 20.5% of all beds in Slovenia. Of these, 39.8% were in hotels and similar accommodation establishments.

Table 3: Number of tourist beds in the municipalities of the Coastal-Karst Region in August 2016.

Municipality	Beds
Ankaran	3,424
Izola	4,235
Koper	1,508
Piran	13,369
Total	22,536

Source: SURS

In 2016, there were 785,793 tourist arrivals (63% of foreign tourists) recorded in the region that generated 2,384,693 overnight stays (59.5% foreign). In the total number of overnight stays in Slovenia, the region had a 21.3% share.

Most overnight stays were generated in the Municipality of Piran, followed by the municipalities of Koper, Izola, Ankaran (coastal municipalities), Sežana, Hrpelje-Kozina and Komen.

Table 4: Tourist arrivals and overnight stays in the Coastal-Karst Region in 2016

Municipality	Tourist arrivals	Overnight stays
Ankaran	66,707	251.653
Izola	93,513	341.578
Koper	55,248	137.455
Piran	470,270	1.472.109
Total	685,738	2.202.795

Source: SURS

(2) Development objectives and needs

Slovenia is the only country in the world where a visitor can enjoy the Mediterranean, the Alps, or the Pannonian Plain in a tiny geographical area in Central Europe. Slovenian tourism is developing on the foundations of green, sustainable and responsible development. The strategic visions for Slovenian tourism is therefore to be a global green, boutique destination for demanding guests looking for an active and diverse experience, peace of mind and personal benefits.

The National Strategy for Sustainable Growth of Slovenian Tourism 2017-2021 imagines Slovenia as green, active, and healthy destination, with Mediterranean Slovenia as one of its macrodestinations. This macroregion offers Mediterranean diversity and the natural wonders

of Karst, with premium wines and outstanding gastronomy. The Mediterranean Slovenia is interesting because of inviting and easily accessible Mediterranean towns, closely linked with green Istrian countryside, underground adventures and authentic culinary experience. The leading destinations are Portorož/Piran, Izola, Koper, Ankaran, Postojna Cave, Lipica and Škocjan Caves, the Vipava Valley and Brda. The Strategy foresees the following activities:

- development of a Sun&Beach tourism product,
- development of outdoor tourism product,
- development of a "sports" tourism product,
- improvement of a system of thematic trails,
- investments in new tourism facilities,
- smart mobility,
- spatial, natural and cultural resources,
- valorisation of nature protection areas,
- improvement of public beaches,
- improvement of public spaces (squares, pedestrian corridors, urban furniture, etc.,
- improvement of public infrastructure for outdoor sports (cycling lanes, trekking paths, lookouts, etc.),
- adaptation of public transport to the outdoor activities needs,
- improvement of sports infrastructure,
- improvement of infrastructure,
- implementation of sustainable mobility solutions,
- definition of areas designated for tourism development,
- tourism development plan for protected areas.

The Sun&Sea Vision 2021 is one of four foundational products of Slovenian tourism. Sun& Sea follows the traditional seasonal Mediterranean tourism product Sun&Beach, which is based on beaches, sun, swimming, relaxation, fun and activities. The Vision 2021 intends the development to go towards boutique products with high added value, based on the concepts of the Riviera, high quality beaches, attractive public spaces, cultural events, historical towns, summer event, and numerous water and other outdoor adventures, alongside outstanding gastronomy and wines. The key measures to achieve this vision are:

- hotels and tourist settlements of high and luxurious categories;
- improvement of public beaches;
- arrangements of public spaces in the coastal belt (promenades, squares, walking trails, urban public equipment, sustainable mobility and similar).

The Strategy for Tourism of the Municipality of Koper outlines sustainability, authenticity, courage and partnerships as the foundations for the further development of tourism in their area. The Municipality of Koper builds on a mild and warm Mediterranean climate, making it a pleasant destination year round. The old medieval town of Koper, well-established links to green countryside, rich cultural programme and diverse sporting infrastructure are also among the main draws of tourism industry at Koper. The destination wishes to be recognised as an active destination, with strong green character. The Municipality of Koper will focus most on active Mediterranean holidays, exploring nature and culture, gastronomy, as well as cruising, sport tourism and climbing. The Municipality of Koper adopted the development vision of the coastal part of the municipality, which includes a coastal promenade lined with trees and associated greening of parks, city beaches, bathing areas, walking zones, as well as areas for quays and areas designated for various water sports. This green coastal promenade is envisioned to become a communication linking axis between the city centre and other part of

the city. The municipality also plans the development of smart beaches and establishment of a centre for water sports.

The Municipality of Izola aims to conserve the natural parts of the coast (Strunjan Landscape Park), while also developing the coast further for other purposes. Currently no tourism strategy is relevant on the municipal level.

The Municipality of Ankaran is presently developing a touristic strategy.

The Municipality of Piran has a vision of becoming a destination with exceptional tourist offer, which will by using innovative technologies and sustainable approach enable an environment that will ensure good quality of life to both the residents and visitors. The municipality of Piran will also, similarly to Koper, invest most into the following strategic areas:

- events and business meetings,
- Sun&Sea,
- health and wellness,
- gastronomy,
- nature explorations,
- culture and heritage,
- sport tourism and recreation,
- fun and free time.

The Sun&Sea strategic area is the one that has the most link to the maritime spatial planning, as the plans are to improve the quality of services by arranging public spaces in the coastal belt (beaches, promenades, squares, walking trails, sustainably mobility, etc.). The access to the sea should also be increased (vessel rentals, sailing, etc.). Furthermore, the Municipality plans on encouraging the maritime identity of its residents (with sailing courses, rowing, swimming, competitions, etc.) and further development of nautical tourism. Public maritime transport should also be established. The Sečovlje and Strunjan saltpans will also be increasingly developed for touristic purposes, with improved access, more promotion and development of new tourist products linked to the traditional saltworks. Moreover, the recreational and sporting tourism will also be developed, both on beaches and inland, with new equipment rentals and a more comprehensive inclusion of water sports into tourist offer.

All coastal municipalities have developed plans and strategies of various detail with regard to coastal tourist development. Only the Municipality of Ankaran is severely limiting the development along their coast and planning on conserving a large proportion of it within the Debeli rtič Landscape Park. The spatial plans of the other three coastal municipalities (Koper, Izola and Piran) are presented below.

The Municipality of Koper envisions the following activities and measures:

- preparation of additional beach and bathing areas;
- coastal arrangements for access to the sea without physical barriers and other limitations;
- maritime arrangement for the protection of the Semedela Bay and the city coast (increasing the length of the fishing pier, construction of sea wall and similar);
- multidisciplinary use of the arrangements (sea walls, quays, bathing areas, promenades, parks by the canals, water sports, passenger terminal and similar);
- priority measure (shared with the Municipality of Izola): completion of the promenade between Koper and Izola, walking trails, bathing platform with access to the sea, anchoring area with bathing platforms;

- establishment of a marina in the Semedela Bay (deepening of the seafloor, coastal restructuring, construction of a sea wall).

The Municipality of Izola plans on implementing the following measures:

- conserving of natural coast in the area of the Strunjan Landscape Park;
- construction of a sea wall (island) in the Viližan Bay, with the purpose of coastal protection from winds and for extension of the coastal line;
- priority task (shared with the Municipality of Koper): completion of the promenade between Koper and Izola, walking trails, bathing platform with access to the sea, anchoring area with bathing platforms;
- development of a new marina and communal quays in the Viližan Bay is also planned, alongside the promenade development and the extension of the coastal line into the terrestrial part of the bay;
- the area in vicinity to the Izola dockyard is also under development plans. The plans outline the designation of public spaces for touristic purposes, achieving the status of bathing waters and new locations for water sports. New short piers and closed thermal pools in the sea are also under consideration;
- the area around the Hotel Delfin at Izola is also to be developed into a beach area with sporting grounds (tennis, beach volleyball). The existing rip-rap is to be extended into the beach pier, as well as a new pier to be used as a beach is to be constructed. A closed natural pool is also to be constructed;
- alongside the main pier of the Marina of Izola, a new beach area should also be constructed (partly with grass and partly concrete). A small pier will have to be added to act as a coastal defence;
- the Municipality of Izola also intends to extend the wooden pier and add a few additional shorter piers in the San Simon Bay and prepare a centre for water sports, bathing and the Strunjan Landscape Park visitor centre in Podbelveder.

The Municipality of Piran development plans include:

- extending the Portorož Marina;
- construction of communal quays and a pier for docking of touristic vessels in the area of salt storehouses;
- extension of communal quays in Piran and construction of a pier for docking of touristic vessels in Piran;
- in the area of the Sečoveljske Saltpans Landscape, the extension of existing sporting activities and the Saltworks Museum are planned, as well as construction of new dykes and an eco or nudist beach;
- in the neighbouring Jernejev kanal area, a new spatial delineation is planned, including deepening of the canal, removal of existing quays, cleaning of the canal and construction of new piers and bridges. The canal is to be used as a communal quay area;
- development parts of the Seča Peninsula as bathing waters (potentially with separate areas for children and dogs), as well as a portion of the peninsula to be developed for water sports, in particular kiting. Construction of new shorter piers, perpendicular to the coast, to extend the beach areas and alleviate the access to the sea, is also planned;
- extension of bathing waters, particularly in the areas of the Marina Portorož, Portorož city (some conflicts with prominent hotels), the coastal area in front of the Life Class Hotels at Portorož, Bernardin hotel complex (Lepa Vida);

- new communal quays are also to be constructed next to the abandoned salt storage facilities between Portorož and Bernardin alongside the development of sporting activities;
- in the same area, the Municipality of Piran also wants to construct a docking site for larger boats (e.g. cruise ships). An alternative location would be next to the larger pier in Piran.
- there are also plans for the introduction of artificial underwater reefs and potentially of an underwater archaeological park (Fisine) between the large pier at Piran and Punta.

The Municipality of Ankaran is dedicated to conservation of natural parts of the coast, natural and cultural landscapes, especially of the area of Debeli rtič, unique elements (e.g. cliffs) and other important components, such as forests. The objective is to conserve and upgrade the coastal belt, as the most natural part of the Slovenian coast and improve its accessibility. The areas for settlement are planned only within the area of the urbanistic plan, and therefore limit any use of the open landscapes.

(3) Transboundary issues

Coastal tourism, with the associated processes of coastal urbanisation and littoralisation, is recognised as one of the most prominent pressures on the Mediterranean environment in general. The biggest urban agglomerations Ankaran, Koper, Izola and Piran have waste water collection and treatment infrastructure and the environmental state of the sea in the period 2009-2015 was good. Nevertheless, the tourism sector is accompanied with a risk of discharges of poorly treated waste waters (sewage, pool water, meteoric water from parking lots, etc.) into the marine waters. Those discharges may not only cause pollution events, but could also amplify eutrophic conditions in the waters and present the conditions for harmful algal blooms, which can then affect the quality of the marine waters on an international level in the Gulf of Trieste.

C.4.7.2 Beach-based activities

(1) Statistical overview and development trends

Most tourist and recreational activities in the proximity to the sea are based on the use of the sea. The use of the sea for such activities is permitted along the whole coast in a 150 m belt, unless it is explicitly prohibited (e.g. around ports). The boundary of areas for recreation and relaxation on land is defined with the boundary of cadastral areas, while on the sea it relates to awarded water rights, or marked bathing waters, or areas under legislation (150 m). In case there is infrastructure on the coast, those areas have to be evidenced separately. Ships, boats, and other floating devices, with exception of rowing boats, have to keep the following minimum distance from the coast:

- ships – 300 m,
- yachts and speed boats – 250 m,
- others – 200 m.

Where sea bathing areas are designated, the vessels have to sail at least 50 m from the outer boundary of the bathing area, but always the minimum distance above applies. The use of surfs, expect in bathing areas and ports, is allowed in a 1,000 m belt from the coast. In the natural and unofficial bathing areas, bathing is permitted in the 150 m belt from the coast (Peterlin et al., 2012).

Currently, 14 water permits are in force for natural bathing areas with a manager, under 10 different managements, with a combined area of 172,855 m^2 (Atlas voda, 2015). The permits for the use of marinas are paid to the municipalities, whereas the concessions for the

management of bathing areas and beaches are paid to the national treasury (Petelin, 2012). A wide array of water sports activities have been developed in all four coastal municipalities, including swimming, sailing, wind-surfing, diving, and fishing, alongside with jet-skiing, skiing, and paraski.

(2) Transboundary issues

In an area with dense marine uses, a wide array of water sports activities may overlap with other maritime uses, such as shipping and fishing, thus, presenting a risk of accidents and localised pollution episodes. Water sports have also been linked to collisions with marine mammals and turtles. Since both species groups are vulnerable, this can have a significant impact on their populations, which reside in the whole the Northern Adriatic. Beach-based tourism activities are also a considerable source of marine litter, which is because of currents also a pervasive transboundary issue.

C.4.7.3 Maritime tourism

Cruise tourism

(1) Statistical overview and development trends

Since 2005, the Port of Koper also operates a passenger terminal. Since then the Municipality of Koper is actively trying to develop into a better cruise destination, especially by establishing links between the city centre and the green surroundings and countryside. Since 2011, the Port of Koper also welcomes cruise ships, with the number of passengers arriving yearly in the range between 57,000 and 80,000, with the trends being relatively stable, and the tourist demand and offer steadily improving, which is expected to continue into the following years.

(2) Development objectives and needs

While the Port of Koper does not expect a substantial increase in the number of cruise ships entering the Port, further development of the touristic ports in Ankaran, Izola, Piran and Portorož will increase the amount of maritime transports within the Slovenian waters, especially if Izola and Piran start receiving large international touristic ships too, in addition to smaller tourist boats, linked to the cruise ships, docked at Koper.

A part of the Port of Koper, which is functionally linked to the city, is intended for the arrangement of the main passenger terminal for national and international maritime passenger transport. The Resolution on the National Programme on Maritime Development of the Republic of Slovenia outlines that the passenger terminal will include border controls and will house the Slovenian Maritime Administration, as well as other national maritime related offices. To stimulate national public and regular international passenger transport, the existing ports at Ankaran, Izola, Piran and Portorož are being developed and modernized. Piran and Izola ports could also include an upgrade for the international passenger transport of large tourist vessels.

(3) Transboundary issues

Cruise tourism increases the number of large ships plying the waters of the Gulf of Trieste, therefore increasing the pressure of maritime transport in the region and conflicting with other uses of the marine area, such as fishing. The anchoring of cruise ships in the Koper Bay can cause sediment perturbations, and due to high concentrations of mercury and TBTs in those sediments, their resuspension in the water column, which can have a widespread contamination effects, also affecting neighbouring countries. Moreover, the cruise tourism additionally compounds the pressures of coastal and nautical tourism and is a major source of pollution, marine litter generation, and the emitter of noise pollution impacting cetaceans and marine turtles.

Sailing and nautical activities

(1) Statistical overview and development trends

Nautical tourism is mainly centred at Izola and, to a lesser extent, Portorož and Koper. Marina Izola offers 700 quays for vessels up to 45 m long and anchoring site, with all the needed infrastructure. The Yacht Centre Izola is another addition to the nautical tourism in the Municipality of Izola.

In 2009, in three Slovenian marinas there were 5,365 recreational vessels, which was 356 less than in 2008. However, generally in the period between 2004 and 2008, the nautical tourism was on the rise. The conservative estimate is that at weekends, about 15% of the registered vessels are at sea.

A considerable problem is still illegal anchoring both at sea and in ports and marinas. A number of vessels, every year, is noticed anchoring outside the official ports or vessels anchoring within the ports, but exceeding the number of vessels that the port is officially allowed to have.

There are on average 135 annual events taking place in the Slovenian sea, mostly sailing or rowing regattas. A number of regattas are organised with the participation of the Marina Izola. Perhaps the most notable is the Diplomatic Regatta, with more than 100 sailing boats and 1,200 participants. The Municipality of Piran also hosts a number of regattas every year (e.g. Portorož-Monfalcone, Portorož-Lignano, Piran/Portorož-Milje, Portorož Cup). The largest regatta, of which a small part takes place close to the anchoring area of the Port of Koper, is called Barcolana, and is normally held in the first half of October. There is also the Internautica fair every year at Portorož (Municipality of Piran).

(2) Development objectives and needs

The nautical tourism is envisioned to grow in the future. While the Marina of Izola, the largest in Slovenia, is not expected to grow, the Municipality of Izola plans on extending the communal piers in the Viližan Bay (along the island and the coast), along the coastal road Koper-Izola and in the San Simon Bay.

The Municipality of Piran also plans on extensions of the communal quays, as well as extensions and deepening of the Portorož Marina.

Spatial planning situation for the sailing and nautical activities overlaps in large part with the development of coastal tourism. Therefore, the plans for development of quays and other infrastructure associated with sailing and nautical tourism are described below.

(3) Transboundary issues

In an area with dense marine uses, nautical tourism overlaps with other maritime uses, such as shipping and fishing, thus presenting a risk of accidents and localised pollution episodes. Yachting and sailing have also been linked to collisions with marine mammals and turtles. Since both species groups are vulnerable, this can have a significant impact on their populations, which reside in the whole Northern Adriatic. Nautical tourism activities are also a considerable source of marine litter, which is then because of currents also a pervasive transboundary issue.

C.4.8 Public sector

C.4.8.1 Defence/military areas

(1) Statistical overview and development trends

The purpose of Slovenian maritime military division is defence of the Slovenian marine waters in the system for maritime protection, security and maritime rescues. The 430th Navy

Division is composed of an order of multi-purpose vessels and an order of divers. They have a use of six vessels (source: www.slovenskavojska.si):

- multipurpose vessel Almaz Project 10412 “Triglav” (49,5 m length),
- rapid patrol ship Super Dvora Mk2 “Ankaran” (25 m length),
- four boats (10 m length).

In accordance with the Decree on Determination of Defence Requirements (OG RS, No. 30/03) there are a number of marine and coastal areas defined as areas of potential exclusive use and areas of controlled use.

Areas of exclusive use are the areas, which are primarily utilised for other purposes, but can be repurposed in emergency or war state for defence needs, as well as in peaceful times for military training. Those areas include airports, heliports, landing stripes; ports; ramps in railway transport; training areas; mobilisation areas; objects and areas needed for supporting the host country in accordance with confirmed obligations in international contracts.

Areas of limited and controlled spatial use are areas which include security areas of object, where human use limitations are necessary from security or technical reasons, and are next to areas of exclusive or possible exclusive use. Those areas include firearm warehouses, facilities and areas for the destruction of unexploded lethal weapons, polygons, training areas, and shooting ranges, military radar positions and military airports, heliports, and landing stripes.

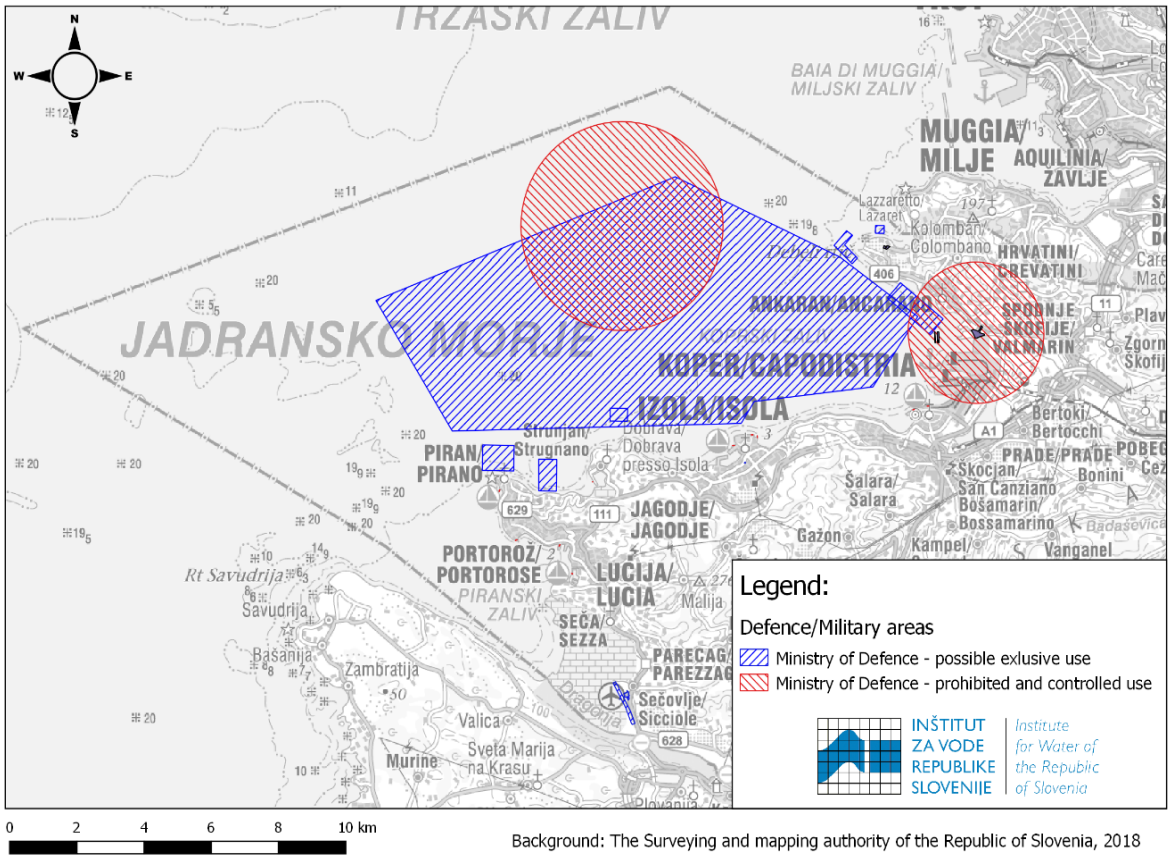


Figure 7: Military/defence areas in the Slovenian sea (prepared by IzVRS, based on Kovačič et al., 2016).

(2) Development objectives and needs

Defence needs in the coastal belt and at sea are ensured with the determination of exclusive use (Barracks of the Slovenian Maritime Division Ankaran), potential exclusive use, as well as limited and controlled use for the defence needs at sea.

The Resolution on General Long-term Programmes of Development and Equipment of the Slovenian Army by 2025 outlines the following needs:

- development of capacities for surface functioning, diving capacities, and maritime operation's centre;
- ensuring the needed quays for military vessels and vessels of partner states and organisations;
- ensuring the needed infrastructure for the inland defence system.

The processes of urbanisation, not-thought through spatial projects, as well as technological development with the climatic alterations are unbalancing the natural equilibrium, increasing the number of accidents and the associated damage. With global climate changes, the deleterious impacts of the sea on land are increasing (e.g. flooding), which increases the need for rescues and sanitation, which is also the purview of the defence sector.

The objectives for the development of the defence/military sector at sea were discussed with the representatives of the Ministry of Defence (20 September 2018). The spatial needs of the defence sector in the Slovenian marine waters are relatively rare, with little overlap with other uses of the marine space, due to the flexibility and adaptability of the Ministry of Defence. In the Slovenian territorial waters, only sailing and diving exercises are normally undertaken; however, those may be undertaken any place within the Slovenian aquatorium. If the defence/military activities overlap with other uses, the Ministry of Defence already has a successful collaboration established with the Slovenian Maritime Administration. All activities and exercises involving fire weapons are undertaken in international waters and never occur within the Slovenian territorial waters.

Defence needs in the coastal belt and at sea are ensured with the determination of exclusive use (Barracks of the Slovenian Maritime Division Ankaran), potential exclusive use, as well as limited and controlled use for the defence needs at sea. These will also be formalised in the maritime spatial plan.

(3) Transboundary issues

Military and defence uses of the marine area can cause significant noise pollution; however, the Slovenian Ministry of Defence does not undertake any such activities within the Slovenian territorial waters, even any international military practices take place in the international waters. Therefore, the military uses in this pilot area are not expected to produce any transboundary issues.

C.4.8.2 Research and education

(1) Statistical overview and development trends

Education activities are undertaken by all major Slovenian universities and a fair number of primary and secondary schools, mainly in the form of excursions and field work. All educational activities combined present a negligible impact on the Slovenian sea.

Research activities involve monitoring of the state of the Slovenian sea, which is done be the Environment Agency of Slovenia (quality of the sea and land-based pollution, chemical and ecological state and water quality at shellfish farms), the Marine Biological Station Piran (physical, chemical and biological oceanography), and the Institute for Water of the Republic of Slovenia (marine litter, microplastics). The Institute of the Republic of Slovenia for Nature Conservation monitors the state of the preservation of nature, biodiversity and the state of natural monuments of national and local importance, while the Fisheries Research Institute of

Slovenia monitors the fishing activities for the purpose of ensuring sustainable use of fish, as well as monitoring of fish populations.

All the above-mentioned institutions also participate in a number of research projects, which are often funded by the EU.

This field has been decreasing somewhat since 2010, but Kirn et al. (2018) expect it to increase in the coming years.

(2) Development objectives and needs

The field of cultural and archaeological research has been largely neglected in the past, with a large number of sites still being unrecorded and properly researched. Currently, the Register of Immovable Cultural Heritage holds 38 underwater sites (mainly shipwrecks). However, the detailed bathymetric data shows the presence of around 90 sites, including both shipwrecks and features of anthropogenically altered prehistoric cultural landscape (architecture, mounds, etc.).

Legally, the protection of archaeological heritage is ensured in the processes of confirmation of spatial acts; however, it is not established in cases of their alteration.

All cultural heritage is under intensive pressure of maritime transport, linked to the Ports of Koper and Trieste, particularly due to the deep draft of cargo vessels. The growth of both ports is a cause for particular concern to the cultural conservationists. The use of bottom trawling fishing techniques is also a significant problem.

With greater financing at the national level, cataloguing, research, and preservation of the Slovenian underwater cultural heritage is needed, based on a number of international conventions that the Republic of Slovenia has already adopted and ratified. The development objective is a comprehensive conservation in the framework of management of the marine environment. The goal of this objective is the conservation of underwater cultural heritage, its sustainably physical and value-based existence and its adaptation to the needs of modern society. The following measures are needed:

- underwater archaeological heritage needs to be treated as a non-renewable anthropogenic component of the marine environment. The economic subjects that threaten its existence with their activities, need to be included in the process of conservation and management, under the “polluter pays” principle;
- undertaking systematic archaeological research for determination of the composition and scope of archaeological remains is needed. Based on the findings, special protection regimes and measures can be established;
- the best assessed registered archaeological sites need to be designated as cultural monuments;
- the wider expert and general public need to be included in raising awareness about the importance of the present archaeological sites.

(3) Transboundary issues

While research and education activities can cause environmental impacts (e.g. foundations for research buoys, intrusive sampling, noise of research vessels, lost equipment at sea), those are judged to be close to negligible and could not give rise to any transboundary issues.

C.4.9 Nature conservation

(1) Statistical overview and development trends

Slovenian coastal and marine space is very biologically diverse, regardless of its limited size. Due to the shortness of its coast, Slovenia has only few coastal and maritime habitat types;

however, they contribute significantly to the country's biotic diversity. In the last half a century, the size of coastal habitat types has reduced considerably and the pressure on them has increased. For example, only several hundred aquatic birds wintered at Škocjanski zatok in the end of the 90's, while in the second half of the 80's there were thousands of them. The situation has improved after 2007 (reconstruction of habitats) in terms of a number of bird species and the number of birds.

According to the Institute of the Republic of Slovenia for Nature Conservation and the Slovenian official reports for the Initial Assessment and GES, the marine and coastal habitat types in this area include: shallow sublittoral rock and biogenic reef, shallow sublittoral mixed sediment, littoral sediment, estuaries, mudflats and sandflats without vegetation of higher plants but with annual halophytes, marine marshes and coastal lagoons, to mention only the most typical ones. Wetlands are vital for the survival of aquatic birds. They appear there in high density, which is certainly an indicator of wealth and diversity of these productive ecosystems. Most remaining coastal habitat types are now under legal protection.

A considerable part of the Slovenian marine and coastal areas have already been protected under a variety of different designations (e.g. Natura 2000, nationally designated protected areas, Ramsar sites, ecologically important areas, etc.).

There are currently eight nationally designated protected areas in the coastal and marine area of Slovenia. Out of those, there are three landscape parks, which protect both anthropogenic cultural heritage and natural values in their areas, three nature reserves, which afford stricter protection to biodiversity, and two natural monuments. Additionally, there are 14 Natura 2000 sites, mainly overlapping with other nature protection designations.

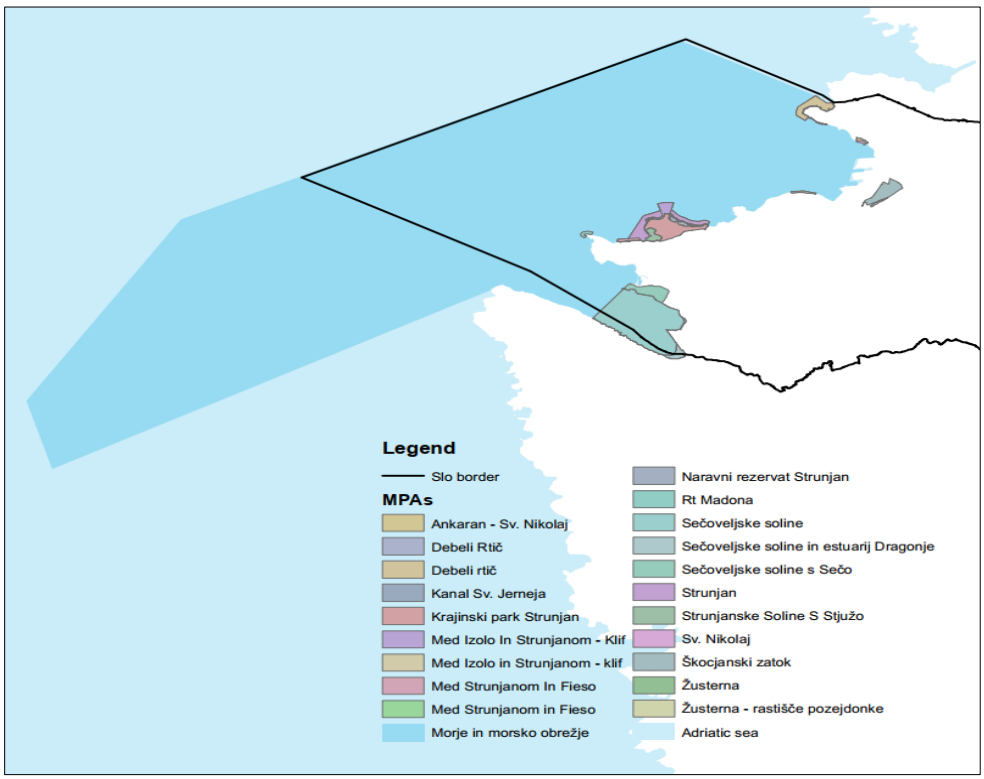


Figure 8: Map of Slovenian coastal and marine protected areas (IzVRS, 2019)

The Škocjanski zatok Natural Reserve is managed by a non-governmental organization (DOPPS-BirdLife Slovenia) on the basis of a concession. The Škocjanski zatok Natural Reserve comprises a lagoon with low water level and the Bertoki Bonifika. It conserves an

area of considerable importance to migrating birds on the Adriatic Flyway, as well as one of the most important brackish habitats in the Northern Adriatic. The area has undergone significant habitat restorations before it was designated as a nature reserve. It is of special significance because of its location close to the urban tissue of the city of Koper.

The Strunjan-Stjuža Nature Reserve is part of the Strunjan Landscape Park and was designated alongside it, albeit with a stricter nature protection regime. The reserve includes the only natural Slovenian lagoon and the Strunjan saltworks, which together with the Škocjanski zatok and Sečovlje saltworks, form one of the important feeding, breeding and migrating stops for birds using the Adriatic Flyway.

The Strunjan Natural Reserve is a part of the Strunjan Landscape Park. It comprises a 4 km long northern coast of the Strunjan Peninsula and the associated 200 meters strip of coastal water. Due to its geological and geomorphologic features, a great biotic diversity and the fact that this is the longest part of uninterrupted natural coast in the whole Gulf of Trieste, the Natural Reserve is of exceptional importance from the point of view of valuable natural features protection. The Strunjan cliff (up to 80 m high) is the highest known coastal flysch wall on the entire Adriatic coast. In 2004, a broader area was protected by the Decree on the Strunjan Landscape Park.

The Sečovlje Saltpan Landscape Park was protected by the Decree on the Sečovlje and Strunjan Saltpan Landscape Parks in 2001. The manager of the Landscape Park is the Soline d.o.o. company. Due to exceptional landscape and ecological features, the Sečovlje Saltpan was the only wetland in Slovenia listed among the Ramsar localities in 1993. Being a rich treasure of flora and fauna, the area is one of the most important natural heritage locations in Slovenia. The sub-Mediterranean climate, high salinity and the abandonment of saltpan activities in the major part of saltpans have created special ecological conditions where only highly adapted organisms survive.

Figure 9: Protected areas – Strunjan Landscape Park Strunjan.
(Source http://www.parkstrunjan.si/index.php?page=static&item=59:)

The Strunjan Landscape Park was protected by the Decree on the Strunjan Landscape Park in 2004. This park covers the most extensive part of the marine area of any Slovenian protected areas, as well as the traditional terrace agricultural lands of the Strunjan peninsula, the only Slovenian natural lagoon of Stjuža and Strunjan saltworks. The marine part of the park protects the seagrass meadows, stony corals, catsharks, dolphins and turtles, thus being known as the most biodiverse part of the Slovenian sea. The park also allows traditional sustainable fishing within its boundaries.

Additionally, the Municipality of Ankaran has recently protected the area of Debeli rtič as a landscape park. The area is divided into three zones, based on the natural characteristics, the level of threats posed to fauna and flora, as well as the current use and urbanisation of the area. The first conservation area, which will be most strictly protected, includes land and sea at the end point of the peninsula, the cliffs and about 250-450 m belt of the coastal sea with an underwater reef. The second conservation area includes the land based forest mask close to the Sv. Jernej Bay and two areas of naturally conserved sea and coastal areas. The third conservation area includes the urbanised or already anthropogenically modified areas, mostly in the centre of the peninsula.

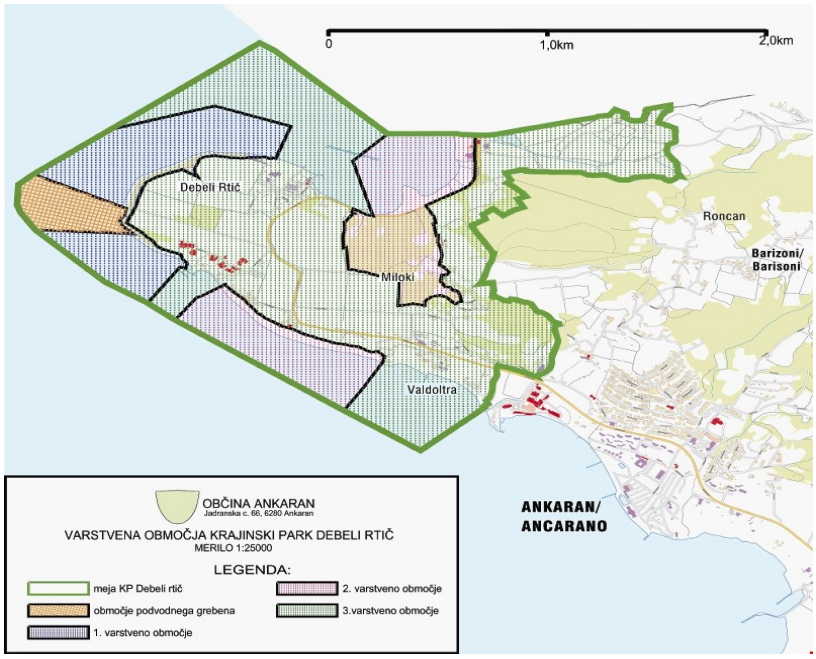


Figure 10: Debeli rtič Landscape Park – protection regimes.
(Source: https://www.google.com/search?client=firefox-b-ab&biw=1280&bih=550&tbm=isch&sa=1&ei=dQlLXPywAc3awQK927ywDg&q=krajinski+park+debeli+rtič&oq

Moreover, there are already a number of other, less powerful designations in place, namely the two designated natural monuments in the Slovenian sea, the Rt Madona and Debeli rtič. Under the Habitats and Birds Directives (92/43/EEC and 2009/147/EC, respectively), the Natura 2000 network was also set up. Most Natura 2000 sites overlap, at least in part, with other existing protection designations. There are currently four SPA (Specially Protected Areas), which are Debeli rtič, Škocjanski zatok, Strunjan and Sečovlje Saltworks (which also include the marine part of the Gulf of Piran). Additionally, there are 10 SAC areas (Special Areas of Conservation), which are Sečovlje Saltworks and the estuary of the Dragonja River, Sv Jernej Canal, Piran Cliff, between Strunjan and Fiesa, Strunjan Saltworks with Stjuža, between Izola and Strunjan sliff, Žusterna – the *Posidonia* area, Škocjanski zatok, Ankaran-Sv. Nikolaj and Debeli rtič.

Furthermore, a number of ecologically important areas have also been designated. Those do not have a firm legal background, or associated protection measures, so they are the weakest of the nature conservation tools described in this chapter. The entire area of the Slovenian sea was designated as an ecologically important area (the sea and the coast). Additionally, there have been other overlapping designations of ecologically important areas, such as Debeli rtič, Sv. Nikolaj, Škocjanski zatok, Rižana River estuary, Žusterna, Žusterna-Izola, Izolansko brezno, Strunjan, Fiesa lakes, Piran Cliff, Rt Madona, Mogoron and Sečovlje saltworks, including the Seča peninsula.

As the morphological modification of the coastal area increases, it results in the loss of coastal habitats, destruction of nesting areas close to the shore line, disturbance or interruption of migration routes of animal species and the fragmentation of habitats not providing enough space for the survival of some species.

The studies show that only 25% of the coast is left in its natural state (according to the Institute of the Republic of Slovenia for Nature Conservation, Regional Unit Piran, the share of natural coast does not exceed 20%). A large part (38%) is moderately altered, while the rest of the coast (37%) is considerably or extremely altered. These parts host harbours, marinas and urban areas, which intervene with the intertidal zone and the sea.

A number of key problems were identified:

- in general, the biotic diversity has been reducing due to the increased pressure on habitats and habitat types;
- the health of habitats and ecosystems depends on the quality of the sea and river water (sanitation, discharges from boats, marine transport), human actions affecting the seabed (fishing and pleasure boats), and the occupation and use of coastal areas;
- strong urbanisation pressures and thus the ecosystems subjected to deterioration;
- the system of nature protection has been established at the national level, but it is deficient in some points: in some protected areas, management has not been regulated (Strunjan Landscape Park, Debeli Rtič, Rt Madona), the safeguard regime is not efficient enough, financing is not satisfactory, infrastructure is unregulated, etc.;
- the tourist potential of protected areas is not exploited adequately and the cooperation between the managers of protected areas and tourist operators is too weak.

(2) Development objectives and needs

The Debeli rtič Landscape Park still has to be consolidated and effectively managed. However, the process is well on the way and it is expected that it will be concluded in the near future.

Additionally, as per the requirements of the Birds and Habitats Directives, Slovenia still needs to designate the SAC areas for bottlenose dolphins (*Tursiops truncatus*), loggerhead sea turtles (*Caretta caretta*) and the European shag (*Phalacrocorax aristotelis desmarestii*). Some potential areas for designation of those sites were already in consideration. The SI-MARINE LIFE project, suggesting the Natura 2000 site for the European shag and dolphins, has already been discussed; however, none have been confirmed yet.

The Sečovlje and Strunjan saltpans (in their associated landscape parks) are planned to be increasingly developed for sustainable tourist purposes, with improved access, more promotion and development of new tourist products linked to traditional saltworks by the Municipality of Piran.

C.5 LAND-SEA INTERACTIONS

C.5.1 Interactions due to natural processes

C.5.1.1 Risks to coastal areas (coastal erosion, marine flooding and saline intrusion)

In the Slovenian coastal area, there are three areas defined (Izola, Koper and Piran) as the Areas of Significant Impacts of Floods according to the Floods Directive (2007/60/EC). In two areas (Izola and Piran), marine flooding is the main source of risk, while in the area of Koper the flood risk is a result of both marine and river flooding.

Within the three areas and some other flood prone areas, the flood hazard has been assessed according to the Rules on the Methodology to Define Flood Risk Areas and Erosion Areas Connected to Floods and Classification of Plots into Risk Classes (OG RS, No. 60/07), and flood maps have been produced). According to the National Flood Risk Management Plan (Government RS, 2017), non-structural as well as structural risk prevention measures are planned.

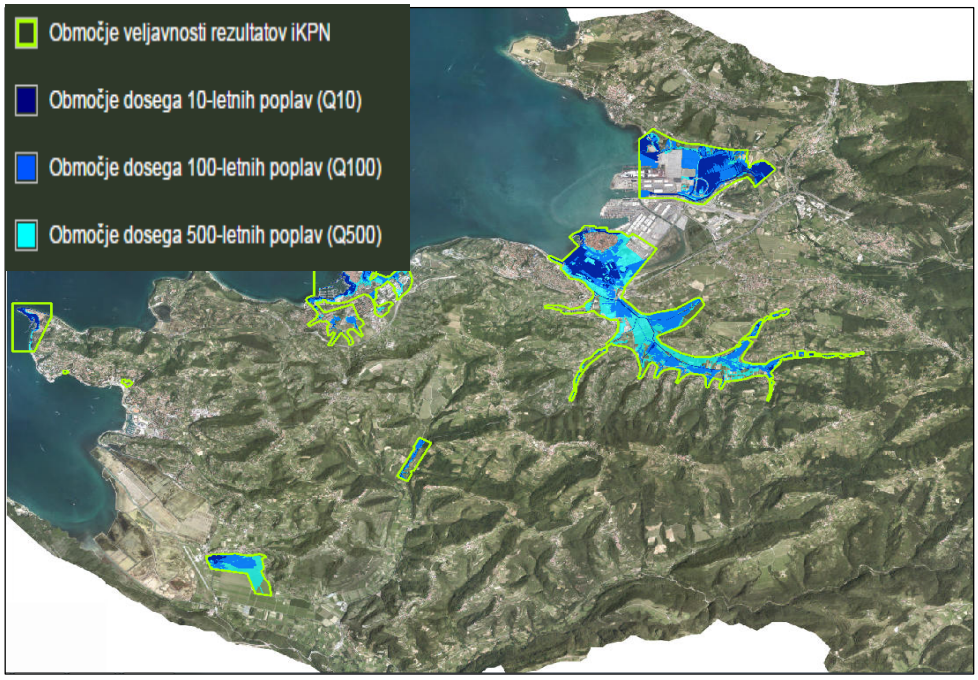


Figure 11: Map of areas with 10-, 100-, and 500-year floods on the Slovenian coast – integral map of flood risk (Source: Altas voda, 2015).

Natural coastal erosion processes in the Slovenian coastal area have been significantly altered, since only 23% of the coastline remains in natural state (Peterlin et al., 2013). An important part of the natural coastline represents the flysch cliffs at Piran, Strunjan and Debeli rtič. According to the existing research, the erosion processes on flysch cliffs show a coastal movement ranging from 6 mm to 22 mm per year (Zorn, 2008).

C.5.2 Interactions due to human uses and activities

C.5.2.1 Land-sea interactions

Waste (marine litter)

Marine litter is a land to sea interaction, as the bulk (80%) of litter in the sea comes from land-sources (UNEP-MAP, 2005), which includes coastal tourism, industry, and transport (e.g. Port of Koper), as well as sources from the further inland, with litter transported to the sea by rivers, wind, and other anthropogenic pathways.

Litter can be found throughout the Slovenian marine waters, including floating on the sea surface and in the water column, as well as in the sediments of the seafloor and stranded on the beaches. Unfortunately, it is not possible to accurately determine how much of the litter found in the Slovenian sea or coast is land-sourced. However, Vlachogianni et al., (2016) developed a method within DeFishGear project for such an assessment on the sub-regional scale, for the Adriatic and Ionian Seas. They found that they could identify the source of only 53.7% of 70,581 beach litter items that were collected during the project. For Slovenia, the figure was higher, 57.58% of 5,362 litter items had an identified source. Out of thee identified litter items, 87.95% were attributed to land-sources.

The percentages change with different litter parameters. Litter on the Slovenian seafloor was found to be composed of 50% land-sourced litter items and 35.7% items with clear marine-source, while the rest had undistinguishable source. Due to the variability in the data, DeFishGear project was not able to assess the sources and distribution patterns of the floating litter (Vlachogianni et al., 2016).

On the other hand, according to Veiga et al., (2016a) JRC "Technical report on Identifying Sources of Marine Litter", for many categories described as land-sourced in Vlachogianni et al. (2016), additional probabilities would have to be established and that the above results can be construed as overly simplistic. Applying this strict methodology to the DeFishGear and the Slovenian national monitoring data (2014-2017), only 13.6% of all collected beach litter items can have a definitely determined source.

Monitoring of marine litter in Slovenia is undertaken regularly on three coastal locations and routinely only covers beach litter. A vast majority of litter found was composed of artificial polymers (72.4%), followed by glass/ceramics (22%), with other categories represented in significantly smaller amounts). Seasonal variations are seemingly not statistically significant, yet more data will be needed to confirm that trend.

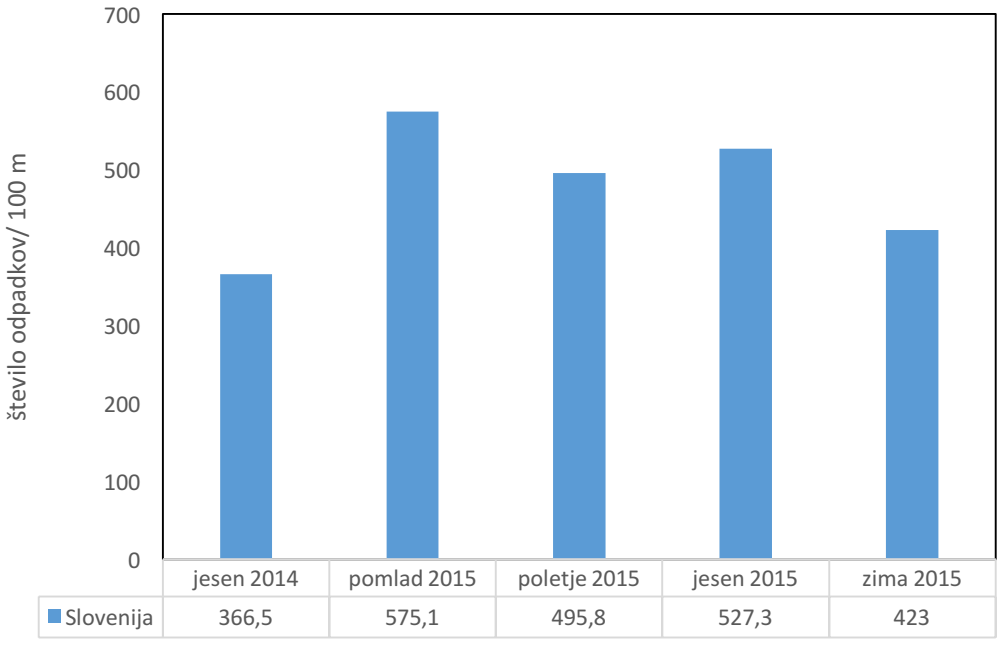


Figure 12: Monitoring data from three Slovenian locations showing the amounts of beach litter found in the years 2014 – 2015.

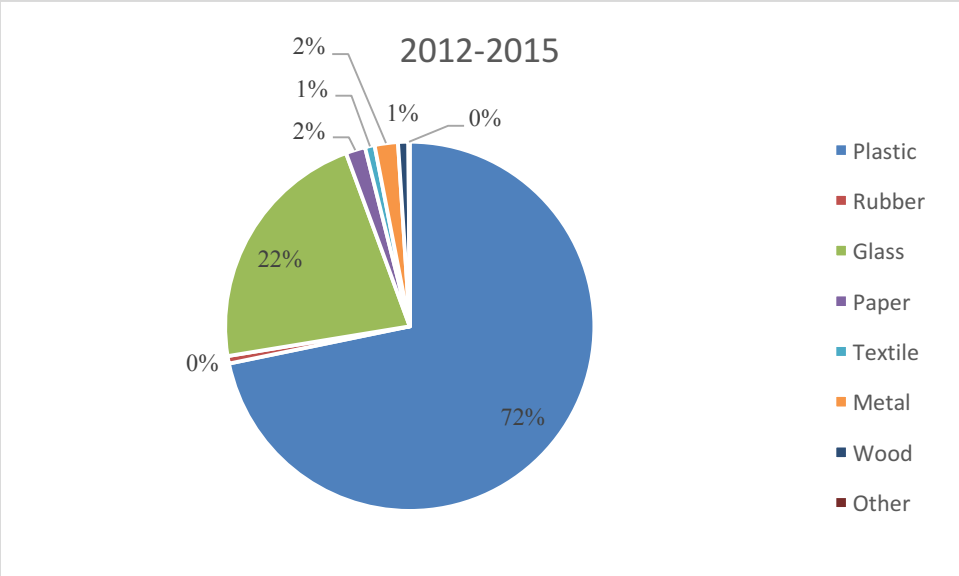


Figure 13: Monitoring data from three Slovenian locations showing the composition of litter items found in the years 2014 – 2015 (Institute for Waters of the RS, 2015).

Marine litter is one of the major pressures on the marine ecosystem and on the ecosystem services provided by the sea. The number of animal species known to ingest litter (both macro- and micro-litter) is increasing and it includes seabirds, turtles, marine mammals and fish (Kühn et al., 2015). The effects of ingestion on the population level of various species are still poorly researched, but could potentially be devastating particularly from the derelict fishing gear (Werner et al., 2016). This can further affect provisioning ecosystem services, if the populations of fishing interest or species regulating the populations naturally (top-down predators, or bottom-up prey) start to collapse or alter their behaviour or size. Moreover, the excess of litter in the marine environment also has negative social and economic impacts, as it affects the provision of cultural ecosystem services, which has an effect on recreational and tourist activities (Werner et al., 2016).

Marine litter does not impact human activities in a known, positive manner; however, it is implicated in a number of negative impacts in tourism, fisheries, aquaculture and energy supply. Consequently, it causes economic losses to individuals, enterprises and communities (Werner et al., 2016).

Marine waste is addressed in the Marine Strategy Framework Directive, under Descriptor 10. Subsequently, a number of measures to mitigate the current state of saturation of Slovenian sea with marine litter were proposed and confirmed in the Slovenian National Plan for the Management of Marine Environment (MOP, 2017). The Marine Environment Management Plan makes references to both national, European, and international legislation in order to combat marine litter pollution. At the national level, the topic is mentioned in the Waters Act, Nature Conservation Act, River Basin Management Plans (also under the EU Water Framework Directive), and Regulation on Green Procurement. At the European level, MSFD and WFD are particularly relevant to this issue, but also the Directive 2015/720 on reduction of plastic bag consumption. Internationally, there are International Convention for the Prevention of Pollution from Ships (MARPOL), Barcelona Convention and its Regional Action Plan on Marine Litter Management.

Currently, major knowledge gaps still exist about both the sources and transfer pathways of litter into the seas and around the seas, as well as the degradation processes and the possibilities for litter particles to adsorb and leach toxins in the environment. Recently, there

has also been a push to identify the role of floating litter particles in aiding the expansion of invasive alien species; however, that also is not yet researched in detail. The exact pathways of litter, exerting pressure on various ecosystem components, are still very poorly understood.

C.5.2.2 Use of natural resources (water abstraction, removal of aggregates)

Abstraction of seawater for human uses is regulated in Slovenia as one of the Sea to Land interactions. Some water is used for spas, some for the production of heat, technological and other reasons (fire water).

Geographically, this activity is distributed along the Slovenian coast as shown in Figure 14.

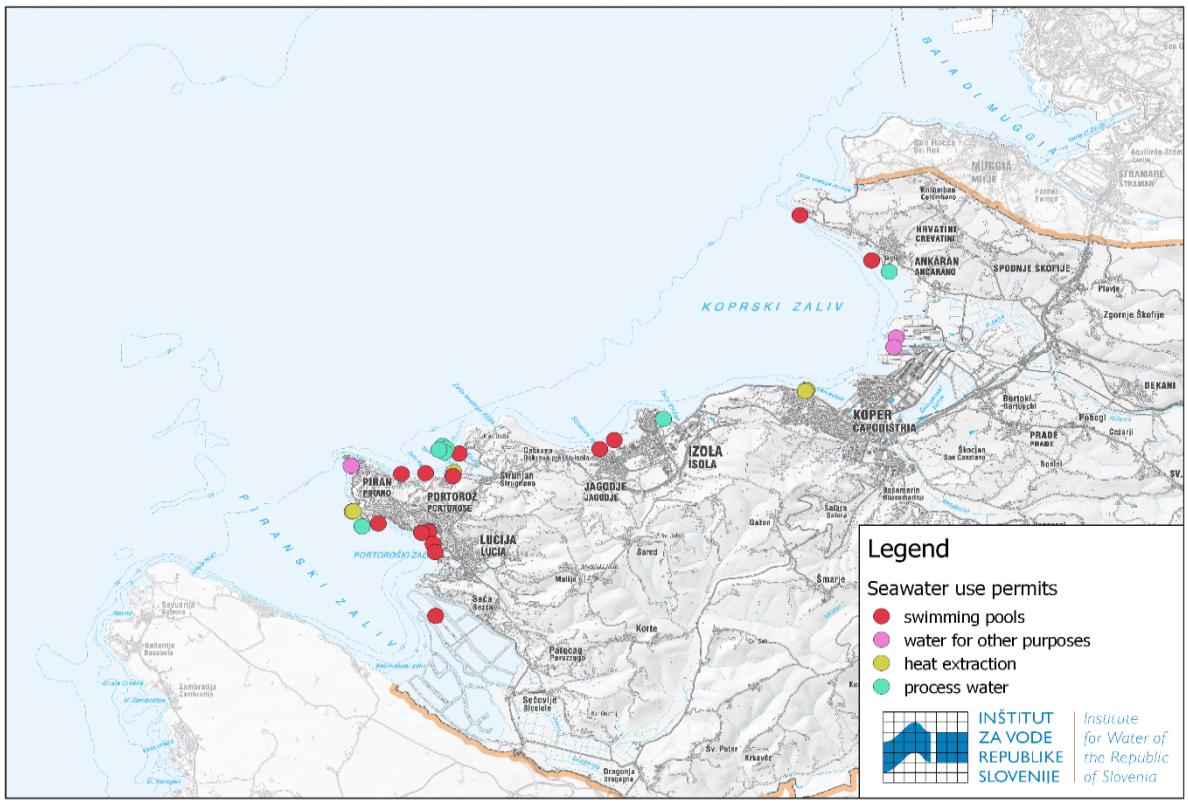


Figure 14: Seawater use permits (prepared by IzVRS, data source: Atlas okolja, 2017).

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 the jurisdiction of the Slovenian Water Agency and monitored by the Environment Agency of Slovenia (Atlas voda, 2015).

C.5.2.3 Harmonisation of land use in the coastal zone

Planning and harmonisation of land use at the junction of aquatic and terrestrial land (coastal zone) is a complex methodological process. The sea and coast form an organic whole, which requires a comprehensive programming and effective management. Most activities are associated with the marine environment (tourism, fisheries, nautics, etc.) and require a certain

infrastructure on the coast; therefore, a separate planning for aquatic and terrestrial land is practically impossible.

Within the analytical phase, a study on the "Harmonisation of Regimes in the 100-meter Coastal Zone of the Adriatic Sea with the requirements of Article 8 of the ICZM Protocol – SHAPE Project (URBI, IPO, 2014)" was referred to. The study deals in detail with the definition of the coastal zone on the basis of an in-depth analysis of the uses and regimes. Moreover, it defines various forms of coastal zone management. The study is an appropriate reference point for the harmonisation of uses on the coast and, therefore, its results should be properly integrated into the MSP.

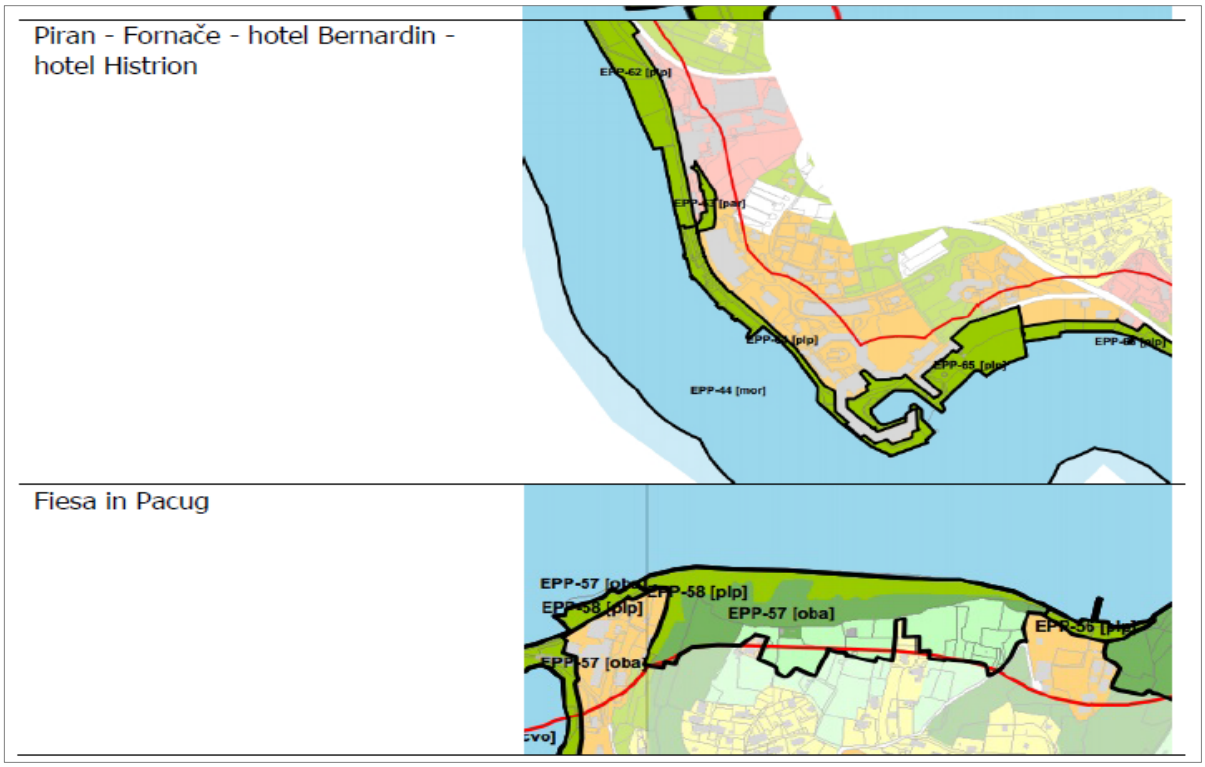


Figure 15: Adjustment of the coastal zone according to ICZM (URBI, IPO, 2014).

C.6 CONFLICTS AND SYNERGIES IN THE USE OF MARITIME SPACE

C.6.1 Existing conflicts

C.6.1.1 Shipping

Maritime shipping is an important sector, since it has major socio-economic effects and it is also one of the most important sectors regarding the use of marine and coastal space. On the other hand, shipping causes a series of effects on the environment:

- **Underwater noise:** shipping is one of the most important anthropogenic sources of underwater noise at lower frequencies. Underwater noise levels in the Slovenian sea are being monitored at a permanent measurement station at Debeli rtič. Since underwater sound at lower frequencies has far reaching effects, the whole Slovenian sea is affected. Underwater noise also has transboundary implications.
- **Seabed disturbance:** the shallow and soft bottom of the Slovenian sea is prone to several shipping related disturbances, from sediment resuspension due to vessel propulsion systems, to damage on the seabed due to anchorage. The Gulf of Koper is a highly affected area of the Slovenian sea.

- **Introduction of non-indigenous species** through ballast water discharges and hull fouling represents a serious threat to coastal and marine ecosystems. Several non-indigenous aquatic species for which it is presumed were transported via ballast water have been found in the Slovenian sea. The ballast water management is again a clearly transboundary issue.

Certain use-ecosystem conflicts posed by shipping are well recognised and certain measures have been proposed. These range from quieter ship designs (e.g. IMO 2014) to international approaches to ballast water management (Penko et al., 2016).

C.6.2 Existing synergies

C.6.2.1 Fishing for litter and fishing activities

Fishing for Litter is an initiative based on the cooperation with fisheries associations, in which fishermen voluntarily bring ashore the litter that is collected in their nets during their normal fishing operations. Fishermen are also asked not to discard their damaged or useless fishing gear into the sea, but dispose of it in the ports. Fishermen are not financially compensated for their engagement, but the disposal logistics are offered freely. Most of the litter collected under this scheme is collected from the seafloor.

In the scope of the DeFishGear project, which piloted the Fishing for Litter incentive in the Adriatic-Ionian region, 726.9 kg of litter was collected from fishermen in the ports of Koper and Izola over a 23 month period. Most of the collected litter was plastic (45%), followed by wood (18%), metal (12%), rubber (11%), glass (6%), textiles (4%), and other (4%) (DeFishGear, 2016).

It is vital to bring together fishermen and their associations with waste industries, harbour authorities and representatives of the communities in order to jointly agree on logistics, communication, public relations, and so on. It was found that great effort is needed on a personal level for fishermen to understand that Fishing for Litter can be conducted easily as a part of their fishing routine. Therefore, it is greatly beneficial, if at the start of the implementation there is some kind of pre-existing personal relationship to build on. It is essential to provide an organised and simple scheme for the fishermen (bin availability, collections, and potentially compensation). Often, it is more challenging to set this system up with municipalities and port authorities than with fishermen, as there is a lack of will and indifference to the problem.

This approach is now being commonly tried out and implemented across Europe. In Germany, fishermen are given large bags to store the litter collected at sea and containers for waste disposal are available in selected harbours for free. After the collection, the litter is analysed and, if possible, recycled. Not only does this activity remove litter from the seas, it is also raising awareness about this issue within the fishing industry.

C.7 TRANSBOUNDARY ISSUES

C.7.1 Maritime transport

C.7.1.1 Ballast waters

Shipping moves over 80% of the world's commodities, and with it approximately 3-5 billion tonnes of ballast water around the world every year (Emami et al., 2012). Annually, over 10 million tonnes of ballast waters are released into the Adriatic ports. Moreover, it is expected that this amount will increase in the future, following the rise in the cargo transport in the Adriatic region. Although the majority of ballast water discharged in the Adriatic originates

from within the Adriatic Sea, donor locations from all over the world were observed (David et al., 2016).

Marine bio-invasion by ballast water derived organisms can threaten native biodiversity (Emani et al., 2012). The presence of non-native species in the ballast waters released into the Adriatic has already been proven, and overall over 70 non-native species are known in the Adriatic Sea. Most of those can be linked to the ballast waters.

Due to the non-existent boundaries of the natural sea ecosystem, ballast water management is a crucial and complex issue affecting all of the Adriatic countries, and can be exclusively linked to shipping activities. Within the project BALMAS a regional ballast water management system was prepared, which is coherent with the International Convention for the Control and Management of Ship Ballast Water and Sediments (BWM Convention) and includes aspects from risk assessment, early warning, compliance monitoring and response (Penko et al., 2016). The developed system however awaits implementation in the Adriatic countries, of which two have not yet ratified the BWM Convention.

C.7.1.2 Underwater noise

Underwater noise is generated by many natural sources, including waves, weather, glaciers, and animal sounds. However, in recent decades the human induced noise has been increasing (Solan et al., 2016). Shipping, oil and gas prospection, along with sonars, pile driving, and dredging devices are introducing considerable amount of anthropogenic noise into the environment (Andre et al., 2011). Physical, physiological, and behavioural effects can be the consequences on marine biota due to the exposure to underwater noise (Solan et al., 2016; Tasker et al., 2010).

Underwater noise can be divided into continuous and impulsive noise. Continuous noise is the background noise without a distinguishable source (Tasker et al., 2010). Maritime traffic is the largest anthropogenic contributor to continuous noise levels in the seas. Ambient sound from commercial shipping can be quite variable given that it is modulated by both shipping activity and environmental conditions for long range acoustics propagation (Wenz, 1962). Although smaller vessels generate less noise, their high density in space and time (tourism) can be a source of high levels of poorly assessed underwater noise (McDonald et al., 2006).

Impulsive sounds are typically brief with a rapid rise time, meaning there is a large change in amplitude over a short period of time. Thus, low and mid-frequency sounds are damaging to auditory structures. Main anthropogenic sources of impulsive underwater noise are impact pile driving for in-shore and off-shore construction, seismic exploration with airguns, explosions and certain sonar systems (Tasker et al., 2010).

Several measures for minimising underwater noise impacts are available. These range from technical improvements on noise sources (the so-called silent ships), mitigation technics (e.g. bubble curtains for pile driving), to administrative measures (e.g. within the framework of maritime spatial planning, alteration of shipping routes). However, currently in the EU, the most widespread measures to combat this issue are various monitoring measures and construction of reliable models of pressures on different ecosystem components (Borsani et al., 2015). For impulsive noise by far the most common measure proposed is the establishment of noise registers, which will describe spatial and temporal distribution of impulsive noise pressures. This will in turn, enable assessment of cumulative impacts on marine species populations. Yet, proper mitigation measures are more or less lacking, at the moment.

In the Slovenian sea, a permanent underwater sound measurement station is located 300 meters off the coast at Debeli rtič. The station has been operational, with interruptions, from the beginning of 2015. The available measurements and knowledge are not yet sufficient to assess the state of underwater soundscape or to assess the trends (Zupančič and Peterlin, 2016).

C.7.2.3 Marine litter

Marine litter is one of the most pervasive transboundary issues in all of the world's seas nowadays. Litter was found in oceanic gyres, shorelines, sediments, and in the deep sea. Plastic litter, which is the most problematic, accumulates in high densities, travels long distances, and degrades slowly over centuries. Particularly in the Adriatic Sea plastic accounts for more than 90% of all litter found (Vlachogianni et al., 2016). Marine litter has been shown to cause death, injuries, and other physical damage to marine organisms, as well as leaching toxins and causing economic damage to tourism, fishing industry, and vessels (Ryan, 2015).

Mediterranean Sea has one of the highest concentrations of marine litter globally, with an estimated 700 tonnes entering the Mediterranean per day. Koutsodendris et al., (2008) estimated that in the Mediterranean Sea, 69% of litter comes from land sources, and 26% is vessel-based. Land-based origin relates to beach tourism, and other activities taking place on the coast, but can also be connected to urban and industrial sources further inland, with litter being transported into the sea by rivers or winds. Sea-based sources are mainly due to discharges of litter into the sea from maritime activities, such as shipping, fishing, offshore installations, mining, extraction, or dumping of refuse (Veiga et al., 2016b). Jambeck et al., (2015) argued that the population size and the quality of waste management systems largely determine which countries contribute the most to the uncaptured waste, available to become plastic marine debris. Without improvements to waste management infrastructure, the cumulative quantity of plastic waste available to enter the oceans from land is predicted to increase by an order of magnitude by 2025.

Marine litter has been recognised as a critical problem in the Mediterranean, which is in large part due to the natural characteristics of the basin as an accumulation basin with limited water exchange with the World Ocean (Vlachogianni et al., 2016). The transport and accumulation of litter is heavily influenced by currents and winds, therefore litter can cover long distances from their source before sinking to the seafloor, being deposited on the shore, or degrading over time (Andrady, 2015).

In recent years, transport of marine litter has also been linked to the spread of invasive and non-native species. Light, floating litter items, provide a suitable substrate for "hitch-hiking" of smaller organisms, such as bacteria or algae, which can then cover longer distances, than before (Reisser et al., 2014).

Microplastics present a further complication. The term refers to litter particles smaller than 5 mm, thus covering a heterogeneous assemblage of particles in varying sizes, shapes, colours, chemical composition, densities, and other characteristics. Microplastics are distributed throughout the entire water column, with particularly great accumulation in the sediments. Microplastic items can also act as vectors of potentially toxic substances.

While it is widely acknowledged that marine litter will persist in the marine environment, for at least, decades to come, and likely longer, there are no comprehensive strategies for its removal. Beach clean-ups are a widely employed method for both monitoring and removal of litter. Fishing for Litter is another activity that is taking a hold across Europe and involves fishermen bringing to ports the litter they catch in their nets, as well as properly disposing derelict fishing gear, instead of dumping it in the seam which leads to the occurrence of

"ghost fishing". More successful was the DeFishGear project, a three-year long project piloting coordinated and harmonized actions on the science-policy-society interface in Adriatic and Ionian Seas. The project succeeded in developing and implementing marine litter monitoring methodologies for beach, sea surface, and seafloor litter, as well as litter in biota and microplastics. Those methodologies were agreed and coordinated between both EU and third countries bordering Adriatic and Ionian Seas and undertaken during the duration of the project. Since then, the methodologies have been used for national monitoring programmes, as well as being adopted by the EEA as the official guidelines for marine litter monitoring in all four European regional seas.

C.8 SWOT ANALYSIS OF THE CASE STUDY AREA

The results of SWOT analysis are shown in tables below.

The following maritime sectors/activities were analysed (Aquaculture, Fisheries, Maritime transport, Nature and species conservation, Tourism and underwater cultural heritage).

Table 5: SWOT analysis of the case study area: aquaculture, fisheries, maritime transport, environment, nature and species conservation, tourism and underwater cultural heritage.

AQUACULTURE	
STRENGTHS	WEAKNESSES
− Good infrastructure for the aquaculture industry (ports, piers). − Appropriate quality of the sea for the successful operation of aquaculture activities. − Nearby demand for aquaculture products (developed tourism on the coast). − A strong fish brand established. − High professional competence of the producers (fish and shellfish).	− Limited spatial possibilities for aquaculture. − Existing areas designated for aquaculture are fully occupied. − Conflicts with other uses of the sea.
OPPORTUNITIES	THREATS
− Increased demand for and consumption of seafood.	− Pollution of the environment with organic matter due to the shell secretion causing the formation of a secondary hard layer on the sea bottom under the shellfish plantations. − Possibility of the generation of marine plastic waste (plastic mesh for shellfish farming), which in certain amounts ends up in the marine environment.
FISHERIES[1]	
STRENGTHS	WEAKNESSES
− Close linkage of marine fisheries to the local economy. − Partly modernised infrastructure in fishing ports. − Integration of fishing ports in the functioning of local communities: quick unloading – higher quality of products. − Artisanal fishing practiced by individual fishermen, fishing families and fishing family businesses.	− Limited spatial possibilities for fishing. − Large part of the sea is occupied by the traffic separation zone and the anchorage area of the Port of Koper that restrict the fishing area. − Small size of the sector relative to other economic sectors in Slovenia. − Old fishing fleet with obsolete equipment.

[1] Adapted from the Operational Programme for Slovenia, European Maritime and Fisheries Fund.

– Fishermen's experience. – Small-scale coastal fishing and the circumstances which enable sustainable fishing as compared to industrial fishing. – Several protected areas established for the conservation of marine biodiversity (species, habitat types).	– Mixed seasonal fishing – it is difficult to specialise in one fishing technology only. – Ignorance of the population status of the various marine species under Natura 2000. – Interaction between fishing activity and the protected species and habitat types are only partially examined and evaluated. – Lack of communication and knowledge sharing among fishermen, profession and environmental organizations. – Little research experience in the selectivity of fishing gear, state of marine resources and management of the marine environment and space. – Lack of infrastructure for fishermen and aquaculture workers, especially at Seča.
OPPORTUNITIES	THREATS
– Existence of natural potential (albeit limited) for increasing the catch. – Adjustment of the navigation regime in the waterway corridors within the traffic separation scheme. – Diversification of activities in relation to tourism and environmental protection. – Increased demand for and consumption of seafood. – Continued sustainable development of the Slovenian fishing fleet in accordance with the reformed Common Fisheries Policy (CFP). – Protection and restoration of marine biodiversity and ecosystems. – Safeguarding of protected marine resources.	– Negative trends regarding the shared fish stocks in the northern part of the Adriatic Sea. – Climate change (weather extremes), disappearance of species, changes in sea temperature, etc. – Negative impacts of anthropogenic activities on marine ecosystems (eutrophication, pollution, introduction of alien species, etc.). – Shallowness and a closed nature of the Northern Adriatic. – Lack of space at sea and ashore. – Increase in maritime traffic in the northern part of the Adriatic Sea.
MARITIME TRANSPORT, PORT OF KOPER	
STRENGTHS	WEAKNESSES
– Geostrategic location, good development prospects of the northern Adriatic ports, including the Port of Koper. – Spatially and technologically stable and prosperous operation of the Port of Koper (also important synergistic effects). – Constant increase in the volume of cargo handled by the Port of Koper. – Growth of passenger traffic at the Port of Koper (cruise ships). – Adoption of the National Spatial Plan for the area of the Port of Koper. – Established scheme of traffic separation (effective regulation of heavy traffic).	– Maritime transport and port operations cause negative impacts on the environment. – Space limitations of the Port of Koper. – Location of the Port of Koper in relation to urban centres and the consequent potential conflicts with local communities.
OPPORTUNITIES	THREATS
– Development and growth of the Port of Koper is an opportunity for the economic development of local communities and the country. – Enhanced safety of navigation allows safe growth and development of the Port. – Passenger traffic connection of the coastal towns. – Establishment of cross-border maritime passenger operations.	– Increased risk of maritime accidents due to the growing maritime traffic. – Risk of ecological disasters. – Risk of the presence of alien species due to ballast water. – Destruction of cultural heritage (anchoring) and habitats (anchoring and re-suspension of sediments due to navigation).

ENVIRONMENT (RELATED TO MSFD), NATURE AND SPECIES CONSERVATION	
STRENGTHS	WEAKNESSES
− Biodiversity – good environmental status. − Rare and threatened habitats are properly protected and preserved. − Eutrophication due to human activities and its adverse effects is negligible. − Good conditions in terms of the concentration of nutrients in seawater and the concentration of dissolved oxygen in the bottom layer of the seawater. − Quantities of marine litter do not threat marine organisms and human welfare.	− Natural marine environment is considerable burdened and fragmented. − Infralittoral zone, i.e. the area of shallow water closest to the shore, with algal overgrowth and beds of marine phanerogams covers only about 2% of the surface area. − Unfulfilled international obligations regarding the protected share of land and the sea. − Absence of regular monitoring programmes (irregular measurements and poor data sets). − Incomplete data on the spatial distribution of habitats. − Altered conditions for some populations. − Status of some habitats is not good. − Effects of the concentration of contaminants on organisms. − Tourism industry does not participate in the investment into the infrastructure for visiting the protected areas.
OPPORTUNITIES	**THREATS**
− Establishment of new protected areas and other measures for the protection of natural values and the preservation of marine biodiversity. − Cooperation with other countries of the Northern Adriatic in the framework of MSFD implementation. − MSP could contribute to better preservation of habitats.	− Climate changes (coral bleaching), − Microplastics. − Fishing with purse and pelagic trawlers, trammel nets and fixed nets. − Illegal harvesting of sea shells. − Maritime transport and anchoring. − Urbanisation. − Changing of the sea-bottom structure. − Changing of the water regime due to new piers. − Ballast waters (input of non-indigenous species).
TOURISM	
STRENGTHS	WEAKNESSES
− Favourable geographical location (seaside). − Favourable climatic conditions. − Growth in tourist sector. − Long tradition in tourism activities. − Preserved environment and nature protection areas. − Rich cultural heritage (conservation, diversity). − Revival of cultural traditions. − Developed nautical tourism. − Positive trends in the development of cruise tourism. − Established cycling, walking and other thematic trails. − Rich gastronomy.	− Municipal spatial plans do not protect spatial potentials for the development of tourism infrastructure. − Pressures on the coastal strip, unbalanced spatial distribution of tourism infrastructure. − Poor quality and lack of accommodation capacity in some places. − Weak cooperation with neighbouring regions. − Underdeveloped entrepreneurship and small business. − Lack of original retail offer. − Decline of city centres.
OPPORTUNITIES	THREATS
− Innovation and new tourism products: active tourism (cycling and thematic trails, hiking), ecotourism (protected areas), wine tourism, gastronomic tourism, etc.	− Exceeding the carrying capacity of the environment in some places. − Unregulated growth of tourist capacities (private accommodation).

− Cross-border tourist destinations (possibility of developing joint tourism programmes). − Growth in the number of tourists from distant markets (eastern markets). − Business and conference tourism. − Promotion of entrepreneurship and small business.	− Pressures on spatial (landscape, urban) qualities as a consequence of inadequate building. − Risk of greater environmental pollution. − Lack of drinking water. − Conflicts of interest in land use and failure to comply with the requirements/guidelines of sustainable tourism. − Accessibility (obsolete railway infrastructure, vignette system, poor bus connections, etc.).
UNDERWATER CULTURAL HERITAGE	
STRENGTHS	WEAKNESSES
- As a result of past investigations there exist 52 identified and registered sites of underwater cultural heritage, (37 totally submerged sites and 15 partially submerged sites, source: Register of Slovene Cultural Heritage). After bathimetric research, there is also a list of 50 located sites with the anthropogenic changes, however, not registered in the official Register of Slovene Cultural Heritage - Great variety and scientific value of the registered heritage (shipwreck and ruins of ports from the Roman era, shipwrecks from the Middle Ages, early modern age, 19th and 20th centuries, relics of a hydroplane, etc.) - Existing legal framework for protection of the heritage. - Existing museum for maritime cultural heritage (Sergej Mašera Maritime Museum of Piran). - Great public interest in some matters regarding underwater cultural heritage (e.g. the story of ocean liner Rex).	- Non-existent systematic investigations and monitoring of the underwater cultural heritage due to lack of funds. - Lack of implementation of legal protection of the underwater cultural heritage. - Lack of mitigation measures to reduce the damage caused by maritime transport and professional fishing.
OPPORTUNITIES	THREATS
− Possibility of the long-lasting in situ preservation of non-threatened heritage. − Possibility of the recuperation of threatened heritage and its conservation on a secondary location. − Great potential for new discoveries on unexplored areas of the seabed. − Great potential for presentations and interpretative infrastructure for the public to enjoy the benefits of underwater heritage. − Possibility of application of polluter pays principle and implementation of mitigation measures. − Increased research would enable better knowledge of cultural heritage and its protection. − Presentation of cultural heritage to the general public, also for tourist purposes. − Possible provision of financial resources for research and protection of cultural heritage from the fees paid by shipowners.	- Uncontrolled and irreversible damage caused by maritime transport (construction of port infrastructure, deepening of waterways, anchoring of cargo ships, impacts of ship's screws on the seabed), professional fishing, looting, aquaculture and natural factors.

C.9 SUMMARY OF THE CASE STUDY ANALYSIS (MSP ORIENTED)

Based on the analytical phase and the study analytic materials, statistical data, available databases and consultations with various stakeholders, detailed parameters of the present situation and the MSP objectives were defined for each activity as a planning point of departure.

C.9.1 Aquaculture

Present uses and regimes

The following data layers were used when addressing the situation in the aquaculture areas:

- parts of the sea where the water quality is favourable for life and growth of shellfish and marine gastropods, and
- areas for the cultivation of marine organisms.

Processes and trends

When investigating the aquaculture areas it was found out that all the three locations where aquaculture activities were performed (Debeli rtič, Strunjan and Seča) were fully utilised. Representatives of the aquaculture operators expressed interest in defining additional areas and arranging new technological infrastructure on land (piers for unloading shells, etc.). A study (commissioned by the Ministry of agriculture, Forestry and Food) is under preparation, which is focused on defining the quality of the sea (appropriate potential locations) for new fields and alternative forms of cultivation.

The processes and trends are detailed in the notes of consultations with the representatives of the Ministry of Agriculture, Forestry and Food, the Fisheries Office and the aquaculture operators.

Objectives

- To maintain the existing three aquaculture locations in the present extent.
- To provide adequate new locations for the operation and development of aquaculture activities.
- To define a central location for the construction of a new technological pier (unloading of shells, equipment, etc.).

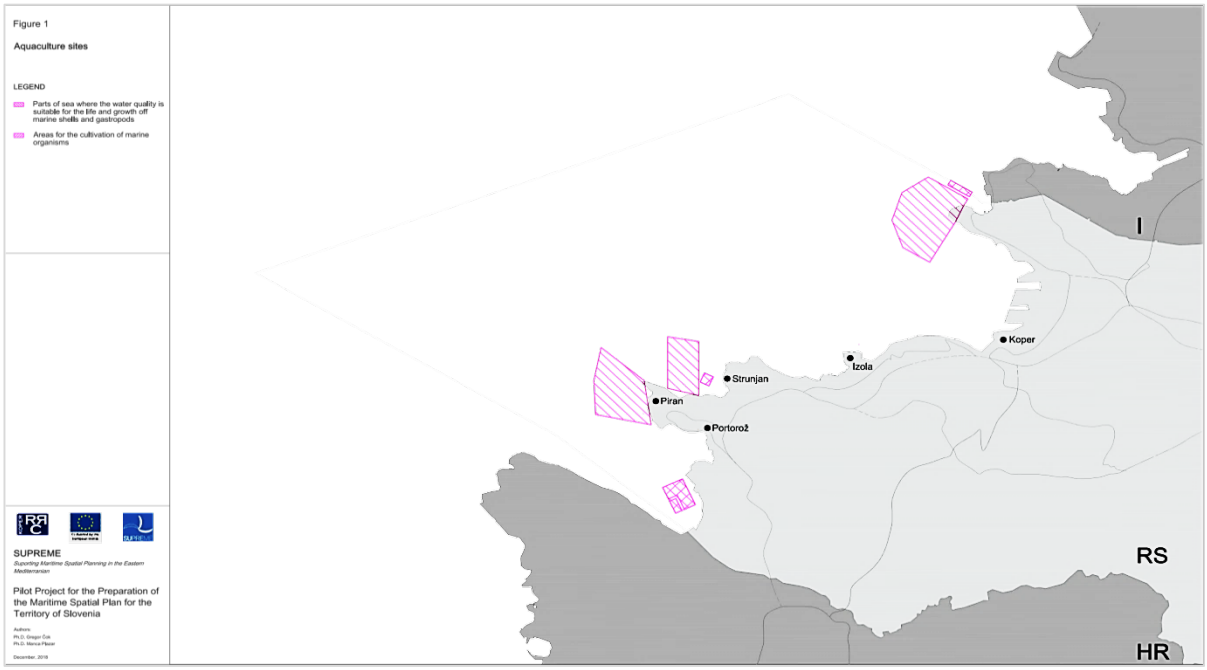


Figure 16: Aquaculture areas

C.9.2 Fisheries

Present uses and regimes

The following data layers were used when addressing the situation in the fishing areas:

- fishing zones,
- fishing reserves,
- restrictions on the use of purse-seine nets,
- area ban on fishing with demersal nets,
- trawling – corridor.

Considering the new maritime border between Slovenia and Croatia, as established by the arbitration award on 29 June 2017, only a single fishing zone, covering practically the entire Slovenian territorial waters of internal waters, will be introduced within the preparation of the MSP.

Processes and trends

In dealing with the fisheries area it was found that the industry was facing a number of problems (spatially limited fishing area, additional fishing restrictions in the area of traffic separation scheme, outdated, incapacitated and impoverished fishing fleet, issues of seasonal supply and demand, etc.) the catch is in evident decline and fishermen complement their core business with tourism, aquaculture and other activities. By contrast, a predominant expert opinion prevails that there is enough potential (various fish) in the Slovenian sea, but the opportunity has not been seized for various reasons.

Besides its direct business impact, fisheries in Slovenia also have a wider social (tradition, identity, culture, education, etc.) and economic significance (tourism, sport, etc.). It is therefore necessary to maintain and enhance its future existence and development.

The processes and trends are detailed in the notes of consultations with the representatives of fishermen, the Ministry of Agriculture, Forestry and Food and the Fisheries Office.

Objectives

- To identify appropriate measures for a more effective harmonisation of navigation and fishing in the area of traffic separation scheme.

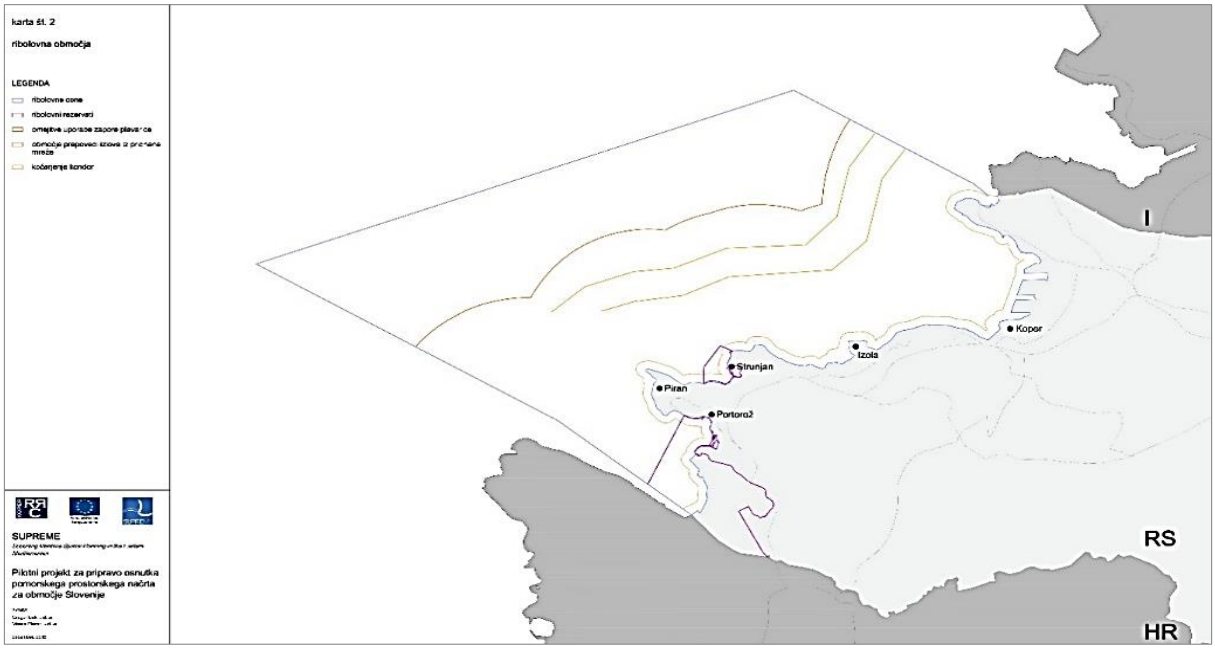


Figure 17: Fishery areas.

C.9.3 Plants and infrastructure for exploration, exploitation and extraction of oil, gas and other energy sources

Present uses and regimes

When examining the situation in the area of plants and infrastructure for exploration and extraction of energy products, there were no activities and uses or related regimes were registered.

Processes and trends

When considering the situation in the area of plants and infrastructure for exploration and extraction of energy products, any existing or prospective interests were recorded. Due to the limited spatial possibilities and a wide range of the users already present in the area, the placement of such activities would be hardly feasible and environmental questionable.

Objectives

- There are no goals recorded in this area with regard to the water land.

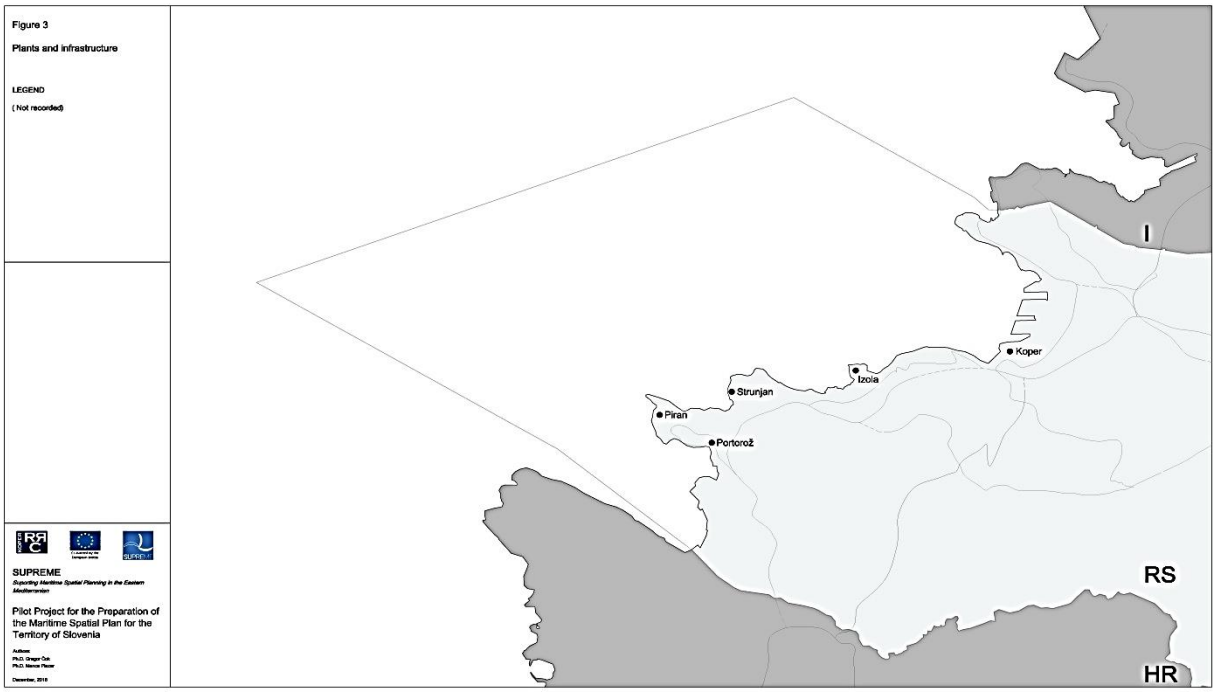


Figure 18: Energy products (not recorded).

C.9.4 Maritime transport routes and traffic flows

Present uses and regimes

The present uses and regimes in the area of maritime transport routes and traffic flows are regulated by the applicable legislation. In this context, the most important regulation for the Slovenian sea is the inter-state Memorandum (Slovenia-Croatia-Italy) establishing a common navigational system and a traffic separation scheme in the Northern Adriatic (adopted in 2000, effective from 2004). When considering the situation in the area of maritime transport routes and traffic flows, the following data layers were used:

- area of the traffic separation scheme,
- lines of the traffic separation scheme,
- anchoring area,
- port area,
- navigation facilities.

It was noted on the basis of the recorded situation, that the area traffic separation scheme comprises approx. a half of the territorial waters of the Republic of Slovenia.

Processes and trends

In dealing with the area of maritime transport routes and traffic flows it was found that the present state (as defined by the Memorandum) complies in all parameters (surface area and regimes) with the needs of the Port of Koper as a central provider of port operations in the Northern Adriatic. Here, it is necessary to draw attention to the international aspect, since the ships bound for the nearby northern Italian ports navigate across the Slovenian territorial sea. Development trends of the discussed activity are reflected in both the transport strategy of the Republic of Slovenia and the business interests of all large ports in the Northern Adriatic. Based on the recorded data it is assumed that the maritime transport will strengthen intensively in the future, both in the number of inward load-bearing capacities and dimensions of ships.

The processes and trends are detailed in the notes of consultations with the representatives of the Port of Koper and the Slovenian Maritime Administration.

Objectives

- To permanently maintain the existing regimes in the areas of traffic separation scheme and anchorages of the Port of Koper.
- To ensure conditions for the realisation of passenger ports in accordance with the Transport Development Strategy of Slovenia to 2030 (aquatic and terrestrial land).

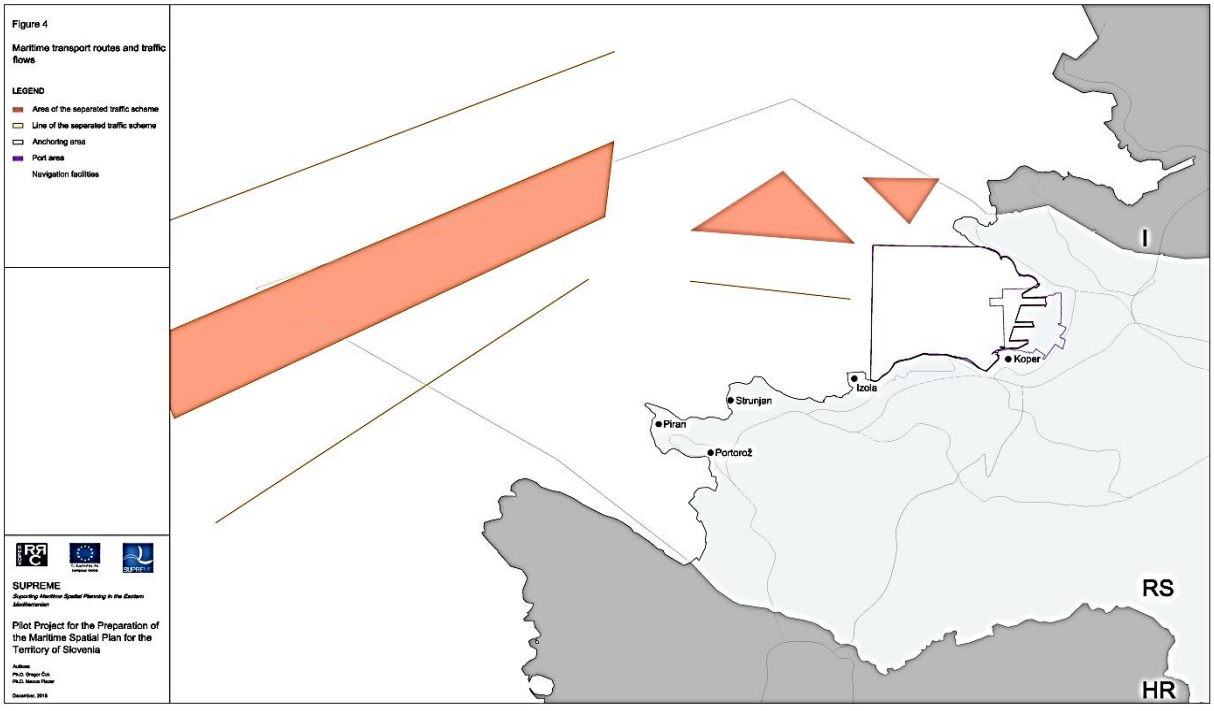


Figure 19: Maritime transport routes and traffic flows.

C.9.5 Military training areas

Present uses and regimes

In the examination of the situation in the field of military training areas, the following data layers were used:

- areas of exclusive use for land defence,
- possible areas of exclusive use,

- navigation exercise areas,
- diving exercise areas,
- areas of limited and controlled use on the coast,
- mooring areas,
- areas for work with explosive devices,
- locations of finds and temporary storage of unexploded ordnance (UXO).

The map (in the analytical part) displays all available data, including those that determine the on land activities of the Ministry of Defence of the Republic of Slovenia (MORS) on land.

Processes and trends

The MORS activities at sea are relatively few, including mainly the exercise in navigation and diving. When carried out, the MORS properly adapt them to other activities. The present uses and regimes, provided by the MORS as a material for the purposes of preparing the MSP (GIS study), meet their current and long-term needs.

Based on the available information, it was found that the MORS is very flexible in carrying out the activities (coordination with other activities), and that the diving activities can to some extent be moved to other locations in the case of a justified need.

The processes and trends are detailed in the notes of consultations with the representatives of the MORS.

Objectives

- To ensure the conditions for sustainable implementation of activities of the Ministry of Defence at sea.
- To formalise (through MSP) the existing sites: exclusive use, possible exclusive use and the areas of limited and controlled use for the purposes of defence at sea.

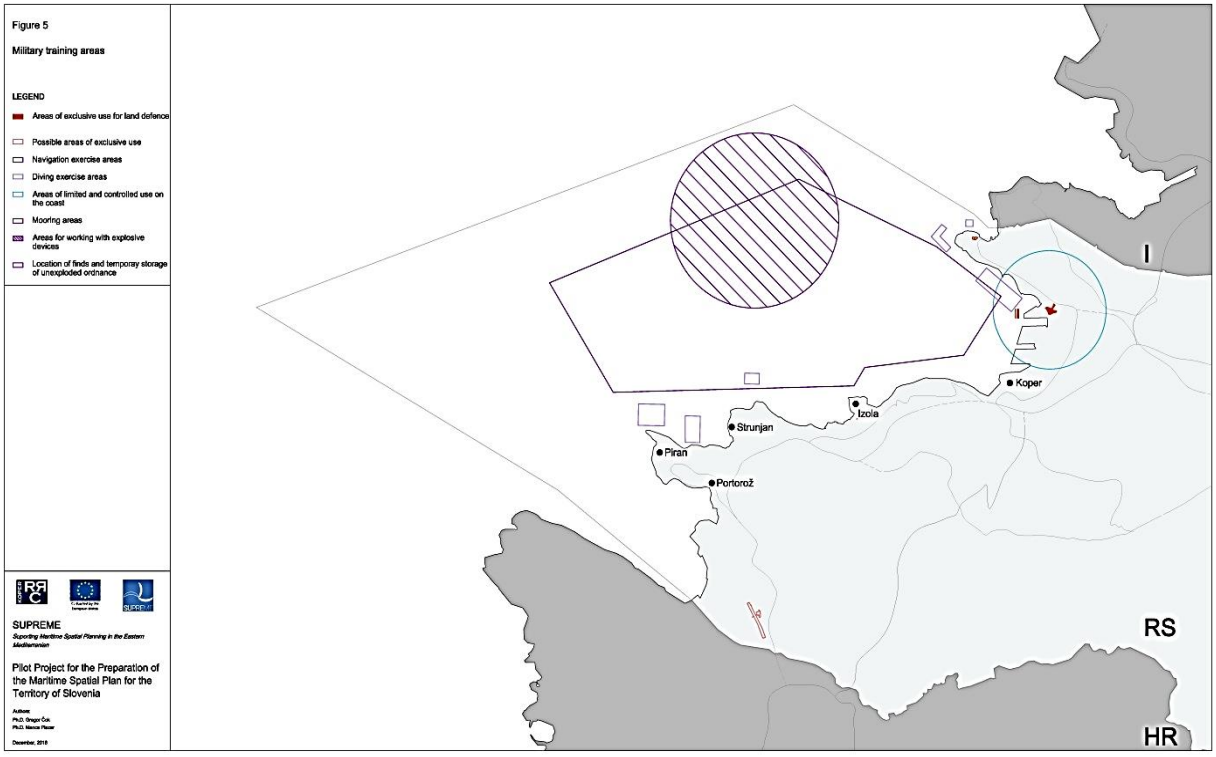


Figure 20: Military training areas.

C.9.6 Areas for nature and species conservation and protected areas

Present uses and regimes

When examining the situation in the areas for nature and species conservation and protected areas, the following data layers were used:

- Natura 2000,
- Protected areas (polygons): landscape parks, natural monuments, natural reserves, monuments of designed nature.

Processes and trends

When addressing the areas for nature and species conservation and protected areas, various views were identified (also opposing) on the interplay between the protection and development trends in the coastal zone. The current regimes in their present form safeguard the natural entities rather successfully; therefore, it is necessary to effectively coordinate the nature protection interests with other spatial interests in the preparation of the MSP.

It was noted that the competent spatial planning institutions have an intention to modify some existing regimes (Strunjan Landscape Park, Debeli rtič, the area between Koper and Izola) and protect some new sites (wetlands at Sv. Nikolaj).

Some protected areas are increasingly subject to the interests of tourism as a business sectors; therefore, more "destination" pressure on such locations is expected in the future. In this sense, it is necessary to establish additional preventive regulatory measures (access regime, restriction and control of visits, etc.).

The processes and trends are detailed in the notes of consultations with the representatives of the Institute of the Republic of Slovenia for Nature Protection.

Objectives

- To maintain the existing areas of nature and species conservation and protected areas in the existing extent and partial modification (expansion) of the regimes.
- To protect particular new locations and introduction of new protection regimes.

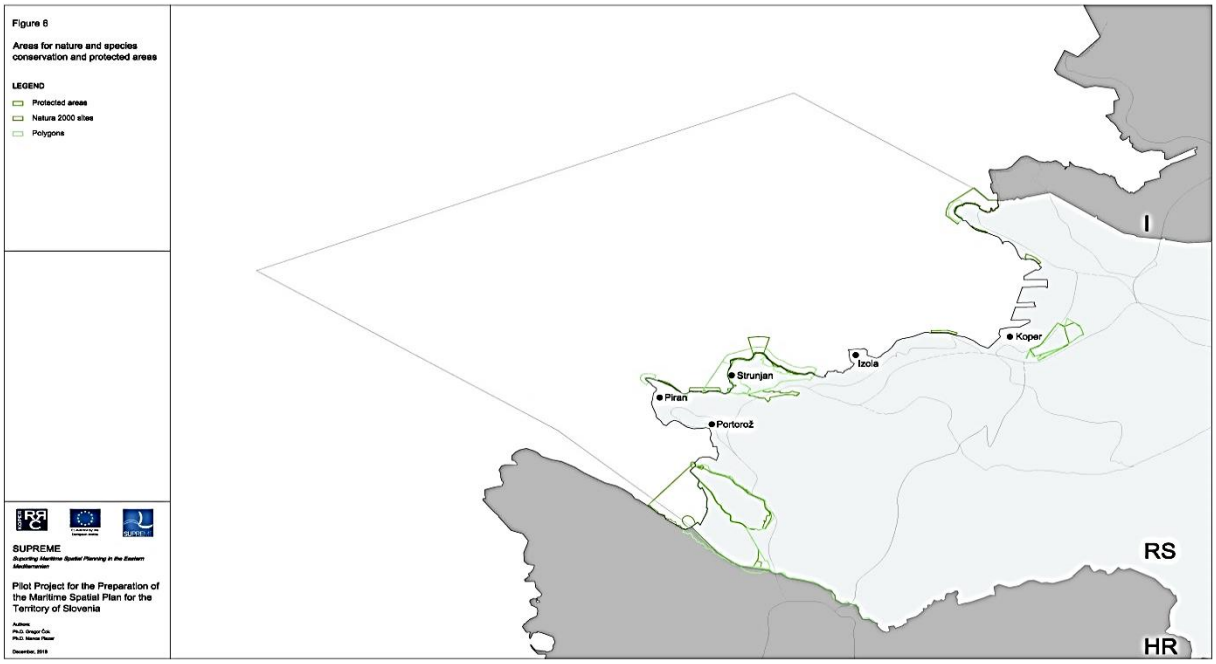


Figure 21: Areas for nature and species conservation and protected areas.

C.9.7 Areas of raw materials exploitation

Present uses and regimes

When examining the situation in the areas of raw materials exploitation, it was established that the industry is carried out by two saltworks (Strunjan and Sečovlje). The following data layers were used:

- saltworks.

Other interests in the potential exploitation (e.g. minerals, water, substrate, etc.) were not identified from the available data. In the context of discussions with local stakeholders, only one initiative was received for the placement of a technological plant for seawater desalination.

Processes and trends

In addition to direct economic impact, the saltworks also have a wider social significance for the Slovenian coastal area. The two saltpans are historic locations where a traditional activity associated with the marine environment is performed. Their existence if particularly important in terms of cultural landscape since due to their characteristic saltpan features, a particular architectural typology and the scenery of saltworks infrastructure, both locations represent fundamental vehicles of identity in the coastal area. They are also important from an educational, technical (heritage) and tourism perspective. The activities at both sites are aimed at restoring of the banks and general regulation of the internal land to ensure their performance and continued existence. In a symbolic sense, these two areas with their activities and products are, to a certain extent, also the indicators of a good status of the sea and the marine environment respectively.

Objectives

- To ensure the conditions for sustainable implementation of saltworks activities at existing locations (Sečovlje and Strunjan).

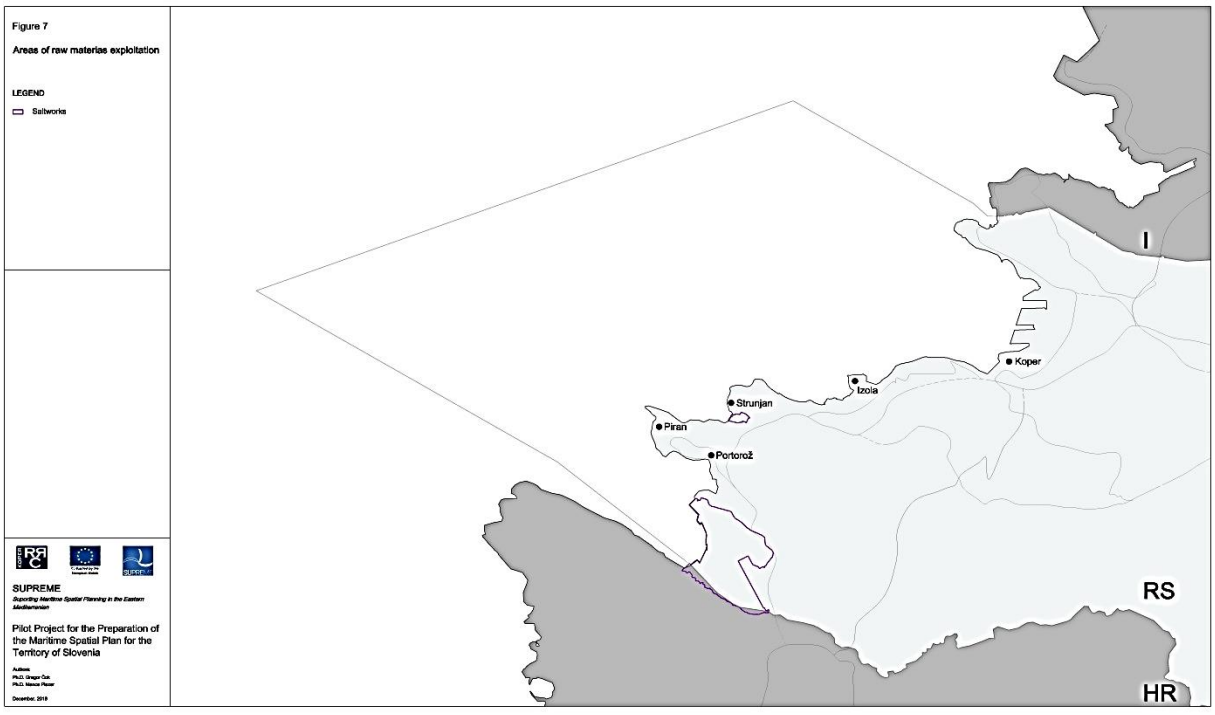


Figure 22: Areas of raw materials exploitation.

C.9.8 Scientific research

Present uses and regimes

When studying the situation in the field of scientific research, no dedicated or specially designated areas and specifically defined regimes for the purposes of research were identified.

Processes and trends

In considering the situation in the field of scientific research, despite the absence of specific uses and regimes, activities of various institutions actively performing certain partial technical and/or scientific research of the marine environment were identified (e.g. Slovenian Environment Agency, National Institute of Biology – Marine Biology Station Piran, Institute for Water, etc.). It is necessary to highlight the wider international aspect of the marine environment research and the participation in international research projects.

According to the present spatial conditions, it is suggested to specifically define, within the MSP, the entire Slovenian territorial sea as an "area dedicated to scientific research"

Objectives

- To ensure the conditions for a smooth exploration of the marine environment.

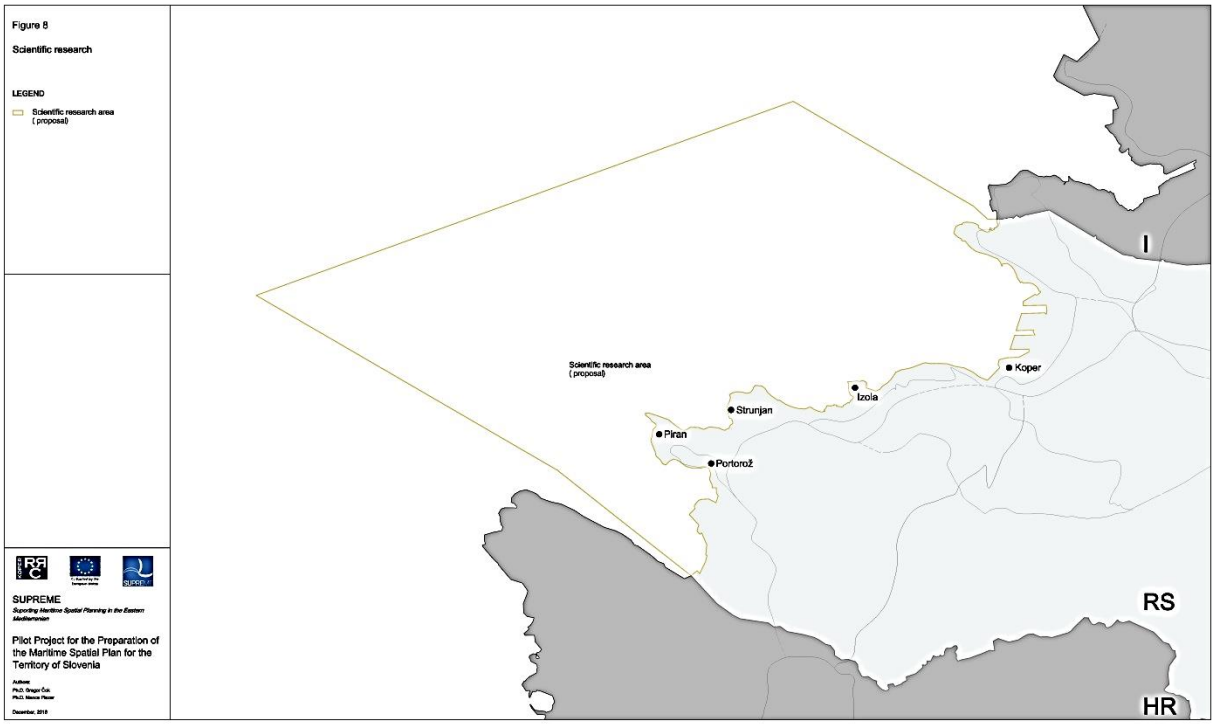


Figure 23: Scientific research.

C.9.9 Submarine cables and pipelines

Present uses and regimes

When considering the situation in the area of submarine cables and pipelines, the following data layers were used:

- underwater pipes.

The identified pipes (municipal infrastructure) are located mainly in the urbanised area of Koper, Izola, Piran and Portorož; they are not significantly distant from the coastline (approx. 500 m into the sea).

Processes and trends

In the field of underwater pipes it can be assumed that the need for discharges at sea will increase with the further urbanisation (detected in the spatial plans of all four coastal municipalities). When planning the anthropogenic interventions in the coastal area, nature conservation guidelines and conditions should be strictly observed, as also their location in relation to potential conflicts with anchoring and the locations of underwater cultural heritage.

The processes and trends in the urbanisation of the coastal zone and the consequent additional pipelines are detailed in the notes of consultation with the representatives of local communities.

Objectives

- To define the protocol and methodology for the coordination of individual uses in the siting of new underwater pipes/anchoring areas, stationary anchors, bottom fishing).

Figure 24: Submarine cables and pipelines.

C.9.10 Tourism

Present uses and regimes

When studying the situation in the field of tourism, primarily the data layers with a direct impact on the water land were used (Source: GIS), namely:

- bathing waters,
- bathing waters – impact areas,
- bathing waters – catchment areas.

Moreover, the Maritime Administration provided the following data (not geo-positioned): regatta racing lines, racing fields and fishing competitions areas.

There are also other data available for tourism, including the information relating to commercial renting of tourist vessels, coastal cleanup events, fireworks on the sea, etc. Since these activities are of a piecemeal nature and minor importance to the MSP, they are not

presented in the analytical maps. Also, the maps do not specifically highlight the tourist accommodation capacities and other tourist infrastructure located in the hinterland.

Processes and trends

In addition to maritime transport and logistics activities, tourism is one of the key industries in the Slovenian coastal area. In the post-independence period (after 1991), tourism is undergoing a drastic quantitative and qualitative development and, based on the current pan-European trends, its expansion may also be expected in the future.

At the operational level, spatial processes and trends, reflected in the development interests of local communities, are particularly important in the preparation of MSP. They are clearly evident in spatial development strategies and spatial plans of all four coastal municipalities.

The processes and trends are detailed in the notes of consultations with the representatives of local communities.

Objectives

- To ensure conditions for the implementation of the strategy of sustainable growth of tourism in Slovenia.
- To ensure conditions for a harmonised siting of tourism infrastructure in the area (protection interests/regimes, fishing and nautical infrastructure, transport, etc.).

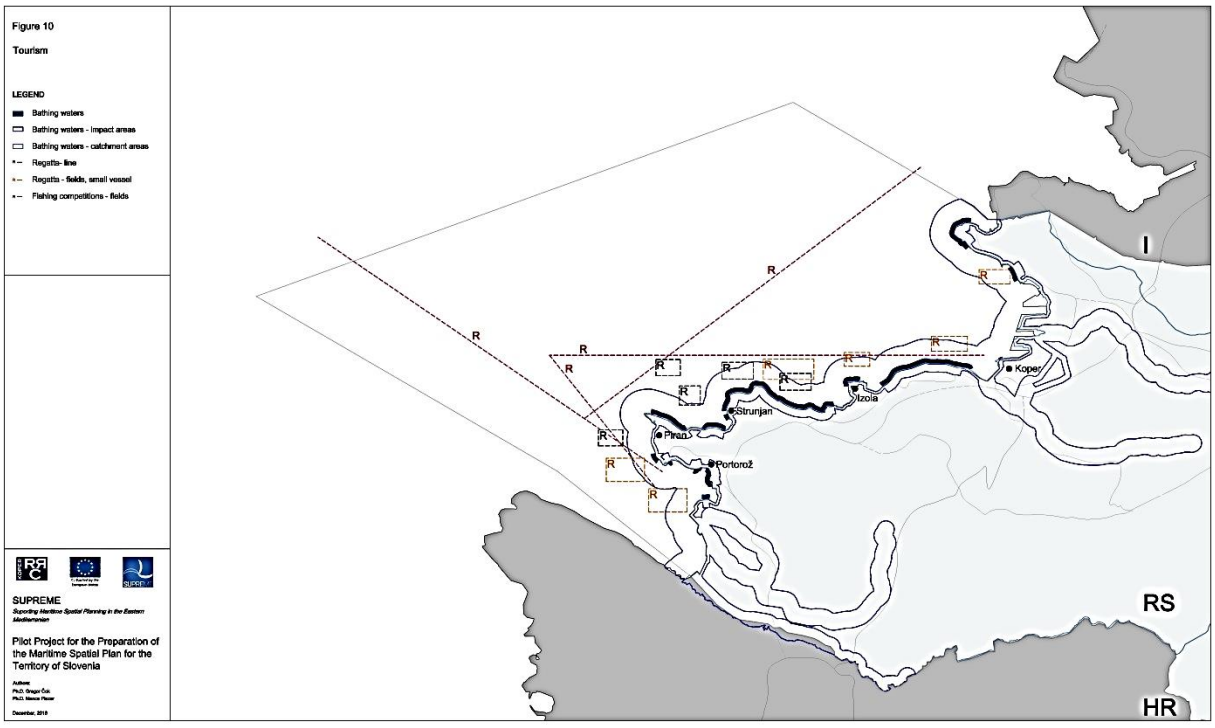


Figure 25: Tourism.

C.9.11 Underwater cultural heritage

Present uses and regimes

When examining the situation in the field of underwater cultural heritage, the following data layers were used:

- legal regimes of the protection of cultural heritage.

The analytical map shows the cultural heritage in the coastal zone.

Processes and trends

As regards the underwater cultural heritage it was determined that this area is still largely unexplored. Currently, there are 38 underwater sites recorded in the official register of immovable cultural heritage of Slovenia; however, there are 52 sites that have not yet been investigated. All sites are deemed to be exposed to pronounced negative impacts of navigation and docking of large ships (large draft) and other activities that intensively destroy the heritage (e.g. bottom fishing). In this context, the necessary measures for the protection of heritage should be taken as soon as possible (within the process of MSP preparation), in parallel also with the measures for its promotion.

The processes and trends are detailed in the notes of consultations with the representatives of the Institute for the Protection of Cultural Heritage of Slovenia..

Objectives

- To ensure conditions for the most effective protection and promotion of underwater cultural heritage.

Figure 26: Underwater cultural heritage.

D. VISION, SCENARIOS AND OBJECTIVES OF MSP

D.1 DEFINING THE STRATEGIC FRAMEWORK

Slovenia is a member of the EU and also participates in other international structures that define a broader strategic framework for the development of marine and coastal areas, which is the starting point for the implementation of maritime spatial planning. In the framework of cooperation, a set of strategic documents and acts of the international law has been prepared, which define the objectives in the fields of maritime sectors development and environmental protection.

Of importance for the implementation of the case study is the EU Strategy for the Adriatic and Ionian Regions (EUSAIR), which defines the common interests of partners in the region. The general objective of the EUSAIR is to promote economic and social prosperity and growth by improving its attractiveness, competitiveness and connectivity. The strategy is strongly focused on maritime and marine issues, particularly stressing the importance of MSP in achieving development and environmental goals of the region.

The strategy integrates the most important EU documents related to maritime and marine activities, namely the Common Fisheries Policy (CFP), Marine Strategy Framework Directive – MSFD (2008/56/EC), Water Framework Directive (WFD (2000/60/EC), Maritime Policy, Directive 2007/60/EC on the assessment and management of flood risks, EU Strategy on Adaptation to Climate Change and others.

An important framework also derives from the Barcelona Convention (Convention for the Protection of the Mediterranean Sea against Pollution).

D.2 DEVELOPMET VISION

Slovenia is preparing a new Spatial Development Strategy of Slovenia 2050. The starting point of the document (working paper) is a vision which, among other elements, also includes the sea.

The sea and the coast are a recognised spatial and developmental advantage of Slovenia, as a maritime-oriented country maintaining and developing the fisheries as an economic sector, also important for the preservation of national and spatial identity.

The vision provides the basis for the creation of spatial development objectives. A broader development vision is defined in the Regional Development Programme 2014-2020 for South Primorska (the only coastal region in Slovenia). The Vision, as defined by the partners in the process of document preparation, reads: The South Primorska region – the European window to the world. The region of prosperous economy, high-quality of life based on the creativity of the people and sustainable management of its assets."

The European window to the world implies the development of the region, based on sea and coastal position (here the maritime routes extend deepest into the Central Europe), the port as a node of logistics, transport and trade links and services. Moreover, strengthening of sustainable patterns of production, consumption and spatial organization in the region is also of importance.

The vision has a strong "maritime" orientation, which denotes an important role of maritime spatial planning in its achievement.

Due to the limited spatial capacities and the presence of many interests, the Slovenian MSP vision may be defined as a provision of conditions for long-term coexistence of all existing

activities which, however, have to comply in a more integrated way with the requirements of environmental protection, nature conservation and preservation of cultural heritage as also the synergy of all other stakeholders in the area. In planning and implementing specific activities at sea, it is necessary to consider the upper carrying capacity of the sea or the limit values from an ecological perspective.

D.3 DEFINING THE BROADER OBJECTIVES RELATED TO MSP

The objectives of the case study in Slovenia were defined in chapters C.9.1 – C.9.11 on the basis of broader international strategic and other documents, mainly from the EU and the Adriatic-Ionian region), and particularly on the basis of national and local sectoral strategic and planning documents.

The section below provides a summary of the objectives on the international level, as defined in the SUPREME Deliverable 1.2.1, followed by a summary of sectoral objectives derived from the national strategic documents[2]. In the last segment of the section, a summary of the Spatial Development Strategy of Slovenia is given, in particular those parts of the document that are more or less directly related to the sea and the coast.

D.3.1 Main activities: high-level objectives (international/EU objectives)

D.3.1.1 Fisheries

EUSAIR

- To promote research, innovation and business opportunities in blue economy sectors, by facilitating the brain circulation between research and business communities and increasing their networking and clustering capacity.
- To adapt to sustainable seafood production and consumption, by developing common standards and approaches for strengthening these two sectors and providing a level playing field in the macro-region.
- To improve sea basin governance, by enhancing administrative and institutional capacities in the area of maritime governance and services.

Barcelona Convention

- To prevent, reduce and control marine litter generation and its impact on the coastal and marine environment.
- Sea-floor integrity is maintained, especially in priority benthic habitats.
- Populations of selected commercially exploited fish and shellfish are within biologically safe limits, exhibiting a population age and size distribution that is indicative of a healthy stock.
- Alterations to components of marine food webs caused by resource extraction or human induced environmental changes do not have long-term adverse effects on food web dynamics and related viability.
- The sustainable use of natural resources is ensured, particularly with regard to water use.

[2] MORJE IN OBALA - Gradivo za sestanek Tematske fokusne skupine v okviru prenove Strategije prostorskega razvoja Slovenije, Ministrstvo za okolje in prostor, 2017 (Sea and Coast – materials for the meeting of the thematic focus group witihn the recasting of the Spatial Development Strategy of Slovenia, Ministry of the Environment and Spatial Planning, 2017.

CFP

- Fishing activities are sustainable in ecological, economic and social terms and provide a source of healthy food for EU citizens.
- Foster a dynamic fishing industry and ensure a fair standard of living for fishing communities and in the meantime achieve sustainable catch levels in the long term for all stocks by 2020.
- Minimize or avoid unwanted catches and harmful practices.

Marine Strategy Framework Directive - MSFD (2008/56/EC)

Descriptor 3: Requires that all populations of commercially exploited fishes and molluscs should remain within biologically safe limits;

Descriptor 6: Sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected;

National strategies and plans: objectives

Operational programme for the implementation of the European Maritime and Fisheries Fund in the Republic of Slovenia for the period 2014-2020:

1. Reducing the impact of fisheries on the marine environment, including the avoidance of random catch and its minimising.
   (The Republic of Slovenia will contribute to the achievement of the Maximal Sustainable Yield (MSY) in two ways that are compatible with the reformed CFP, i.e. through the implementation of the obligations regarding the landings and participation in management plans for shared stocks at the sub-regional level.)
2. Protection and conservation of aquatic biodiversity and ecosystems.
   (Better knowledge if the marine environment and fish stocks, active participation of fishermen in the protection and restoration of marine biodiversity and the diversity of the northern part of the Adriatic Sea through their involvement in the measures for the protection of marine environment and the littoral, and in the implementation of nature protection measures in accordance with the priority action framework set out in the Management of the Natura 2000 Sites.)
3. Enhancement of the competitiveness and viability of fisheries enterprises, including the small-scale coastal fleer and the improvement of safety and working conditions.

(Investments to increase the value of fishery products and processing, marketing and direct sale of catches, investments to ensure better safety of vessels, modernisation of port infrastructure, taking into account the moorings, and modernisation of landing sites.)

D.3.1.2 Aquaculture

EUSAIR

- To promote research, innovation and business opportunities in blue economy sectors, by facilitating the brain circulation between research and business communities and increasing their networking and clustering capacity.
- To adapt to sustainable seafood production and consumption, by developing common standards and approaches for strengthening these two sectors and providing a level playing field in the macro-region.

- To improve sea basin governance, by enhancing administrative and institutional capacities in the area of maritime governance and services.

Barcelona Convention

- Human-induced eutrophication is prevented, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algal blooms, and oxygen deficiency in bottom waters.
- To prevent, reduce and control marine litter generation and its impact on the coastal and marine environment.
- Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystem.

CFP

- Aquaculture activities are sustainable in ecological, economic and social terms and provide a source of healthy food for EU citizens.

Marine Strategy Framework Directive – MSFD (2008/56/EC)

Descriptor 6: Sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected;

Descriptor 9: Contaminants in Seafood: "Contaminants in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards";

Water Framework Directive – WFD (2000/60/EC)

- Preventing the deterioration of the ecological and chemical status of all surface water bodies and achieving a satisfactory quality.

National strategies and plans

The National strategic plan for aquaculture development in the Republic of Slovenia (2014-2020):

- encourages sustainable, competitive, and knowledge-based aquaculture in Slovenia (in line with the Europe 2020 goals);
- requires that the EU and national policies in the fields of nature conservation, environment, use and management of waters, conservation of habitats, as well as the wellbeing of animals of aquaculture are respected.

Therefore, the aims are to:

- increase production and self-sufficient supply with sea organisms (they must fit into natural environment of Slovenian waters, harmonised with ecosystem functions, and are following objectives of Water Framework Directive and Marine Strategy Framework Directive);
- introduction and implementation of new technologies and species that may lead to positive economic effects;
- implementation of closed circuit units for production of seafood;
- preserve and increase the number of working population in aquaculture;
- improve territorial cohesion;
- strengthen sustainable aquaculture, including biodiversity.

Operational programme for the implementation of the European Maritime and Fisheries Fund in the Republic of Slovenia for the period 2014-2020:

- Slovenia has potential for further development of a competitive and sustainable aquaculture;
- for the placement of new facilities and new breeding techniques in aquaculture, the most suitable areas for aquaculture will be searched for on the basis of the current situation, taking into account the natural features of the environment, conservation requirements and spatial planning procedures on land and at sea.[3].

D.3.1.3 Maritime Transport

EUSAIR

- To strengthen maritime safety and security and develop a competitive regional intermodal port system.
- To develop reliable transport networks and intermodal connections with the hinterland, both for freight and passengers.
- To achieve a well-interconnected and well-functioning internal energy market supporting the three energy policy objectives of the EU – competitiveness, security of supply and sustainability.

Barcelona Convention

- Contaminants cause no significant impact on coastal and marine ecosystems and human health.
- To prevent, reduce and control marine litter generation and its impact on the coastal and marine environment.
- Noise from human activities causes no significant impact on marine and coastal ecosystems.
- Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystem.
- The natural dynamics of coastal areas are maintained, and coastal ecosystems and landscapes are preserved.
- The sustainable development of coastal zones is facilitated by ensuring that the environment and landscapes are taken into account in harmony with economic, social and cultural development.

International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM), Adoption: 13 February 2004; Entry into force: 8 September 2017

- To prevent the spread of harmful aquatic organisms from one region to another, by establishing standards and procedures for the management and control of ships' ballast water and sediments.
- All ships in international traffic are required to manage their ballast water and sediments to a certain standard, according to a ship-specific Ballast Water Management Plan.
- All ships will also have to carry Ballast Water Record Book and an international ballast water management certificate.

[3] MORJE IN OBALA. Gradivo za sestanek Tematske fokusne skupine v okviru prenove Strategije prostorskega razvoja Slovenije, Ministrstvo za okolje in prostor, 2017.

White Paper "Roadmap to a Single European Transport Area – towards a competitive and resource efficient transport system" COM (2011) 144 final

- Growing transport and supporting mobility while reaching the emission reduction targets.
- Improving energy efficiency performance, developing and deploying sustainable fuels and propulsion systems.
- Optimizing the performance of multimodal logistics chains (Deliver a fully functional and EU-wide core network of transport corridors, ensuring facilities for efficient transfer between transport modes (TEN-T core network) by 2030, with a high-quality high-capacity network by 2050 and a corresponding set of information services).
- Using transport and infrastructures more efficiently through use of improved traffic management and information systems.

Integrated Maritime Policy (IMP)

- Technological growth, research and innovation in the marine and maritime sector (C 1.3.6).

Maritime Transport Policy (2009-2018) and the following implementation report, published in September 2016 identify general objectives related to five thematic areas:

- Maritime Safety and Security;
- Digitalisation and Administrative Simplification;
- Environmental Sustainability and Decarbonisation;
- Raising the Profile and Qualifications of Seafarers and Maritime Professions;
- EU Shipping: A stronger global player.

National strategies and plans: objectives

Resolution of Maritime Strategy of the Republic of Slovenia (OG RS – previous, No. 10-403, 1991):

1. Slovenia shall lead a maritime oriented economic and development policy, supporting:
   - development of the Port of Koper with land connections to the Hungarian and Austrian borders;
   - development of ecologically sound activities;
   - passenger maritime transport and the development of small transit marinas;
   - restructuring of activities on the coast (environmental impact, no spatial possibilities);
   - development of freight and tourism shipping;
   - fisheries and aquaculture in conjunction with agriculture in the hinterland;
   - development of marine sports.
2. The country shall care for sustainable land use and conservation of natural and cultural heritage in the coastal zone (reaching agreements with the neighbouring countries, establishment of monitoring of the state of the sea, protection of the sea and the coast, e.g. town centres, saltworks, etc.), and
3. Care for the maritime legal regulation in line with the international rules (establishment of maritime traffic control and a marine clean-up service with cross-border cooperation in case of major sea pollution, development of maritime education, and a comprehensive agreement of waterways and fishing areas in cooperation with the two neighbouring countries.

Resolution on the National Programme on Maritime Development of the Republic of Slovenia (OG RS, No. 87/10)

The document concludes the following:

- maritime economy in the Republic of Slovenia is very diverse and cannot be linked only to shipping;
- development of maritime activities should be sustainable and conducted in the generally accepted way;
- activities, linked to the maritime economy, should be aligned with all stakeholders active in the same space, or wish to become active in this space in the future;
- when assessing the economic importance of ports, a wider outlook is needed, which would also encompass all port activities needed for the organization and implementation of maritime freight transport and services linked to freight.

D.3.1.4 Environmental conservation

- To ensure a good environmental and ecological status of the marine and coastal environment by 2020 in line with the relevant EU acquis and the ecosystem approach of the Barcelona Convention.
- To contribute to the goal of the EU Biodiversity Strategy to halt the loss of biodiversity and the degradation of ecosystem services in the EU by 2020, and restore them in so far as feasible, by addressing threats to marine and terrestrial biodiversity.
- To improve waste management by reducing waste flows to the sea and, to reduce nutrient flows and other pollutants to the rivers and the sea.

Barcelona Convention

All the strategic objectives of Barcelona Convention tackle the Environmental Conservation theme.

NATURA 2000 (Birds & Habitat directives)

- Avoid activities that could seriously disturb the species or damage the habitats for which the site is designated.
- Take positive measures, if necessary, to maintain and restore these habitats and species to improve conservation.

Marine Strategy Framework Directive – MSFD (2008/56/EC), Structure, functions and processes of marine ecosystems – Annex III, Table 1

- Achieving the Good Environmental Status (GES) of the EU's marine waters by 2020 and protect the resource base upon which marine related economic and social activities depend.

D.3.1.5 Coastal Tourism

EUSAIR

- Diversification of the macro-region’s tourism products and services along with tackling seasonality of inland, coastal and maritime tourism demand.
- Improving the quality and innovation of tourism offer and enhancing the sustainable and responsible tourism capacities of the tourism actors across the macro-region.
- Wide area branding (Northern Adriatic, EUSAIR brand).

Barcelona Convention

- Human-induced eutrophication is prevented, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algal blooms, and oxygen deficiency in bottom waters.
- Contaminants cause no significant impact on coastal and marine ecosystems and human health.
- New and emerging land-based pollution related problems are identified and tackled, as appropriate.
- To prevent, reduce and control marine litter generation and its impact on the coastal and marine environment.
- Alterations to components of marine food webs caused by resource extraction or human induced environmental changes do not have long-term adverse effects on food web dynamics and related viability.
- The natural dynamics of coastal areas are maintained, and coastal ecosystems and landscapes are preserved.
- The sustainable development of coastal zones is facilitated by ensuring that the environment and landscapes are taken into account in harmony with economic, social and cultural development.
- The sustainable use of natural resources is ensured, particularly with regard to water use.
- To ensure sustainable use of natural resources, in particular water, in order to prevent their pollution and degradation.

Marine Strategy Framework Directive - MSFD (2008/56/EC)

Descriptor 10: Properties and quantities of marine litter do not cause harm to the coastal and marine environment;

"*Europe, the world's No. 1 tourist destination – a new political framework for tourism in Europe" (COM(2010) 352 final)*

- To stimulate competitiveness in the European tourism sector;
- To promote the development of sustainable, responsible, and high-quality tourism;
- To consolidate Europe's image as a collection of sustainable, high-quality destinations;
- To maximise the potential of EU financial policies for developing tourism;

European Strategy for More Growth and Jobs in Coastal and Maritime Tourism (COM(2014) 86 final)

Improving knowledge:

- Improve knowledge and data availability, in particular coastal and maritime.
- Develop a coastal and maritime focus, where appropriate, in EU tourism initiatives, including in promotional and communication campaigns.
- Promote a pan-European dialogue between cruise operators, ports and coastal tourism stakeholders.
- Support the development of trans-national and interregional partnerships, networks, clusters and smart specialisation strategies.
- Assess the need for EU action on qualification requirements for professional yacht skippers and recreational boating.
- Assess the need for EU action on provisions for nautical tourism safety equipment.

- Stimulate innovative management schemes through the ICT and the Tourism business portal.

Addressing environmental pressures:

- Promote ecotourism, using the European Eco-Management and Audit Scheme and EU Ecolabel indicators and encourage linking to other sustainability actions.
- Promote implementation of the Protocol to the Barcelona Convention on Integrated Coastal Management and the relevant Council Recommendation, and promote Maritime Spatial Planning and Green Infrastructure, to ensure the sustainable development of EU coastal areas.
- Promote strategies on waste prevention, management and marine litter to support sustainable coastal and maritime tourism.

Promoting an innovative, sustainable and high-quality offer, insularity and remoteness, seeing opportunities in geographical constraints:

- Encourage the diversification and integration of coastal and inland attractors, including through transnational thematic itineraries like cultural, religious or ancient trade routes.
- Contract a study on how to improve island connectivity and design innovative tourism strategies for (remote) islands.
- Contract a study to identify innovative practices for marina development.
- Develop an online guide with an overview of the main funding opportunities available for the sector (particularly SMEs).

National strategies and plans: objectives

The National Strategy for Sustainable Growth of Slovenian Tourism 2017-2021:

- development of a tourism product sun & beach,
- development of outdoor tourism product,
- development of a tourism product "sports",
- improvement of a system of thematic trails,
- investments in new tourism facilities,
- smart mobility,
- spatial, natural, cultural resources,
- valorisation of protected areas of nature,
- improvement of public beaches,
- improvement of public spaces (squares, pedestrian corridors, urban furniture…),
- improvement of public infrastructure for outdoor sports (cycling lanes, trekking paths, viewpoints….),
- adaptation of public transport to the outdoor activities needs,
- improvement of sports infrastructure,
- improvement of infrastructure,
- implementation of sustainable mobility solutions,
- definition of areas designated for tourism development,
- tourism development plan for protected areas.

The Vision Sun and Sea 2021, one of four foundational products of Slovenian tourism: the development to go towards boutique products with high added value, based on the concepts of the Riviera, high quality beaches, attractive public spaces, cultural events, historical towns, summer event, and numerous water and other outdoor adventures, alongside outstanding gastronomy and wines.

The key measures to achieve this vision are:

- hotels and touristic settlements of high and luxurious categories,
- improvement of public beaches,
- arrangements of public spaces in the coastal belt (promenades, squares, walking trails, urban public equipment, sustainable mobility, and similar).

Municipal spatial plans and strategies:

The Municipality of Ankaran: severely limiting development along their coast.

Municipality of Koper:

- preparation of additional beach and bathing areas,
- coastal arrangements for access to the sea without physical barriers and other limitations,
- maritime arrangement for the protection of the Semedela Bay and city coast (increasing the length of the fishing pier, construction of sea wall, and similar),
- multidisciplinary use of the arrangements (sea walls, quays, bathing areas, promenades, parks by the canals, water sports, passenger terminal, and similar),
- priority measure (shared with Izola Municipality): completion of the promenade between Koper and Izola, walking trails, bathing platform with access to the sea, anchoring area with bathing platforms,
- establishment of a marina in the Semedela Bay (deepening of the seafloor, coastal restructuring, construction of a sea wall).

Municipality of Izola:

- conserving of natural coast in the area of Landscape park Strunjan;
- construction of a sea wall (island) in the Viližan Bay, with the purpose of coastal protection from winds and for extension of the coastal line;
- priority task (shared with Koper Municipality): completion of the promenade between Koper and Izola, walking trails, bathing platform with access to the sea, anchoring area with bathing platforms;
- development of a new marina and communal quays in the Viližan Bay is also planned, alongside promenade development and the extension of the coastal line into the terrestrial part of the Bay;
- the area in vicinity to Izola's dockyard is also under development plans. The plans outline the designation of public spaces for touristic purposes, achieving the status of bathing waters and new locations for water sports. New short piers and closed thermal pools in the sea itself are also under consideration;
- the area around Hotel Delfin in Izola is also to be developed into a beach area, with sporting grounds (tennis groups, beach volleyball). The existing rip-rap is to be extended into beach pier, as well as a new pier to be used as a beach is to be constructed. A closed natural pool is also to be constructed;
- alongside the main pier of the Marina of Izola a new beach area should also be constructed (partly with grass and partly concrete). A small pier will have to be added to act as coastal defence;
- the Municipality of Izola also intends to extend the wooden pier and add a few additional shorter piers in the San Simon Bay and prepare a centre for water sports, bathing and Landscape Park Strunjan visitor centre in Podbelveder.

Municipality of Piran:

- extending the Portorož Marina;
- construction of communal quays and a pier for docking of touristic vessels in the area of salt storehouses:

- extension of communal quays in Piran and construction of a pier for docking of touristic vessels in Piran;
- in the area of the Landscape park Sečoveljske soline, the extension of existing sporting activities and the Saltworks Museum are planned, as well as construction of new dykes and eco or nudist beach;
- in the neighbouring Jernejev kanal area, a new spatial delineation is planned, including deepening of the canal, removal of existing quays, cleaning of the canal and construction of new piers and bridges. The canal is to be used as a communal quay area;
- development parts of the Seča peninsula as bathing waters (potentially with separate areas for children and dogs), as well as a portion of the peninsula to be developed for water sports, in particular kiting. Construction of new shorter piers, perpendicular to the coast, to extend the beach areas and alleviate the access to the sea, is also planned;
- extension of bathing waters, particularly in the areas of the Marina Portorož, Portorož city (some conflicts with prominent hotels), coastal area in front of Life Class hotels in Portorož, Bernardin hotel complex (Lepa Vida):
- new communal quays are also to be constructed next to the abandoned salt storage facilities between Portorož and Bernardin alongside development of sporting activities;
- in the same area, Piran Municipality also wants to construct a docking site for larger boats (e.g. cruise ships). An alternative location would be next to the larger pier in Piran.
- there are also plans for introduction of artificial underwater reefs and potentially of an underwater archaeological park (Fisine) between the Piran's large pier and Punta;

D.3.1.6 Coastal Defence, Flood Protection and Restructuring of Seabed Morphology

EUSAIR

- To contribute to the goal of the EU Biodiversity Strategy to halt the loss of biodiversity and the degradation of ecosystem services in the EU by 2020, and restore them in so far as feasible, by addressing threats to marine and terrestrial biodiversity.
- Improving the quality and innovation of tourism offer and enhancing the sustainable and responsible tourism capacities of the tourism actors across the macro-region.

Barcelona Convention

- Biological diversity is maintained or enhanced. The quality and occurrence of coastal and marine habitats and the distribution and abundance of coastal and marine species are in line with prevailing physiographic, hydrographic, geographic, and climatic conditions.
- The natural dynamics of coastal areas are maintained, and coastal ecosystems and landscapes are preserved.
- New and emerging land-based pollution related problems are identified and tackled, as appropriate.

Directive 2007/60/EC on the assessment and management of flood risks

- Reduce and manage the risks that floods pose to human health, the environment, cultural heritage and economic activity.

2013 EU Strategy on adaptation to climate change

Infrastructures need to be designed to withstand potential flooding, also taking into account the potential impact of climate change on the frequency and intensity of floods. In the design of flood defence infrastructure, changing flood intensities and patterns need to be considered.

Marine Strategy Framework Directive – MSFD (2008/56/EC)

Descriptor 6: Sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected.

D.3.2 Spatial Development Strategy of Slovenia 2050 (working material)

The Spatial Development Strategy of Slovenia 2050 (working materials) proposes detailed strategic guidelines for the development of the sea and coast, which will be a basis for the preparation of the maritime spatial plan and integrated coastal zone management programme, as well as all subordinated spatial plans.

Slovenia is a maritime country, pursuing maritime-oriented economic and development policies.

Koper, a coastal town and its wider area, represent an entry point at which the EU Baltic-Adriatic corridor links the land and maritime passenger and freight transport; it is also important for the international integration of Slovenia and economic development of the wider hinterland.

The entry point is based on the development of the Port of Koper and the hinterland infrastructure, maritime passenger transport in connection with the development of the city of Koper, preservation of the open, not built-up space for green infrastructure, functionally linked to the marine area, a wider hinterland and the coastal system of green cities and areas.

The coastal towns continue to strengthen their functional connection within the wider urban area, especially in the fields of public transport and services, while developing their own distinctive, attractive and modern profile with the respect to nature, tradition and heritage.

A coordinated development vision facilitates the creation of a strategic alliance with the city of Trieste in the fields of public passenger transport and maritime transport. There is a need for closer cooperation between the ports at Koper and Trieste in the light of integration and complementarity. The cities of Koper and Trieste should be addressed and connected as a wider cross-border urban area and, in order to improve functional links, the cross-border public passenger connections need to be strengthened.

The coastal area is highly urbanised and densely populated, multifunctional with a pronounced traffic and transport significance, but also comprising important protected areas and a distinctly rural hinterland, exposed to periurbanisation.

Part of the coastal zone of the Bay of Koper has a leading and nationally important road transport function; in the southern part there are extensive Natura 2000 sites, protected areas, saltpans and the airport. The comparative advantage of the coastal zone is an outstanding cultural landscape with special architectural features.

For the full development of the Port of Koper as an entry point, it is necessary to connect the transport, economic, regional and spatial policies (cities, for example Ljubljana or the wider urban area).

In order to ensure further development of the region and high-quality energy supply, it is necessary to upgrade or establish the required energy infrastructure, including the transmission network for natural gas, renewable gasses and CO_2 neutral gasses. This will ensure the improvement of air quality and reduce greenhouse gas emissions, but also supply the Port of Koper with cleaner and low-carbon sources of energy.

Small size of the coastal area and the sea dictates an accelerated search for synergies and multifunctional links between the functions. Based on the specific spatial potentials, priority should be given, at sea and in the coastal region, to the activities which are exclusively linked to the sea or to the sea-shore interface and, therefore, cannot be performed elsewhere. In particular, such activities include fisheries, aquaculture, marine transport, salt production, research and preservation of underwater cultural heritage, bathing and recreational water activities that have to be spatially and quantitatively balanced to maintain a productive sea and healthy coastal area in the long term. It is necessary to limit the areas for activities that are actually related to the sea and the coast, but are burdensome from the environmental (discharges of wastewater, oil, lubricants, etc.), spatial (changing the natural coast or

coastline, preventing direct access to the sea) and visual (hiding the view of the sea directly from the coast) aspects.

For activities than can be carried out elsewhere than at sea and the coast, alternative solutions should be found on land or in the hinterland. The contacts between the sea, the coast and the hinterland shall be preferably provided through natural links and sustainable regulation. In accordance with spatial potentials, those activities in the coastal area and the hinterland shall be strengthened which have positive impacts on the preservation of vital housing functions in the coastal towns, agriculture and fisheries shall develop in connection with tourism and local supply, while tourism shall focus on quality and environmental sustainability.

The tourist function of the coast and the sea must not take precedence over the vital functions of the coastal towns, such as housing function, provision of services in the hinterland, education and agriculture. Tourism shall focus on quality and environmental sustainability, with special emphasis on the access to the destination.

Development strategies of the coast or tourism in the coastal area, which are part of regional or local development and spatial planning documents, must expressly comprise the measures to adapt to the climate change, particularly in the fields of urban development and planning, green infrastructure and natural resources management. Moreover, the development strategies should provide comprehensive solutions addressing the issues of rising sea levels, increasing drought events, scarcity of drinking and economic water, heat islands and seasonal pressures of tourism, including the pressures on utility services.

In accordance with the Protocol on Integrated Coastal Zone management in the Mediterranean, within the framework of the Convention on the Protection of the Mediterranean Sea against Pollution (Barcelona Convention), a coastal zone shall be established along the entire length of the coast where construction is not allowed, taking into account the permitted exceptions, The coastal zone is intended for nature protection, conservation of natural habitats and landscapes, natural resources and ecosystems, environment-friendly connections between the hinterland and the sea, and adaptation to climate change. The coastal zone is part of the green system of the coastal towns and the region, which shall improve the quality of life in the coastal area; links with the national system of green infrastructure shall be provided. The coastal zone and the substance of pertaining legal regimes shall be detailed in the Maritime Spatial Plan/Action Programme for the Implementation of the SDSS 2030, to be actually exercised through municipal spatial plans and monitored as a spatial regime in the spatial information system.

D.4 DEVELOPMENT SCENARIOS

D.4.1 Potential development scenarios, their comparison and evaluation of impacts

On the basis of the findings, the this phase of the project embraced the creation of potential scenarios for spatial development at sea by using the method of interests and trends identification in the area and their spatial extrapolation and application. The methodology comprised the following steps:

- Step 1: selection of key information;
- Step 2: definition of the categories of prevailing interests and trends relevant to the use of the sea and the coast;
- Step 3: extrapolation of trends and identification of potential scenarios;
- Step 4: comparison of scenarios and evaluation of consequences (this step was carried out with the involvement of stakeholders at the second workshop, in which the participants directly complemented the proposed/identified impacts of each scenario in individual activities/areas (11).

D.4.2 Selection of data and acquisition of additional information

Definition of development scenarios and the synthesis scenario is based on the analysis of the facts and the identification of development interests and trends. The following was analysed within the analytical part of the pilot project:

- the current state of areas, uses and regimes at sea and in the coastal zone;
- development visions and plans of individual sectors, stakeholders and local communities for the sea and the coastal zone, wherein the activities were addressed within 11 areas (as defined in the previous sections).

The recorded strategies were reviewed and a large number of interviews were held with a view to analyse the facts and identify development trends, synergies and conflicts at sea and in the coastal zone. Two workshops involving the stakeholders were carried out and interviews were conducted with institutions that actively participated in the workshops:

- Municipality of Koper,
- Municipality of Ankaran,
- Municipality of Izola,
- Municipality of Piran,
- Public Agency for the Promotion of Entrepreneurship and Development Projects of the Municipality of Izola,
- National Institute of Biology, Marine Biology Station Piran,
- Port of Koper,
- Marina Portorož,
- Strunjan Landscape Park,
- Ministry of Agriculture, Forestry and Food,
- Ministry of Defence,
- Slovenian Maritime Administration,
- Slovenian Maritime Administration, Port State Control,
- MYTILUS Mitja Petrič s. p.,
- Institute for the Protection of Cultural Heritage of Slovenia,
- Institute of the Republic of Slovenia for Nature Conservation,
- Fisheries Research Institute of Slovenia.

D.4.3 Identification of interests and trends in the area

Four main categories of prevailing interests, representing the strongest development trends in the marine environment, were noted within the analytical work, namely:

A: Economic interests linked to maritime transport:
- Port of Koper (National Spatial Plan, business strategy of the company, etc.);
- traffic separation area (interstate memorandum: Slovenia-Italy-Croatia);
- passenger transport (Transport Development Strategy of the Republic of Slovenia, etc.).

B: Interests in the field of fisheries and aquaculture:
- interests relating to fishing areas;
- aquaculture – commercial interests in the expansion of breeding fields;
- supporting the technological infrastructure.

C: Protection interests:
- nature protection areas (protection regimes);
- underwater archaeological heritage (protection regimes);
- new protection initiatives.

D: Tourism development interests:

- development interests of local communities (drafts of municipal spatial plans);
- tourist infrastructure (initiatives, accommodation, programmes, etc.);
- nautics, sports and recreation (marinas, regattas, etc.).

Several distinct areas of interest were noticed in the analysis of activities and uses at sea and in the coastal area. There were four main development trends identified, referred to according to the activity which, in our opinion, represented the vehicle of a specific development trend; (A) transport, (B) fisheries and aquaculture, (C) protection of natural and cultural heritage and (D) tourism.

D.4.4 Extrapolation of development trends and identification of potential scenarios

Based on four major categories of prevailing interests, representing the strongest development trends in the marine area, there were four development scenarios for the Slovenian marine space shaped on the basis of extrapolation of the four main perceived development trends: (A) transport scenario, (B) fisheries scenario, (C) protection scenario and (D) tourism scenario (Figures, 12, 13, 14 and 15).

A specific extrapolated development trend, intensified to the maximum, was transformed into a development scenario. Each development trend is presented separately in an extrapolated and deliberately caricatured way. Model scenarios make the identification of impacts of a particular development trend on other activities easier and more transparent.

D.4.5 Scenarios – identification of key parameters and impact evaluation

Development scenarios were created on the basis of individual parameters and presented at the second workshop. The workshop was attended by all stakeholders in the marine and coastal area as well as the representatives of the four coastal local communities.

For each scenario, the participants identified the synergies and conflicts related to their activities. The workshop of stakeholders and representatives of local communities was devoted to the search for synergies and conflicts between different uses. For the eleven headline and local community activities/ areas of interest, the synergies and conflicts of each scenario were determined directly by stakeholders.

It is assumed that with a given method it is possible to define most accurately what a particular development trend means for the development of other activities, uses and regimes, as well as for the development of local communities.

The four development scenarios (Figures 12, 13, 14 and 15) are presented below. Each scenario is defined by four parameters: (1) development priorities, (2) development assumptions, (3) international dimension and (4) spatial impacts.

Moreover, there is a table of synergies and conflicts between different uses added for each scenario (Tables 1, 2, 3, and 4). The tables were shaped by the help of workshop participants and subsequently supplemented in a certain time after the end of the workshop.

(A) Transport scenario – maritime transport as a development priority

The transport scenario (Figure 12) is based on the priority development of the Port of Koper as a central port in the Northern Adriatic.

(1) Development priorities:

- maritime freight and passenger transport as a development strategy (national and regional level);

- Port of Koper as a target generator of economic development in the field of port services and the supporting economic activities;
- provision of unhindered passage of vessels, anchoring and technical support to cargo and passenger vessels at sea and in the port;
- ensuring adequate technological, business and service/supply infrastructure in the wider hinterland.

(2) Development assumptions – prerequisites for the scenario development:
- ensuring of favourable business environment and development of the port and related economic activities (Republic of Slovenia and European Union);
- further steady increase in maritime traffic in the Port of Koper (up to extreme spatial and technological capacities, as defined by the NSP and in line with the business strategy of the company);
- construction of a new passenger terminal on the coast of the historic centre of Koper;
- development of alternative/new ports for public transport at the locations of Ankaran, Izola, Piran and Portorož;
- all other activities related to the marine environment (fisheries, aquaculture, tourism, etc.) shall adapt to maritime transport.

(3) International dimension:
- integration of the Port of Koper within the international intermodal network (transport, logistics);
- establishment of international public transport connections (Italy-Slovenia-Croatia);
- increase and regulation of maritime transport in the Northern Adriatic.

(4) Spatial results:
- increase in the volume of maritime traffic;
- increased underwater noise;
- increased risk of spillage (ecological conflict);
- increased anchoring in the Bay of Koper (conflict with the interests of the cultural heritage protection);
- greater burden on the navigable corridor;
- realization of the business strategy of the Port of Koper will evidently increase the number of vessels in the territorial waters of Slovenia;
- construction of a passenger terminal will increase the number of large tourist ships and consequently the pressure on the coastal area and the hinterland;
- construction/upgrading of local ports for public passenger transport will increase marine traffic in the narrow sea belt and the need for temporary tourist berths;
- increase in the flow of goods and passengers;
- economic development of the industry and indirectly, boosting jobs.

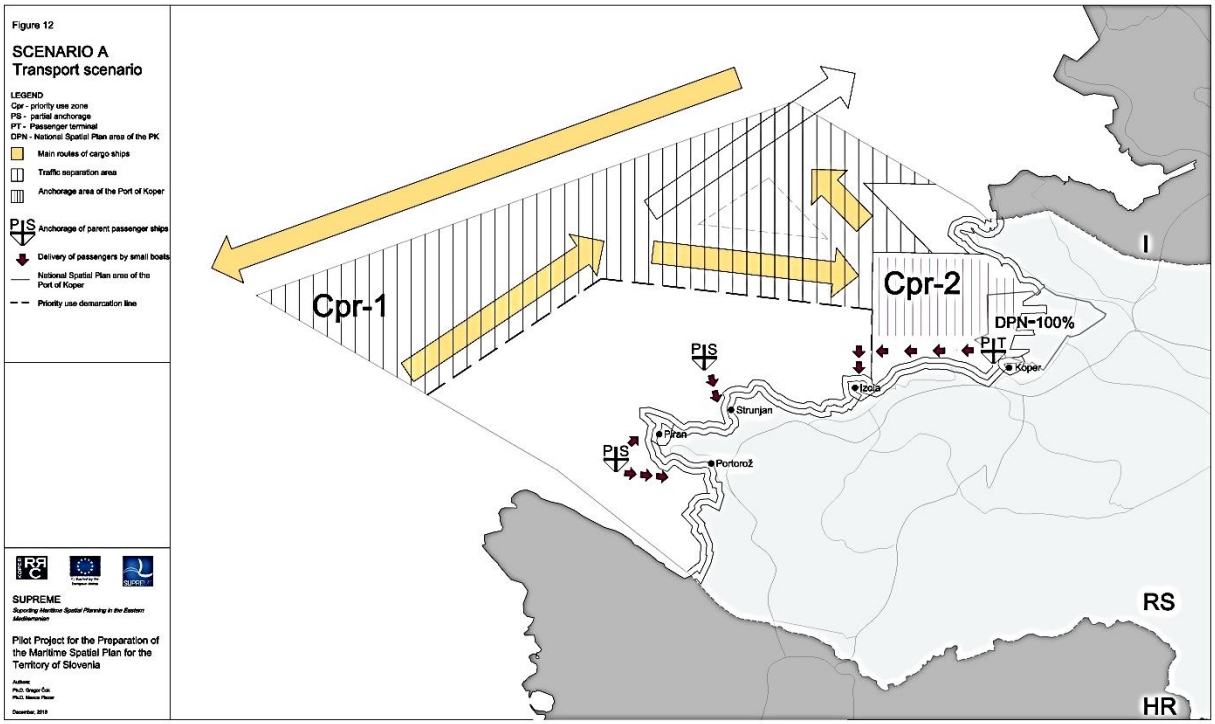


Figure 27: Transport scenario

The transport scenario envisages the following:

- in the areas of traffic separation and anchoring, the priority of the Port of Koper is to perform its transport activity;
- all other uses are limited or impossible (fishing, nautical sports and tourism, etc.);
- construction of a passenger terminal, possibility of undisturbed anchoring for passenger ships off the coast and transport of passengers to the shore by small vessels.

Table 6: Transport scenario – synergies and conflicts.

Area	Positive impacts	Negative impacts
(1) **Aquaculture sites**		- Spatial limitations in definition and development of aquaculture sites at sea and on land. - Higher probability of accidents at sea (spills of hazardous substances, fire, shipwreck). - Risk of contamination of the sea and the coastal zone and the consequent threat to marine organisms in the event of maritime accidents (spills). - Tankers to the Port of Trieste represent the biggest threat. - Introduction of alien organisms through ballast water. - Rising of contaminated sediments from the seabed (especially heavy metals) that poison marine organisms and their consumers.
(2) **Fishing sites**	- There are no apparent positive impacts. - Reduced catches do not have an	- Limitation or difficulties in fishing activities in the area of traffic separation and in the area

	effect on the increase of fish stock. - An increase in fish stock may have a positive impact on fishing in the Italian part of the Adriatic.	of cargo port berths of the Port of Koper. - Risk of contamination of the sea and the coastal zone and the consequent threat to marine organisms in the event of maritime accidents (spills). - Introduction of alien organisms through ballast water. - Rising of contaminated sediments from the seabed (especially heavy metals) that poison marine organisms and their consumers.
(3) **Plants and infrastructure** for exploration, exploitation and extraction of oil, gas and other energy resources, minerals and aggregates, production of energy,		
(4) **Maritime transport routes and traffic flows**	- Increased safety as a result of greater restrictions on other activities.	- Increased freight hinders free navigation of other vessels in the wider area. - Greater risk of accidents at sea (spills of hazardous substances, shipwrecks).
(5) **Military training areas**		- Greater need for the adaptation of operations.
(6) **Nature and species conservation sites and protected areas**		- Risk of contamination of the sea and the consequent threat to the nature in the event of maritime accidents (spills), increased underwater noise, etc. - Risk of contamination of the sea and the consequent threat to marine organisms in the event of maritime accidents (spills). - Deterioration of lighting conditions and, consequently, regression and degradation of underwater meadows, increased risk of collisions with dolphins, etc. - More tourist, greater impact. - Introduction of alien species. - Activation of mercury and other heavy metals from marine sediments.
(7) **Extraction of raw materials**	- Development of specialised forms of tourism may increase the potential and promote saltworks and related activities.	- Negative impacts of shipping may impair the quality of sea water and salt.
(8) **Scientific research**	- Investment in scientific research in the field of mitigation measures and preservation of underwater cultural heritage. - Promotion of scientific research. - Studies of the effects and ways of arrival for each new type of ship (already in progress),	-

	research of vegetation and underwater noise (fans in car carriers).	
(9) **Submarine cables and pipelines**		- Increased number of anchoring poses a threat of damage to submarine cables and pipelines.
(10) **Tourism**	- Increased passenger traffic means an increase in the number of tourists and consequently a positive impact on tourism industry as a whole.	- Restriction on the development of nautical tourism (sea excursions – avoidance of the traffic separation area), permanent presence of large ships (visual effect), etc. - Generation of noise and light pollution, increase in municipal waste. - Risk of the deterioration in the quality of the sea.
(11) **Underwater cultural heritage**	- Proposed introduction of "underwater heritage tax" to be paid by each vessel coming to the Port of Koper. Consideration could be also given to tax agreements with the Port of Trieste and possibly with the Port of Venice. This would allow for a systematic long-term investment in scientific research (A8) in the field of preservation and promotion of marine environment (ME).	- Navigation and anchoring, especially of large ships, causes damage to underwater archaeological sites (physical damage, sill with silt, displacement, etc.) .
(12) **Municipality of Ankaran**	- Impact of A8 and A11 on the heritage tourism – ME.	- A positive impact of this scenario is not clear. - In this scenario, the public interest has not been elaborated. - A thoughtful economic vision and expert analysis of positive and negative impacts on the citizens of Slovenia is expected (e.g. the financial impact on the development of social activities, employment in the local area and wider in Slovenia, revenue growth, etc.). - The limits to transport development are also not clear (natural conditions for maximum development – how much can traffic by sea and land increase), what are the other requirements for this this scenario (development of transport infrastructure), time and financial consequences of the establishment of the necessary conditions for the scenario development. - Business strategy of a company cannot become the national

		strategy for the development of such an important and limited area as the sea. - There is also no analysis of negative consequences of the scenario (permanent destruction of natural and cultural values, risk of accidents, impacts on the population and environment, changes in the population structure, financial and other effects on the shutting down of other activities in the area, etc.). - Inconsistency with the long-term development plan and the municipal spatial plan of the Municipality of Ankaran, responsible for the coastal strip. - A negative impact on planned activities and the uses and regimes at sea and on land in terms of tourism, health and spa activities, communal infrastructure and the citizen's quality of life. - Ships at anchorage pose a visual nuisance, cause noise and light pollution and limit other uses. - Possibility of ecological disasters due to spills and minor but permanent and irreversible negative impacts on the environment. - Impacts must be evaluated on the bases of relevant expert guidelines such as a maritime study, transport study, environmental study, action plan in the event of pollution, analysis of impacts of increased maritime transport on land arrangements, etc.
(13) **Municipality of Koper**	- Impact of A8 and A11 on the heritage tourism – ME.	
(14) **Municipality of Izola**	- Impact of A8 and A11 on the heritage tourism – ME. - Mooring facilities are consistent with the development strategy. - The Municipality of Izola proposes own facilities for small cruisers (tourist use).	- Restriction on construction at sea and on the coast. - Reduction in the planned development of tourism. - Risk of ecological disasters due to spills.
(15) **Municipality of Piran**	- Impact of A8 and A11 on the heritage tourism – ME.	- Restriction on construction at sea and on the coast. - Reduction in the planned development of tourism.

(B) Fisheries scenario – fisheries and aquaculture as a development priority

The fisheries scenario (Figure 13) is based on increased economic exploitation of the sea through aquaculture and fisheries.

(1) Development priorities:
- fisheries and aquaculture as a key economic activity linked to the marine environment;
- national self-sufficiency;
- sustainable use of fishery resources;
- fishery as a traditional industry linked to the marine environment has a broader social significance (symbolic, educational, tourist, economic, etc.).

(2) Development assumptions – prerequisites for the scenario development:
- good condition of the sea (water quality);
- implementation of the National Strategic Plan for the development of aquaculture in Slovenia (No. 34200-1/2014/5);
- implementation of the National Strategic Plan for the development of fisheries in Slovenia;
- implementation of the measures of the European Fund for Maritime Affairs and Fisheries;
- implementation of structural measures under the Council Regulation on the European Fisheries Fund (EFF);
- adjustment of other activities, uses and regimes at sea;
- absence of ecological disasters at sea (spills, accidents, eutrophication).

(3) International dimension:
- implementation of activities in the international context: General Fisheries Commission for the Mediterranean, which aims to promote the development, conservation, regional management and best utilisation of living marine resources;
- adjustment of all policies related to the use of the sea (fisheries, transport, energy) in the Adriatic;
- favourable macroeconomic situation.

(4) Spatial results:
- expansion of areas for the implementation of aquaculture activities;
- more coastal technological activities (logistics), berths, service facilities, loading equipment;
- limitation of maritime freight and passenger transport;
- limitation of coastal navigation and sporting events;
- impact on the coastal tourism (noise at shellfish farms);
- development of specialised forms of tourism;
- impact of aquaculture on native species (introduction of nutrients, medicines, etc.).

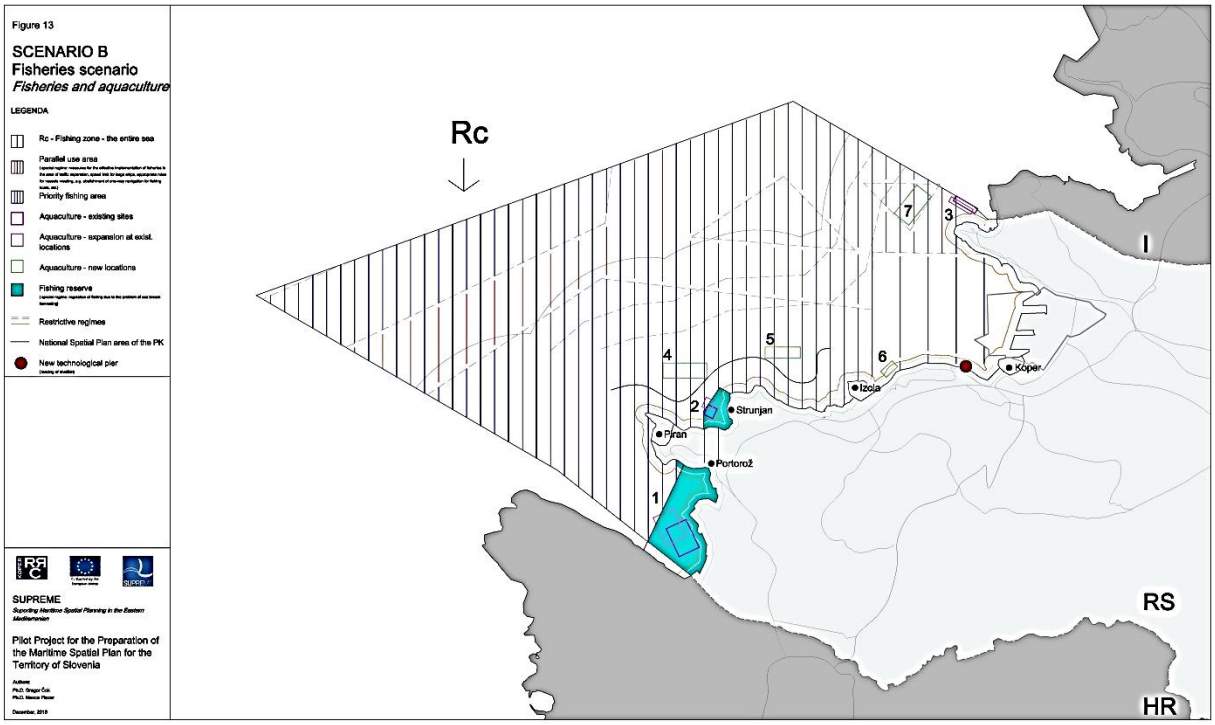


Figure 28: Fisheries scenario

The fisheries scenario envisages the following:

- the entire Slovenian sea shall be treated as a single fishing zone;
- looking for a suitable solution in the area of traffic separation (navigation speed limit, two-way fishing, etc.);
- marking of new aquaculture locations to at least double the existing surface area;
- construction of a new central port for the transhipment of marine organisms.

Table 7: Fisheries scenario – synergies and conflicts

Area	Positive impacts	Negative impacts
(1) **Aquaculture sites**	- Increase in the surface area for aquaculture implies higher production and a positive economic impact on the industry as a whole. - Achievement of self-sufficiency – 100 tonnes.	
(2) **Fishing sites**	- Potential positive impact on gathering of wild organisms next to the aquaculture sites.	- Increased aquaculture areas reduce the fishing areas. - Pressure of passive fishing areas (nets). - Impact of aquaculture on the seabed. - Adverse impacts on important cultural heritage (ICH) – ME.
(3) **Plants and infrastructure** for exploration, exploitation and extraction of oil, gas and other energy resources, minerals and aggregates, production of energy	- No evident impact.	- No evident impact.

(4) **Maritime transport routes and traffic flows**	- Development of regulated navigation (typology of landing piers, berths, etc.)	- Limiting (or even reduction of maritime freight and passenger transport) and the subsequent stagnation of the branch as a whole.
(5) **Military training areas**		- Need for a higher adaptation of individual activities.
(6) **Nature and species conservation sites and protected areas**	- Shags occupy the buoys.	- Fish farming (introduction of medicines, nutrients, non-native and potentially toxic organisms, impact on the seabed structure due to sedimentation): - Shellfish farming (plastics, introduction of alien and potentially toxic organisms). - Increased volume of fishing (impact on fish stocks and the relationships in the food chain, impact on the seabed structure, species and communities.
(7) **Extraction of raw materials**	- Development of specialised forms of tourism or integration of traditional activities associated with the marine environment: salt production and fishing.	- Negative impacts on the sea quality have not been assessed,
(8) **Scientific research**	- Development of specialised forms of tourism (heritage and scientific tourism – ME), which can promote the development of scientific research in geology, sedimentology, biology, marine environment, etc.	
(9) **Submarine cables and pipelines**		- Potential damage due to the anchoring of floating aquaculture facilities and limiting the potential sites for the placement of new underwater pipes and cables. - Potential damage to particular types of fishing (anchoring).
(10) **Tourism**	- Supply and demand: supply of the tourism sector (hotels and restaurants) with fresh fish and shellfish. - Possibility of the development of specialised forms of tourism (fishing trips, guided fishing, etc.). - Global perspective of tourism: preservation and promotion of other traditional activities connected with fisheries and the marine environment	- Aquaculture: noise at the shellfish farms because of night work (loading onto vessels), transport of shellfish over the tourist areas (beaches, accommodation facilities, restaurants, etc.). - Visual impact: fish and shellfish farming fields are located close to the coastal line. - Nautics: hindrance to coastal navigation and water sports. - General: pressure to reduce the

	(shipyards, traditional boats, etc.).	area required for nautical and beach tourism (offshore and onshore). - Fishing: avoidance between the fishing activities and sports events.
(11) **Underwater cultural heritage**	- In turn, the regulated location of aquaculture facilities reduces the pressure on the fishing of wild marine species (bottom trawling) and, consequently, causes less damage to the seabed.	- Damage to underwater cultural heritage sites in order to implement various forms of fishing (trawling). - Damage due to the anchoring of floating aquaculture facilities.
(12) **Municipality of Ankaran**	- Consistent with the development strategy (mainly). - Impact of A8 and A11 on heritage tourism (ME). - The industry shall be complemented with tourist activity, nature conservation and landscape protection. - The existing shellfish farm in the Zaliv Sv. Jerneja shall be maintained. - Possibility of placing infrastructure (transhipment port for aquaculture, berths for fishing vessels, fish market) and thereby additional posts. - Stable and quality supply of marine organisms shall improve the citizen's quality of life and catering. - Enhanced opportunities for the construction of infrastructure for the recovery of fish stocks.	- The question of the appropriateness of the placement of a shellfish farm at Debeli rtič. - Possibility of an ecological disaster due to spills. - The issue of placing the central transfer points for aquaculture. For now, the municipality does not recognise the placement of such a point in its territory. - The issue of the renewal of fish stock. - The bases of the fisheries scenario are not clear. - Fish stock does not allow for a comprehensive development of this scenario. It is necessary to solve the problem of overfishing in Croatia. 100 tonnes? - For this scenario, a basic analytical platform or professionally prepared positions on the objectives, the necessary measures and effects have also not been elaborated. The comments from the general public (not familiar with the fishing industry) do not suffice. - The activity itself is primarily more tied to the coastal "live cultural heritage" than to a serious development scenario. - The expected negative impacts are likely to be disproportionate to the expected positive impacts. - There raises a question of four new shellfish farms, namely, what are the positive financial and wider social impacts. The new shellfish farms are expected to be located in the areas suitable for aquaculture, but outside the area of the Debeli rtič Landscape Park and navigable waterways, while taking into account the

		elements of protection of nature and cultural landscape. - To develop the stagnating fishery industry, it is necessary to improve the condition of the sea. - Possibility of ecological disasters due to spills. -
(13) **Municipality of Koper**	- Impact of A8 and A11 on heritage tourism (ME).	
(14) **Municipality of Izola**	- Strengthening of other development opportunities of Izola as a traditional fishing town. - It is important to coordinate all fishing activities. - Impact of A8 and A11 on heritage tourism (ME).	- Restrictions in the construction of facilities in the sea and on the coast. - Reduction in the planned development of tourism.
(15) **Municipality of Piran**	- Strengthening of other development possibilities of the municipality, in particular the development of tourism. - Impact of A8 and A11 on heritage tourism (ME).	- Restrictions in the construction of facilities in the sea and on the coast. - Reduction in the planned development of tourism.

(C) ***Protection scenario – protection of the areas for nature and species conservation, protected areas and strict protection of underwater cultural heritage***

The protection scenario (Figure 14) is based on the development priorities of extending the scope of protected areas of nature conservation and protection regimes in the already protected areas (expansion of natural reserve areas in the Natura 2000 sites) and their active implementation (increased monitoring programmes to raise the awareness of local population, daily visitors and tourists), strict limitation of any interventions in the coastal zone, registration of all underwater cultural heritage sites and their protection, as well as the adaptation of all other activities and uses to the protection regime.

(1) Development priorities:
- improve the state of the marine environment;
- increase biodiversity in the sea with the introduction of various methods and technologies;
- Sečovlje Saltpans: expand the nature reserve area into the sea within the Natura site;
- Rt Madona: reassess the area of protection and protection regimes, possible expansion of the natural monument protection area;
- Strunjan Landscape Park: enlarge the area of natural reserve beyond the Rt Ronek to protect the coral reef and thereby expand the range of the Strunjan Landscape Park;
- the coastal area between Koper and Izola: protect the Natura site (Posidonia meadows) by the regime of a natural reserve or natural monument;
- wetland area at Sv. Nikolaj, Ankaran: protect the area by the regime of a natural reserve or natural monument;

- Debeli rtič: implement the protection arrangements under the applicable regulation (Decree on the Debeli rtič Landscape Park);
- establish measures for the protection of turtles and dolphins;
- underwater cultural landscape: finalise the recording of underwater cultural landscape and the identified areas of anthropogenic structures and shipwrecks, their valorisation, scientific examination, sustainable protection and proper presentation and promotion (ME);
- stop all anthropogenic interventions in the coastal zone;
- NARLAND: improve the information accessibility of ICH (to all, not just divers) by means of XMR (ME).

(2) Development assumptions – prerequisites for the scenario development:
- protection of the natural marine environment as a national development priority;
- reduction, sustainable levels and increased quality at the expense of mass tourism on land and at sea;
- introduction of new restrictions on the use of the sea;
- ensuring the sustainable use of marine resources and economic exploitation of the sea (fishing, aquaculture);
- restrictions on the development of maritime transport;
- adjustment of other activities, uses and regimes at sea;
- absence of ecological disasters at sea (spills, accidents, eutrophication).

(3) International dimension:
- consensus on the protection of the natural marine environment as a development priority of the macro-region, adjustment of all policies related to the use of the sea (fisheries, transport, energy) in the Adriatic;
- common approach to the protection of underwater archaeological heritage;
- joint measures for the protection of turtles and dolphins;
- favourable macroeconomic situation.

(4) Spatial results:
- permanent preservation of the natural parts of the coast;
- permanent preservation of the natural parts of the sea, expansion of sea meadows, increase in the biodiversity of the sea;
- limitation on all interventions at sea (filling, construction), which have a negative impact on the marine environment and restriction on any interventions in the coastal (intertidal) zone;
- restriction of traffic at sea and in the hinterland;
- reduction and control of the number of tourist vessels to reduce the marine pollution (offshore navigation licences, etc.);
- reduction in the volume of fisheries and aquaculture;
- development of specialised forms of tourism, promoting the natural and cultural heritage in the sea (submarine archaeological tourism, diving, etc.);
- limitation of the number of residents and visitors.

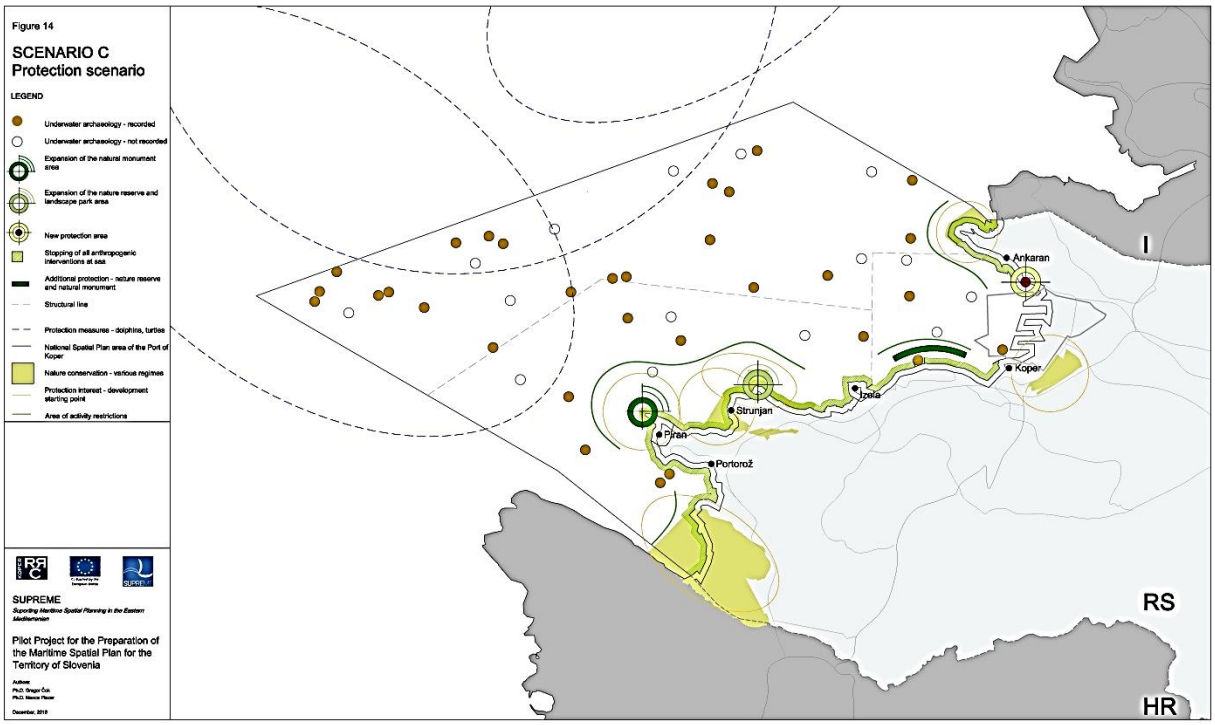


Figure 29: Protection scenario

The protection scenario envisages the following:

- all activities shall be strictly adjusted to the protection regimes and all anthropogenic interventions in the sea suspended;
- enlargement of some natural monuments and nature reserves and introduction of new protection areas;
- investigation, recording and protection of the remaining 42 sites of underwater cultural landscape.

Table 8: Protection scenario – synergies and conflicts

Area	Positive impacts	Negative impacts
(1) **Aquaculture sites**	- Improvement in the biotic state of the marine environment may increase the quality of products.	- Aquaculture areas outside the areas of undersea meadows are admissible.
(2) **Fishing sites**	- Gradual increase in the surface areas of undersea meadows and biodiversity may result in the local increase of fish stock. - Preservation of undersea meadows – sprouting and juvenile fish.	- Pressure to reduce fishing, especially of the practices that have a strong impact on the seabed (trawling) in order to preserve the underwater cultural heritage.
(3) **Plants and infrastructure** for exploration, exploitation and extraction of oil, gas and other energy resources, minerals and aggregates, production of energy, etc.		
(4) **Maritime transport routes and traffic flows**	- Greater control of navigation means more safety and less negative impacts on the	- It is necessary to restrict the maritime traffic. - No increase in ports, marinas,

	environment.	moorings, quays and anchorages. - Elimination of illegal moorings and anchorages.
(5) **Military training areas**	- Reduced or even eliminated pressure on the use of the territorial sea for military purposes (ME).	
(6) **Nature and species conservation sites and protected areas**	- Protection of natural values and conservation of biodiversity of the sea and the seashore. - Development of specialised forms of tourism may promote the conservation of species and protected areas.	
(7) **Extraction of raw materials**	- Development of specialised forms of tourism may increase the potential for salt production and related activities. - Limiting visitors may result in a higher quality of salt. - Greater potential. Cleaner sea increases the quality of salt.	
(8) **Scientific research**	- Preserved natural environment and underwater cultural heritage may become the focus of new scientific research. - Development of specialised forms of scientific and cultural tourism may promote the development of scientific research.	
(9) **Submarine cables and pipelines**	- No more need for a large volume of underwater discharges of stormwater. It is necessary to regulate the existing discharges.	
(10) **Tourism**	- Possibility of the development of higher-quality specialised forms of tourism such as cultural, scientific and sustainable tourism (ME). - Limited development of mass tourism at sea and land.	- Limited development of mass tourism at sea and land.
(11) **Underwater cultural heritage**	- Preserved underwater cultural heritage may become the focus of scientific research. - Development of specialised forms of tourism may promote the underwater cultural heritage by means of IT and XMR. - Recording and survey of anthropogenically changed underwater cultural landscapes and the already identified	

	anthropogenic structures and shipwrecks, their valorisation (ME) and the adoption of appropriate protective measures (eventual moving to land). - Educational effects, history and culture. - Familiarisation of vulnerable groups and everyone else with the heritage in the form of PDP-NARLAND by using IT XMR (ME).	
(12) **Municipality of Ankaran**	- Consistency with the development strategy. - Impacts of A8 and A11 on the heritage tourism (ME). - Improved situation in protected areas by investing in the conservation of habitats and protected cultural heritage. - Strict monitoring of the compliance with protection regimes with the participation of all competent authorities. - Rehabilitation of degraded areas: the contact area between the cargo port and the sports and recreation park, local port and beach at Sv. Katarina, illegal dumpsite in the area of the salt meadow at Sv. Nikolaj. - Development of specialised forms of tourism.	- Ssocial potential of the scenario has not been assessed – specific impacts on the development of other activities is unknown. - Sustainable management versus rapid development of certain activities in Slovenia has not been evaluated.
(13) **Municipality of Koper**	- Impacts of A8 and A11 on the heritage tourism (ME).	- Limited construction in the sea and on the coast. - Reduction of the planned development of tourism.
(14) **Municipality of Izola**	- General improvement of the state of the sea and underwater cultural heritage has an overall positive impact on the quality of life. - Changes in the structure and operation of tourism industry. - Impacts of A8 and A11 on the heritage tourism (ME).	- Limited construction in the sea and on the coast. - Reduction of the planned development of tourism.
(15) **Municipality of Piran**	- General improvement of the state of the sea and underwater cultural heritage has an overall positive impact on the quality of life. - Changes in the structure and operation of tourism industry. - Impacts of A8 and A11 on the heritage tourism (ME).	- Limited construction in the sea and on the coast. - Reduction of the planned development of tourism.

(D) Tourism scenario – development of tourism in the coastal zone and at sea as a development priority

The tourism scenario (Figure 15) is based on the priorities of tourism development at sea and in the coastal tone, namely an increase in the surface area of marinas, moorings, harbours, quays, anchorages, beaches, water sports, underwater hot springs, construction of an island and other offshore facilities.

(1) Development priorities:
- coastal and offshore tourism;
- increase in the number of tourists throughout the year;
- increased surface area of beaches and floating structures (islands, rafts, etc.);
- increase in the number of tourist vessels, relating to the surface area of marinas, number of moorings, daily berths (in the area of Piran, in front of salt warehouses, in Marina Portorož), anchorages (Bay of Koper, Bay of Strunjan, Fiesa, Bele skale, Debeli rtič), leisure harbours (piers at Koper below the Markovec Hill, at the Rt Rex, Piran, Fiesa, Strunjan, Portorož, etc.);
- increase in the space for sports activities at sea (areas intended for boating and other water sports in the Bay of Koper, Valižan Bay and Portorož Bay) and the areas provided for diving centres (Bay of Koper, Fiesa).

(2) Development assumptions – prerequisites for the scenario development:
- tourism as a national development priority;
- increase of tourist capacities and infrastructure on land (hotels, apartments, camps, resting places for caravans, parking sites in the hinterland connected with the coast or along the coast);
- increase in the capacity of municipal and environmental infrastructure;
- arrangement of adequate silt deposition sites during the construction of facilities in the sea;
- adjustment of other activities, uses and regimes at sea;
- absence of ecological disasters at sea (spills, accidents);
- favourable marine biological conditions for the development of tourism (marine organisms . absence of algal blooms, eutrophication and jellyfish), as well as a reasonable quality of bathing waters.

(3) International dimension:
- adequate security situation in the macro and micro region, which attracts visitors from Europe and the rest of the world;
- integration of tourist operators in the Adriatic basin;
- favourable macroeconomic situation.

(4) Spatial results:
- pressure on the undeveloped land in the coastal zone and the consequent loss of attractive features of the coastal environment (view on the sea horizon, natural waterfront, etc. as the elements of economic category);
- construction of large artificial structures and facilities in the sea (islands, ports, piers, urbanised coast) alters the appearance of the sea landscape;
- construction on the seabed causes siltation;
- large number of tourist vessels has an impact on the navigable corridors of ports;
- effects on fisheries and aquaculture;
- filling of underwater meadows and reefs, loss of biodiversity;

- development of specialised forms of tourism, promoting the natural and cultural heritage in the sea (submarine archaeological tourism, diving, etc.);
- increased population on the coast causes higher water consumption, more sewage and pollution of the sea;
- large number of vessels contributes to the pollution of the marine environment;
- underwater noise;
- increased access to the coastal zone (motorised traffic);
- potentially greater impact of tourism on the local population.

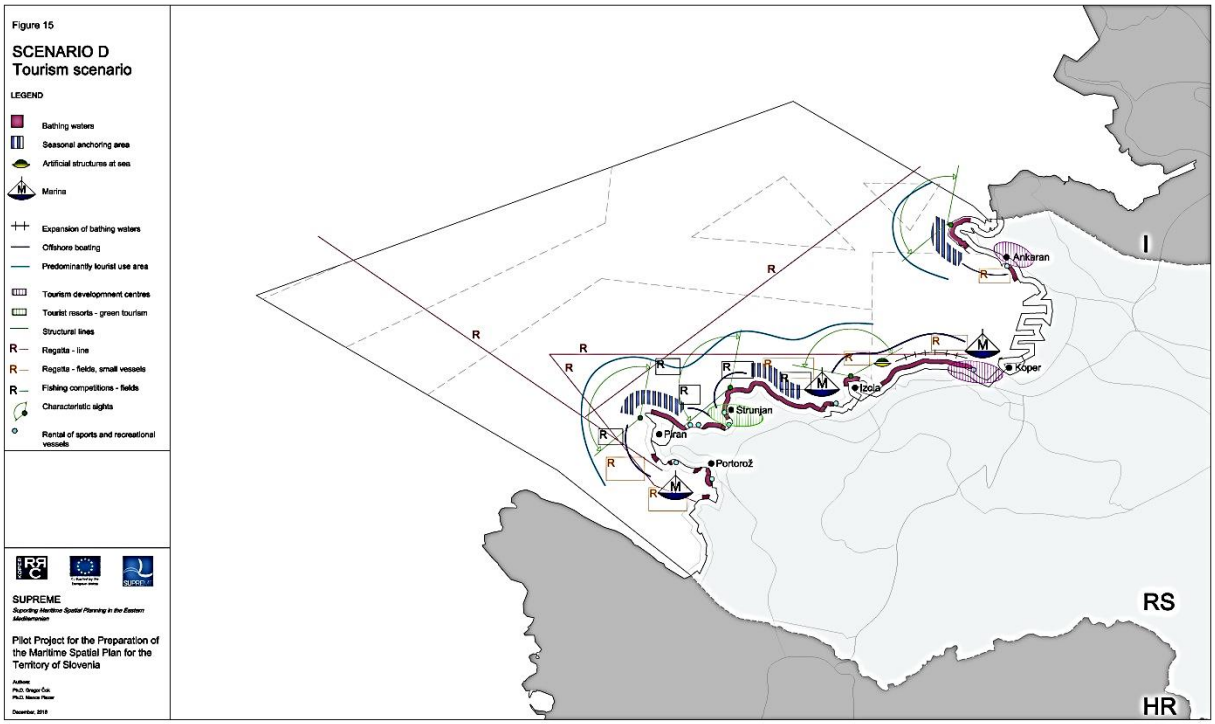


Figure 30: Tourism scenario

The tourism scenario envisages the following:
- promotion of all activities related to tourism, sports and recreation;
- defining the coastal zone at sea to about 1 nautical mile (nm) as a priority tourist area;
- realisation of individual interests of local communities (expansion of beaches, new programmes, etc.);
- finding compromise solutions regarding the interests of natural and cultural heritage protection.

Table 9: Tourism scenario – synergies and conflicts

Area	Positive impacts	Negative impacts
(1) **Aquaculture sites**	- Market aspect: growing demand for fresh marine organisms.	- Pressure to reduce the space needed for aquaculture, bot at sea and on land (land use for tourism purposes, visual aspect).
(2) **Fishing sites**	- Market aspect: growing demand for fresh marine organisms.	- Large number of small pleasure boats presents a potential hindrance to fishing.
(3) **Plants and infrastructure** for exploration, exploitation and		

extraction of oil, gas and other energy resources, minerals and aggregates, production of energy, etc.		
(4) **Maritime transport routes and traffic flows**	- Sharing and rational use of infrastructure. - Development of maritime passenger transport becomes more rational and justified.	- Large number of small recreational and tourist vessels may burden the navigable corridor and anchorage. - Greater possibility of interaction and accidents.
(5) **Military training areas**		- Greater adjustment needed for particular activities.
(6) **Nature and species conservation sites and protected areas**	- Development of specialised forms of tourism that may promote the conservation of species and protected areas. - Opportunity to raise awareness of the residents and visitors.	- Negative environmental impacts on natural values and biodiversity, threats to conservation objectives in protected areas (pollution, noise, hydrocarbons, waste), anchoring damages the seabed. - Introduction of alien species. - Destruction and degradation of marine and coastal ecosystems due to the spread of beaches and construction of facilities in the sea (increased sedimentation, loss of marine meadows and reefs, underwater noise, etc.)
(7) **Extraction of raw materials**	- Development of specialised forms of tourism may increase the value added in production and promotion of salt and related activities.	- Increased number of seasonal residents in the coast may cause greater pollution of the sea and thus a hindrance to the production of salt.
(8) **Scientific research**	- Development of specialised forms of tourism may promote the development of scientific research.	- Mass tourism at sea may hinder the scientific research.
(9) **Submarine cables and pipelines**	- Need for increased number of underwater discharges of stormwater, which is positive because they are urgently needed now and can be made through new investments. - Increase in underwater discharges of treated water from central water treatment plants.	- Need for increased volume of underwater discharges of stormwater.
(10) **Tourism**		
(11) **Underwater cultural heritage**	- Development of specialised forms of tourism may promote underwater cultural heritage.	- Increased number of visitors may lead to uncontrolled use and destruction of ICH, as also uncontrolled (as well as controlled!, actually any) navigation, uncontrolled diving

		and similar activities. - Construction of facilities in the sea and filling may mean a complete loss of certain ICH areas.
(12) **Municipality of Ankaran**	- Realisation (partly) of the development visions. - Impacts of A8 and A11 on the heritage tourism (ME). - Demarcation of use areas ensures greater safety of stakeholders, specially swimmers and athletes. - Development of specialised forms of tourism increases the income of the municipal budget from the tourist tax. - Elimination of illegal anchorages in the areas of the Sv. Katarina pier, Valdoltra harbour and the Debeli rtič Landscape Park. - Faster renovation of infrastructure in local ports.	- Negative impacts on other uses due to increased spatial needs for the purpose of tourism. - Pollution. - Various forms of tourism and the target public have not been identified and evaluated. - Mass tourism has a negative impact on the state of the natural environment, it can further reduce the accessibility of public services to the citizens and the quality of their living space. - Mass tourism is one of the greatest modern causes of pollution and degradation. - The objective of the tourism scenario has to be better articulated, namely, what is the maximum capacity of the area (building, water supply), how much is one tourist supposed to bring and what kind of offer does a tourist wish. - It is necessary to define the correlation of the impact with other activities. Are there enough resources, personnel and skills, and what are the alternative forms?
(13) **Municipality of Koper**	- Realisation of the development visions. - Impacts of A8 and A11 on the heritage tourism (ME).	- Negative impacts on other uses due to increased spatial needs for the purpose of tourism. - Pollution. .
(14) **Municipality of Izola**	- Realisation (partly) of the development visions. The municipality does not wish to develop mass tourism. - Impacts of A8 and A11 on the heritage tourism (ME).	- Negative impacts on other uses due to increased spatial needs for the purpose of tourism. - Pollution.
(15) **Municipality of Piran**	- Realisation of the development visions. - Impacts of A8 and A11 on the heritage tourism (ME).	- Negative impacts on other uses due to increased spatial needs for the purpose of tourism. - Pollution.

E. RESULTS OF THE CASE STUDY IMPLEMENTATION

E.1 DEFINITION OF PRIORITIES AND MEASURES

Based on partial findings stemming from the essential elements of potential development scenarios and discussions with various stakeholders (sectors and local communities) in both the workshops and individual interviews, the below described vision, objectives and priorities were defined.

The vision of MSP in Slovenia is, mainly due to the limited spatial possibilities and the presence of various interests, to ensure conditions for a long-term coexistence of all activities which, however, have to integrally comply with the requirements of nature and cultural heritage conservation, as well as the synergy of all other stakeholders in the area.

In terms of its content, the MSP represents a part of the Spatial Development Strategy of Slovenia dealing with the sea. It shall be implemented as an action plan, which forms part of the national spatial development strategy and has a clearly defined position in the structure of spatial legislation. After the formal adoption it will represent a starting point for the preparation of subordinate spatial acts, i.e. the planning documents at the national, regional and local levels.

The components of MSP are:

- a cartographic presentation of the present and planned activities, uses and regimes at sea (Figure 16), and
- the measures envisaged for the implementation of the MSP (a part of the measures is shown in Figure 17).

As an action plan, the MSP will be implemented through the measures presented below.

E.1.1 Synthetic scenario – draft MSP

The synthetic scenario (Figure 18) summarises the essential elements of each scenario. It selectively integrates the uses, activities and regimes that occur in the four scenarios. It is proposed that the MSP shall be implemented through a set of appropriate measures. The synthesis includes/presents the data (selection of 32 data layers), which directly determine the existing regimes and uses exclusively on water land and an additional data layer, which provides a definition of a 100-metre coastal zone (according to the ICZM Protocol and the definition of the coastal zone proposed within the SHAPE project, respectively) for coordinated planning of terrestrial and aquatic lands. In addition, the graphical presentation of the scenario describes those proposed measures (7 of the total 13 measures) that can be spatially identified and located (Figure 17).

E.1.2 Proposed MSP measures

Within the MSP preparation, the following groups of measures (Table 5) are proposed:

a) establishment of the governance structure at the national level;
b) establishment of the governance structure at the regional (local) level for the coordination of the coastal zone management in accordance with the ICZM Protocol; and
c) specific measures by sectors and locations (uses, regimes, etc.).

The two structures can work together as a whole or separately depending on the issues addressed.

Table 10: Proposed MSP measures.

PROPOSED MSP MEASURES		
↓ **A** **MSP – governance structure at the national level**	↓ **B** **MSP/ICZM – governance structure at the regional (local) level**	↓ **C** **MSP – specific measures**
1. Administrative and supervisory structure. 2. Formation of protocols.	1. Governance structure for the coordination of uses in the coastal zone, covering both a part of the land and a part of the sea.	1. Harmonious use/maritime traffic separation. 2. Modification of coastal anchorages of the Port of Koper. 3. New aquaculture areas. 4. Definition of priorities in the coastal zone. 5. Inventory of underwater archaeological heritage. 6. International protection measures (marine pollution, dolphins, turtles, etc.). 7. Regulation line between tourism and other activities. 8. Locations/areas for sporting events. 9. Interest areas of local communities. 10. Information platform. 11. Sludge disposal areas.

A: MSP governance measures

- Measure 1: establishment of the governance and supervisory structure or MSP implementation within the existing structures (Ministry of the Environment and Spatial Planning, Council for Spatial Development of the Republic of Slovenia, Government Commission for Spatial Development, etc.).
- Measure 2: formation of protocols for:
  a) spatial coordination and time alignment of existing activities, regimes and uses;
  b) siting of new activities, regimes and uses;
  c) implementation of MSP action plan/programme through strategic, development and spatial planning documents at the national, regional and local levels (guidelines, opinions, harmonisation);
  d) international coordination.

The first measure involves the establishment of a governance structure at the national level (a coordinating body responsible for the preparation, implementation and monitoring of the MSP as an action plan of the Spatial Development Strategy of Slovenia.

There are several options here. The first option assumes the formation of a new coordination structure (e.g. PPN Council) to be responsible for management, implementation, monitoring, coordination, etc., while the strategic decisions would be taken over by a decision-making body (council for spatial development, Government, regional councils, etc.).

The second option foresees the coordination to fall under the auspices of the ministry responsible for the environment and spatial planning, carrying out this role within the framework of its duties. In this case, the decision-making role would be assumed by the minister responsible for the environment and spatial planning, carrying out the role within the framework of his/her duties, while the strategic decisions or cross-sectoral decisions would be the responsibility of the Government of the National Assembly.

B: MSP/ICZM governance structure at the regional (local) level

- Measure 3: establishment of the governance structure for the planning of a harmonised land use in the 100-meter coastal zone (as proposed within the SHAPE project).

The third measure comprises the formation of a coordination body to be responsible for the planning and management in the coastal zone (land and sea belt). The body shall be composed of the key stakeholders at the national and regional (local) levels.

There are several options here. The first option assumes the formation of a new coordinating structure (e.g. MSP or ICZM/MSP council) to be responsible for planning, management, implementation of protocols, while the strategic decisions would be taken over by a decision-making body (regional development council, regional council, spatial planning councils, etc.).

The second option foresees the coordination to fall under the auspices of the ministry responsible for the environment and spatial planning, carrying out this role within the framework of its duties. In this case, the decision-making role would be assumed by the minister responsible for the environment and spatial planning, while the strategic decisions or cross-sectoral decisions would be the responsibility of the Government of the National Assembly.

The third option is the creation of a special body at the regional level within the existing or new structures.

C: Specific measures by areas and locations (present uses, regimes and needs, and spatial prognoses)

- Measure 4: Harmonious use/maritime traffic separation: increase in fishing opportunities, examination of the possibilities for the coordination of shipping and fishing in the area of traffic separation scheme (speed limits, two-way fishing, narrowing of the corridor, slowing down the navigation speed); any changes have to be reconciled with the regulating authority, the International Maritime Organization (IMO).

- Measure 5: Modification (reduction in the present size) of the coastal anchorage area of the Port of Koper in the 300-metre coastal strip between Koper and Izola. Reducing the anchorage area would not adversely affect the operation of the Port of Koper, but it would make possible the development of certain activities in the coastal zone without overlapping of regimes.

- Measure 6: Identification of new aquaculture sites. The project is already being implemented – the aquaculture areas will be sited outside the zone immediately next to the coast, in more appropriate areas where there are no conflicts with other uses.

- Measure 7: Definition of priorities in the coordination of anthropogenic activities in the coastal zone with the protective conditions. Placement of many activities in the coastal zone is in frequent conflict with the protection regimes. It is imperative to jointly define the priorities and modalities of the implementation of anthropogenic interventions (for individual cases) that have the least negative impacts on the marine environment.

- Measure 8: Inventory and protection of the unexplored underwater cultural heritage sites. It is expressly needed to register and valorise the underwater heritage sites and take the necessary protection measures (systematic investigation and monitoring of the underwater cultural heritage, implementation of legal protection, mitigation measures to reduce the damage caused by maritime transport and professional fishing).
- Measure 9: Actions in the field of sea protection against pollution and the definition of specific conditions for the protection of dolphins and turtles. In the implementation of this measure, the international dimension is indispensable – coordination of Croatia, Italy, Slovenia and the whole Adriatic basin. It is necessary to specify the joint measures, action plan and the ways of monitoring.
- Measure 10: Definition of the regulation line of interests at approx. 0.8 nm to 1 nm from the coast or the demarcation of the fisheries and aquaculture interests. The definition of a regulation line will allow for a more effective control of the activities at sea and the avoidance of conflict situations (in connection with Measure 3).
- Measure 11: Identification of areas (sites) for sports and recreational activities (regattas, competitions, etc.), those regulated by the present Decisions of the Maritime Administration or otherwise, and the definition of a time scheme of activities. Defining areas will provide for a more effective regulation of the activities at sea and the avoidance of conflict situations. It is necessary to prepare both a time and spatial distribution or refine the coordination protocol (in connection with Measures 1 and 3).
- Measure 12: Identification of the areas (interests of local communities) that can be governed and planned by local communities, having regard to the Measure 2c. It would be reasonable to determine the areas and modalities of spatial intervention in the coastal zone, where the local communities could independently intervene both in the coastal and marine areas. It is appropriate that the local communities can independently start the process of spatial documents preparation for the agreed locations and types of interventions (as defined in the legislation), and join in the preparation of River Basin Management Plans as envisaged by the Measure 2c.
- Measure 13: Formation of an information platform, collection, processing and availability of all data related to the sea.
- Measure 14: Identification of sludge disposal areas on the seabed or on the coast. When building new ports/marinas and in maintenance of the existing waterways, silt must be regularly removed and deposited. There is no suitable location for silt dumping in the Slovenian sea or on the coast.

E.1.3 Cartographic presentation

In the project phase, the cartographic presentations given below were simultaneously created on the basis of known facts and the defined vision and objectives of the MSP:

- map of the proposed MSP measures (spatially defined) at 1:250,000 scale (Figure 31);
- combined map of the present uses and regimes by the MSP Directive areas (11 areas – selected data layers) at 1:50,000 scale (Figure 32);
- Spatial synthesis – draft MSP in the form of a chart, which combines all key development elements, uses and regimes, and a set of the MSP implementation measures at 1:50,000 scale (Figure 33).

The three maps also integrate the international aspects (cross-border cooperation), including in particular the international commitments concerning the maritime transport and the measures for the protection of certain animal species.

Figure 31: MSP measures.

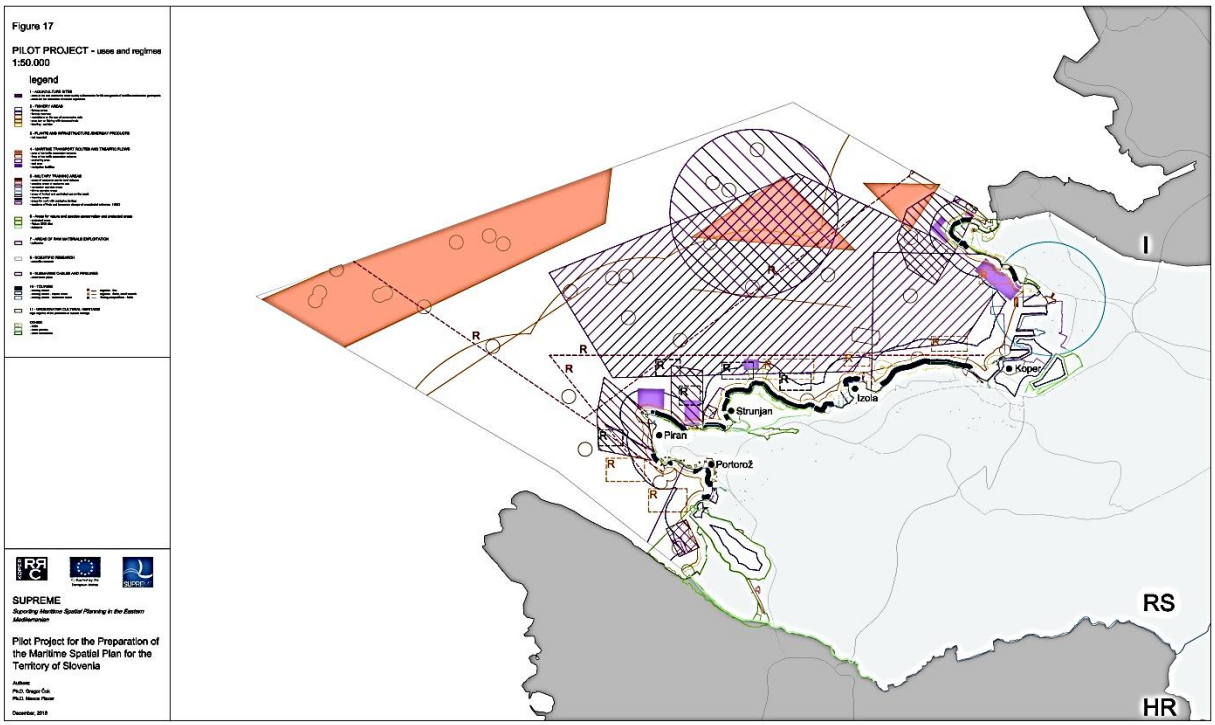


Figure 32: Regimes and uses.

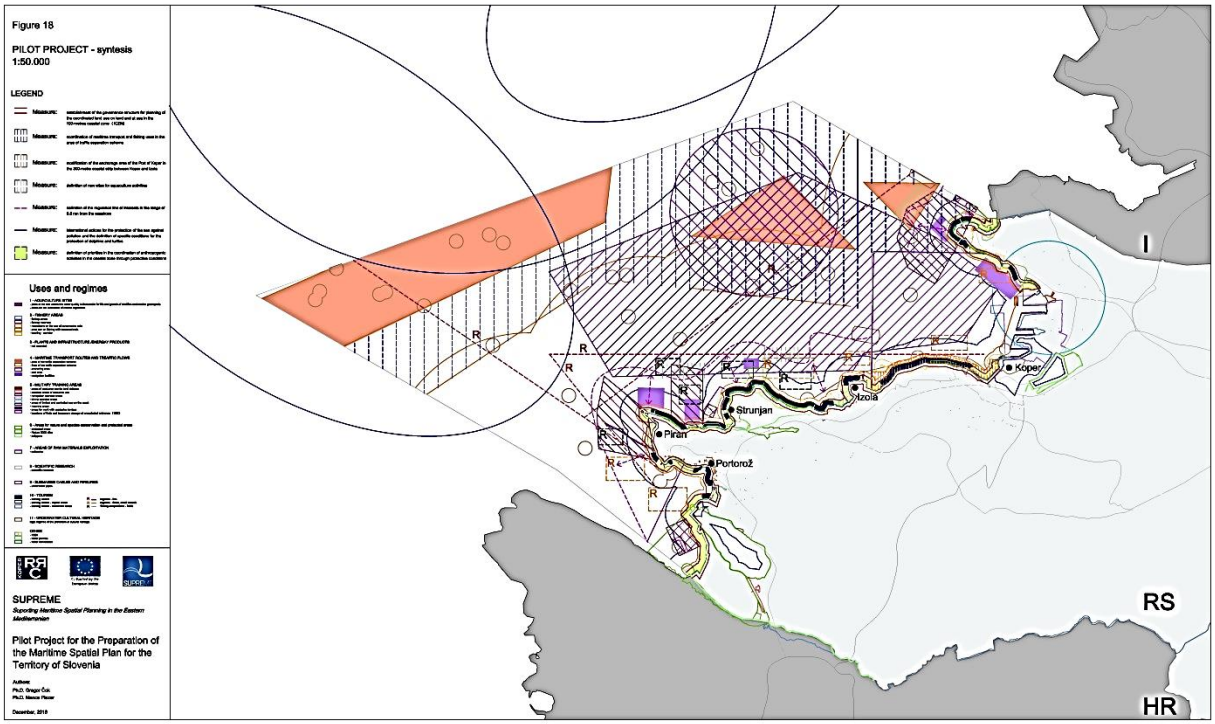


Figure 33: Synthesis – draft MSP.

E.1.4 Conclusions

In accordance with the methodological starting points, the pilot project was focused on the "simulation of MSP preparation". The data used were derived from the available sources, i.e. from the previously concluded sectoral projects, the guidelines provided by the spatial planning institutions and other materials related to maritime spatial planning.

Previous key activities leading towards the MSP preparation in Slovenia include, in particular:

- the activities of the intersectoral "marine" focus group within the preparation of the new Spatial Development Strategy of Slovenia;
- the project "Cartography and Geoinformation Support for Maritime Spatial Planning (GIS, 2016);
- the project "Development Process and Preparation of an Integrated Maritime Spatial Plan (UI, 2018);
- a number of sectoral and international projects concerning the sea, coastal zone and other related topics (Plancoast, CAMP, SHAPE, AdriPlan, etc.);
- various other research and study materials (scientific work, studies, diploma and master's theses, etc.) in the field of planning in the marine area.

The pilot project was analytically conducted in close cooperation with the contracting authority and the representatives of the Spatial Planning, Construction and Housing Directorate of the Ministry of the Environment and Spatial Planning. It focused primarily on the content (activities, regimes and uses) directly related to the water land. When dealing with a wide range of materials, it was found out that there was a large amount of information at disposal, but mainly "generally defined" information (well-known facts, general objectives, positions, guidelines, etc.). Based on those findings, individual consultations started with the stakeholders that worked professionally in the local environment and/or had a detailed knowledge about the various activities at sea. Within that stage of work, new (albeit informal)

information was obtained on the 11 thematic areas, as defined in the MSP Directive, which will have a significant impact on the MSP preparation.

Below are the key findings of the pilot project:

- in the Slovenian territorial sea, a number of activities are carried out which in spite of the diversity of their programmes are already largely coordinated with each other;
- visible disparities are evident between the fishing activities and maritime transport (particularly in the area of traffic separation scheme), protection and development interests in the coastal zone (nature, tourism, transport, interests of local communities) and between specific seasonal nautical and tourism activities in the coastal zone (swimmers, navigation, anchoring);
- the Port of Koper is among the largest "space users" due to its anchorage area and different impacts on the environment; large cargo ships sail to the northern Italian ports of Trieste and Monfalcone through the Slovenian sea; future technological and business growth of the ports in the Northern Adriatic will lead to the expansion of maritime traffic and the resulting increase in the environmental impacts;
- there is a significant lack of space in the field of aquaculture, since all breeding fields at Debeli rtič, Strunjan and Seča are fully occupied;
- the interstate memorandum on traffic separation scheme is the most notable regulatory regime, which area covers approx. 50% of the entire Slovenian sea and presents an evident limitation for other activities and uses (fishing, sports, etc.);
- research of the underwater cultural heritage is clearly insufficient; according to the official records of the Institute for the Protection of Cultural Heritage of Slovenia, there are 38 sites registered, but there are another 52 that have not been investigated and properly secured; underwater heritage is subjected to intense damage and destruction due to the shallowness of the Gulf of Trieste, large ships with deep drafts, frequent anchoring and bottom fishing;
- in the field of energy products (oil, gas and other energy sources) no activities and interests were identified; because of limited spatial possibilities, a wide range of users already present in the area and the potential possibilities, this industry is hardly feasible and it is environmentally questionable;
- among all recorded activities (and the related uses of marine land) there are many historically linked to the marine environment; therefore, their presence in the area has a wider social significance (saltpans, shellfish farms, local harbours – culture, identity, tradition, tourism, etc.); in the MSP preparation, it will be essential to ensure the conditions for their long existence and qualitative development.

The vision of future development should be oriented towards ensuring the conditions for the coexistence of all present actors and the cooperation of stakeholders in reconciling the interests in the enlargement of existing and placement of new activities. It is necessary to define in advance the carrying capacity of the sea (boundary value from the ecological perspective); as a special priority only those activities are highlighted which are carried out in accordance with the international agreements and those of special interest to the Republic of Slovenia.

During the project work process, the stakeholders were encouraged to participate in and promote the maritime spatial planning as a new area of expertise through individual consultations and joint workshops.

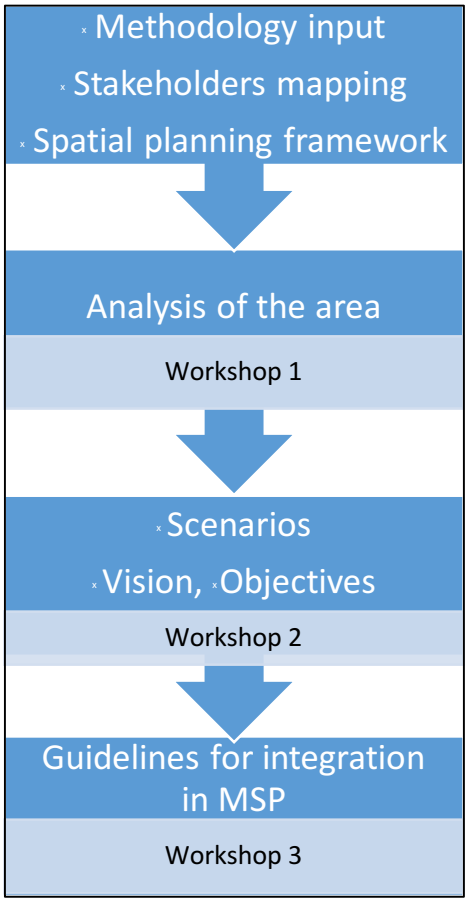
As regards the response, discussion and views of the individuals (also critical) about the presented results, it may be concluded that the pilot project was successful also in the segment of encouraging cooperation, communication, familiarisation with each other (different needs and views) and the disclosure of essential elements and interests that the MSP will have to integrate into its final spatial design.

Based on the foregoing and considering the current situation (intensive and all-embracing use of the Slovenian sea), it is legitimate to wonder, at the completion of the project, to what extent and in which areas is it realistic to introduce eventual changes, both in terms of placing new or phasing out the existing uses and in terms of changing the already established regimes.

It is assumed that the "first" MSP, as a managerial scheme, will essentially be a "comprehensive formalisation of the existing situation". In this sense, its growing importance lies primarily in the development of approaches for future coordination of (too) ambitious interests in a very limited spatial scope.

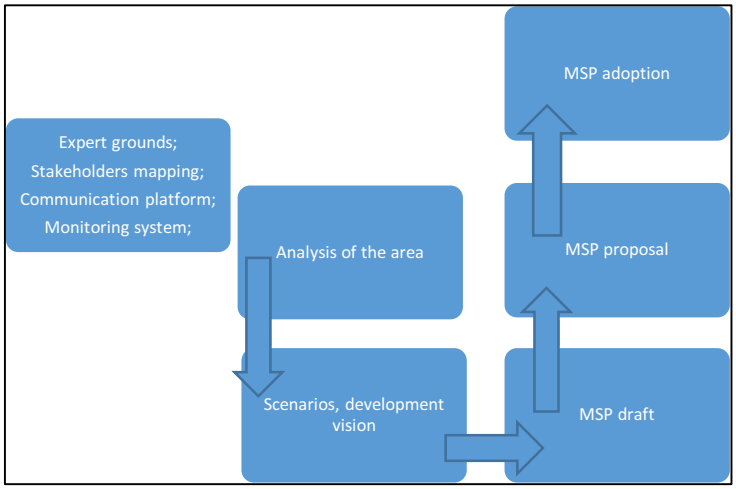
F. SUMMARY OF PROCEDURAL STEPS

Procedural steps in the implementation of the SUPREME case study have been adapted to its ultimate goal being the expert base for a formal MSP process. It is a simplifications of the procedures of a formal MSP preparation process.



The preparatory phase included the setting up of a methodological framework, identification of stakeholders at national and local levels, and the local level planning framework.

Figure 34: Steps of the case study implementation.



The scheme on the left summarises the procedural steps as defined by the study "Development of the Process and Procedures for the preparation of MSP", commissioned by the Ministry of the Environment and Spatial Planning for the needs of the MSP formal process.

Figure 35: MSP process scheme

G. REVIEW OF THE STAKEHOLDERS ENGAGEMENT

The case study implemented within the SUPREME project (Slovenian coast: MSP-ICZM interaction) deals with the preparation of MSP expert grounds and refers to the whole area of the marine territory under the jurisdiction of the Republic of Slovenia. A small geographical area and the fact that marine uses have generally already been defined and no major changes are expected, characterise the implementation of the case study.

The Spatial Planning, Construction and Housing Directorate of the Ministry of the Environment and Spatial Planning was actively involved in the implementation of the pilot project. As the most important "end users" of the case study results, its representatives were members of the SUPREME Project Steering Committee. They participated in the preparation of the ToR content and the establishment of a collaborative process with the stakeholders.

The final phase of recasting the Spatial Development Strategy of Slovenia has been underway for several years. Within the process, a focus group of stakeholders was set up, consisting of the key stakeholders at the national level, responsible for the sea and the coast. During the process of drafting the Strategy, several meetings were held with the stakeholders to obtain all relevant information regarding the current uses, development trends, visions and goals for the future development of the sea and the coastal zone, which will be used in the preparation of MSP that begins this year.

In order to avoid duplication of work, the representatives of the Ministry advocated, during the phase of mapping the stakeholders for the purposes of the SUPREME Project Case Study implementation, to also invite local level stakeholders (fishermen, fish and shellfish farmers, other relevant economic actors, representatives of the local branches of competent ministries and local communities) to participate in the task.

In line with the project implementation dynamics, the process of integration of the stakeholders was structured in three stages: analytical phase (1st workshop), definition of scenarios and their impacts, visions and goals (2nd workshop) and recommendations of the MSP integration (3rd workshop).

In the early phase of the SUPREME Project, the key stakeholders were identified and invited to participate in all stages of the case study planning, preparation and implementation. Participation of the stakeholders was assured through three workshops. The workshops were organised by the project partner. In the period between the first and second workshop (July–October 2018), interviews were carried out with each stakeholder.

G.1 MAPPING OF THE KEY STAKEHOLDERS

There were different categories of stakeholders identified: ministries and national public institutions (20), municipalities (5), economic actors of different sectors and business support organisations (15), civil organisations, universities and research institutions.

G.1.1 First workshop

The following stakeholders participated in the 1st workshop: Ministry of the Environment and Spatial Planning – Spatial Planning, Construction and Housing Directorate (1), Institute of the Republic of Slovenia for Nature Conservation (1), external experts – University of Ljubljana, Faculty for Architecture (2), Municipality of Koper (3), Municipality of Izola (1), Municipality of Piran (1), Municipality of Ankaran (1), landscape parks and protected areas

(1), Port of Koper (1), marina operators (1), business support organisations (1), fishermen (1), RRC Koper (2).

The workshop provided an in-depth overview of the current status (sea uses, conflicts, synergies) and information on the most relevant trends, future needs and what the stakeholders consider important to be included in the next steps of the project implementation. During the discussion, the participants exposed especially the following facts: the need for expanding the aquaculture areas and their proposed locations, the need for new or expanded conservation areas, problems of anchoring in protected areas, urgency of the complementary management of the coast-land territory (ICZM; tourism, marinas and walking trails in relation to the coast protection) and new locations for the deposit of material excavated from seabed.

G.2 INTERVIEWS WITH THE KEY STAKEHOLDERS

In the period between the first and second workshop, interviews were held with the stakeholders on national, regional, and local levels.

The interviewed stakeholders were: four coastal municipalities, National Institute for Biology Piran, Marina Portorož, Port of Koper, Public Agency for the Promotion of Entrepreneurship and Developing Projects of the Municipality of Izola, Strunjan Landscape Park, Ministry of Agriculture, Forestry and Food, Fisheries Research Institute of Slovenia, Ministry of Defence, Slovenian Maritime Administration – Maritime Inspection, Institute for the Protection of Cultural Heritage of Slovenia, Institute of the Republic of Slovenia for Nature Conservation and MYTILUS Mitja Petrič s. p.

The objective of the interviews was to get more details about the future needs of each maritime sector, economic actors and policy makers. The information was used for the development of scenarios, which were presented and discussed during the second workshop.

G.2.1 Second workshop

The second event was held on 7 November 2018. The invited stakeholders were national and local authorities (ministries, institutions and directorates), economic actors, universities and research institutions, and civil society organisations. Twenty-nine participants were present in the workshop.

The objective of the second workshop was to present and discuss the future scenarios, which were elaborated on the basis of the interviews, debate about the consequences of each scenario and consult on the integration of identified current and future MSP needs in Slovenia.

The presented and discussed four scenarios were based on the interests of the main shareholder groups existing in the Slovenian marine area, namely the economic and infrastructure scenario, fisheries and aquaculture scenario, nature and culture protection scenario and tourism scenario.

At the end of the second workshop, the representative of the Spatial Planning, Construction and Housing Directorate, Ms. Lenča Humerca Šolar, presented the ESPO INTERPLACE project, also intended to support the implementation of the MSP Directive. The project emphasis is on studying the interaction of activities at sea and those on land. The case study within that project is carried out in the area of the Piran Bay where the overlapping of activities is supposed to be most intense. In that area, two activities stand out, namely aquaculture and (maritime) tourism. The aim of the project is to obtain the guidelines for spatial planning at sea and ashore, and for management of the interacting activities.

G.2.2 Third workshop

The third workshop was organised on 20 December 2018 in Ljubljana, in the premises of the Ministry of the Environment and Spatial Planning. It was attended by 22 participants, mainly the representatives of the ministries and some institutions from the coastal region.

The workshop was devoted to the presentation of the work done in the previous phases of the project (findings within the analytical phase, scenarios and visions, objectives and recommended measures), followed by a lively discussion which further highlighted some specific aspects of the issue.

The value added through the stakeholders' participation in the process of implementing the SUPREME Case Study is primarily in maintaining the continuity of work and communication between the MSP stakeholders both at the national and local levels, which should gradually grow into a more formalised forms of cooperation for the purposes of preparing and implementing the maritime spatial planning and the implementation of measures within its framework.

H. QUESTIONNAIRE – EVALUATION OF THE MSP PROCESS

H.1 Did the methodology defined through the SUPREME project components prove as good for your spatial planning framework? Please briefly describe how a particular methodology step affected the MSP process and results.

The most important issues, developed through the SUPREME project were:
- models of cumulative impacts,
- integration of participative models of stakeholder involvement,
- integration of land-sea interactions,
- determination of geographical scope of spatial plans and
- mapping of existing and planned land uses.

The models of cumulative impacts may be challenging due to the lack of data and differences in data (series and detail) among the countries that in a way "share the same sea". We suggest further development and improvement of the tool in order to bring useful results.

The stakeholders' involvement is requested by the Directive as well as in all spatial planning procedures in Slovenia. The exercise within the SUPREME project proved that the stakeholders' involvement also helps the process by providing more data and information in all planning phases, which at the end brings better results and, of course, better acceptance of planning solutions. Informal cooperation is just as useful as the formal one.

The land-sea interactions were analysed through connecting the SUPREME activities with the activities of ESPON MSP targeted analysis. In the Slovenian case, the land-sea interactions are an important issue due to particular characteristics of the Slovenian marine space.

The spatial scope was defined according to the national jurisdiction ruling over the territory. The existing spatial planning legislation does not define the geographical scale for a maritime spatial plan. Slovenia finds the recommendation, developed through the SUPREME project, useful. The final decision will be accepted according to the recommendations elaborated in the research project on "Development of the Process and Procedures for Integrated Maritime Spatial Planning" (Goličnik-Marušić, 2018) and the actual planning solutions, which will be the substance of the MSP.

The data of relevant national and local stakeholders were used for the preparation of the case study within the SUPREME project. The same, but updated data will be used in the formal planning process.

H.2 How would you steer the future MSP process, according to the knowledge acquired through the project components?

Slovenia has no tradition in maritime spatial planning as required by the MSP Directive. Maritime spatial planning has now been integrated into the existing spatial planning system of the Republic of Slovenia through the Spatial Planning Act adopted in 2017 (OG no. 61/17 – ZUreP-2). The Spatial Planning Act requires the MSP plan to be prepared in the form of an action programme for the implementation of the Slovenian Spatial Development Strategy at sea. The latter is a strategic document which applies to both land and sea. Currently, the Ministry of the Environment and Spatial Planning is coordinating the preparation of a new Spatial Development Strategy of Slovenia 2050, which will define the broadest context and (sustainable) orientation, relevant also for MSP.

The most important result of the SUPREME project required for formal MSP is the overall that done through the pilot case: the analytical and planning phases, including the stakeholders' involvement.

Answers to the H.1 question partially answer the H.2 question.

H.3. Which problems from procedural steps in the implementation of MSP would you highlight and how do you plan to solve it in future?

Slovenia has already elaborated many needed technical bases and evidences for the needs of MSP. The national, regional and local authorities from the field of spatial planning, as well as other fields, have actively cooperated in different projects in which they all followed a goal to get as many and as good technical bases and evidences required for MSP.

The possible problems that may occur during the process:

- international and cross-border cooperation in spatial planning is not yet common in Slovenia, except for the needs of the SEA;
- demands of different EU directives addressing the sea may be contradictory, since various authorities are responsible for particular EU directives;
- some data sets are not collected or prepared in a way to be appropriate for MSP; some may even be missing;

H.4 Do you think that it is necessary to upgrade your current spatial planning framework with new legal provisions and regulations that would better adapt to MSP needs identified through the Case Study?

No legal changes seem to be necessary at the moment. Competent authority will be able to provide suggestions for a better MSP process only after finishing the first one.

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