



INTEGRATED COASTAL ZONE MANAGEMENT PLAN OF THE ŠIBENIK-KNIN COUNTY

COASTAL PLAN



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Shorter:

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This document has been prepared within the project "Integration of Climatic Variability and Change into National Strategies to Implement the ICZM Protocol in the Mediterranean", financed by the Global Environment Facility (GEF) and implemented by the United Nations Environment Programme (UNEP) and the World Bank, together with partner institutions. One of those partner institutions is the Priority Actions Programme Regional Activity Centre (PAP/RAC) of Split, Croatia, which is the leading institution operating in close cooperation with the Ministry of Environment and Nature Protection, Šibenik-Knin County and the Plan Bleu Regional Activity Centre.

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Regional Activity Centre (PAP/RAC) of Split

ISBN: 978-953-6429-69-1

For bibliographical purposes this document may be cited as:

UNEP/MAP/PAP: Integrated Coastal Zone Management Plan of the Šibenik-Knin County
Split, Priority Actions Programme, 2016

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ACKNOWLEDGMENTS

A number of institutions and organizations of the Republic of Croatia and the Šibenik-Knin County have enabled the preparation of this document through making available necessary data, participation in workshops, interviews, providing comments and other activities. Expressing our gratitude for their help and collaboration, we list them here:

Croatian Environment Agency

State Geodetic Administration, Republic of Croatia

Croatian Bureau of Statistics

Croatian Waters

Ruđer Bošković Institute, Division for Marine and Environmental Research, Laboratory for Physical Chemistry of Traces

Ministry of Construction and Physical Planning

Ministry of Agriculture, Directorate of Fisheries

Ministry of Environment and Nature Protection

Šibenik-Knin County

Administrative Department for Economy

Administrative Department for Maritime Affairs, Transport, Insular and Regional Development

Administrative Department for Environmental Protection and Municipal Affairs

County Protection and Rescue Office of the National Protection and Rescue Directorate

Public Institution "Nature"

Institute for Spatial Development

Regional Development Agency

Port Authority

Tourist Board of the County

Croatian Forests – Forestry Šibenik

Firefighting Association

Institute of Public Health

"Krka" National Park

Association for Nature and Environment Conservation and Sustainable Development "Argonauta"

Polytechnic of Šibenik

Association "Insular Council"

Association for Nature, Environment and Sustainable Development "Sunce"

City of Šibenik

Administrative Department for Economy, Entrepreneurship and Development

Administrative Department for Physical Planning and Environmental Protection

Town of Vodice

Town of Tribunj

Town of Pirovac

NCP-Repair Shipyard Šibenik

CroNoMar Ltd.

i-Navis

It is still raining at the Adriatic, Dalmatia flooded last night, Šibenik assesses damage

Excerpt from the article published on the portal ipress.hr,
15 October 2015

Yesterday evening and last night rain has drowned Dalmatia. It was worst in Vodice and Šibenik, while Murter was cut off from the mainland. In the streets of Vodice torrents were carrying everything along: garbage bins, benches and even cars. The water in the streets was up to 50 cm deep.

Last night the County Emergency Centre 112 of Šibenik received more than 550 calls from people asking for help due to problems caused by the storm, and the fire brigade had 115 interventions.

Most of the interventions regarded pumping the water out of flooded structures, mostly in the Dolac city quarter which was flooded already yesterday evening, and in the areas of Vodice, Srma and Tribunj.

The Šibenik Municipal Library "Juraj Šižgorić" suffered great material damage. The torrent that last night flooded the centre of Šibenik burst through one of the basement windows and flooded the entire basement. A large part of the archive material stored there was damaged, and the firefighters are still on location pumping the water out of the basement hall that was turned into a swimming pool. Damage was also made to a part of the street leading towards the city quarter of Šubićevac where the torrent has dislodged granite paving stones and amassed them in the neighbouring square. According to the available information, there were no casualties.

Flooding has caused considerable damage in the area of Vodice as well. Numerous basements have been flooded, the torrents have damaged some streets, and this morning the population suffers foul smell from the sewerage system since the water has carried away manhole covers.

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List of acronyms

DIVA	Dynamic Interactive Vulnerability Assessment
GDP	Gross domestic product
GEF	Global Environment Fund
ICZM	Integrated Coastal Zone Management
IPCC	Intergovernmental Panel on Climate Change
MAP	Mediterranean Action Plan
MSFD	Marine Strategy Framework Directive
MSP	Marine spatial planning
MSPFD	Marine Spatial Planning Framework Directive
NP	National park
PAP/RAC	Priority Actions Programme/Regional Activity Centre
PCA	Protected coastal area
PEW	Population equivalent
ŠKC	Šibenik-Knin County
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
WMA	Water-management area

I. INTRODUCTION

1 INTRODUCTORY REMARKS

The Integrated Coastal Zone Management (ICZM) Plan of the Šibenik-Knin County (hereinafter: the Coastal Plan) is being developed within the scope of the project “Integration of Climatic Variability and Change into National Strategies to Implement the Protocol on Integrated Coastal Zone Management”. The project is financed by the Global Environment Facility (GEF) and the participating countries, and led by the United Nations Environment Programme (UNEP). The project is being implemented in eight Mediterranean countries. The Coastal Plan is part of the project activities of the Priority Action Programme/Regional Activity Centre (PAP/RAC), operating under the Mediterranean Action Plan (MAP). One of the tasks of the PAP/RAC is to provide technical assistance for Mediterranean countries in their implementation of the Protocol on Integrated Coastal Zone Management (hereinafter: the ICZM Protocol). In addition to its being among the first plans of this kind developed in line with the Protocol’s requirements, the Coastal Plan is special also in addressing adaptation to climatic variability and change in a coastal zone. To date, the topic of adaptation to climate change and its integration into development and spatial plans has not been incorporated into the practice of spatial and development planning in Croatia in a satisfactory manner, although, globally, certain positive steps have been made in this respect in the planning practice.

After the project document for the project “Integration of Climatic Variability and Change into National Strategies to Implement the Integrated Coastal Zone Management Protocol” specified that one demonstration coastal plan be developed in Croatia, the Šibenik-Knin County (hereinafter: the County) was selected. The reasons underlying this choice are: high coastal indentation in the County; importance of the River Krka watershed and the County’s general abundance in water resources; existence of specially protected and vulnerable coastal ecosystems and areas, which are of national importance; and, finally, the presence of negative development processes in the County’s coastal zone. Furthermore, regarding the effects of climate change in Croatia’s Adriatic zone, it is worth mentioning that, in the case of sea-level rise, it is estimated that a coastal zone of 320–360 km² will be exposed to flooding by the end of the century. Moreover, the coastal zone belonging to this county, and especially the wider area of the town of Šibenik, is among the so-called ‘hotspots’ affected by the climatic changes.

In addition to the above, it should be emphasized that the competent authorities of the Šibenik-Knin County (Administrative Department for Environmental Protection and Municipal Affairs and the Spatial Planning Institute) have displayed great interest in the plan’s development and promised their professional assistance. During the course of development of the Coastal Plan, a number of meetings and workshops have been held (especially within the framework of the parallel “Climagine” programme, which is a part of the same GEF project), resulting in a high level of communication between the plan’s beneficiaries and the professional team which has developed it. This aspect has been considered very important, because the numerous contacts have contributed to the promotion of the concept of integrated coastal zone management (hereinafter: ICZM), and also of some complementary concepts and approaches, such as the ecosystem approach, adaptive planning, marine spatial planning, etc.

1.1 Purpose of the Plan

Although the effective Croatian legislation, especially in the field of spatial planning, does not provide for the development of plans for coastal zone management (hereinafter: the Coastal Plan), the Republic of Croatia has signed and ratified the Protocol which foresees the development of such plans. A coastal plan is neither ‘normative’ nor ‘regulative’ – it is not a plan that would regulate a certain issue and thus have legal effects. The application of normative plans is most frequent in the field of spatial planning, and in some other fields such as waste management, water management and similar: that is, in those areas in which it is possible to precisely identify the implementation of actions and those responsible for their implementation, and where

time limits for the realization of the planned actions can be anticipated. However, this Plan belongs among 'indicative' plans – those that have no legal effect, but provide guidelines on how to manage certain issues, and, especially, define the way in which elements that belong to a topic can be incorporated into normative plans, where this is deemed necessary. Indicative plans are often developed in the field of economic planning, and include, for example, the long-term plans of major companies. Indicative plans are also drawn up in those fields in which precise planning frameworks have not yet been established, such as, for example, the field of integrated coastal zone planning and management. Nonetheless, the methodology of developing coastal plans foresees that they be adopted by the competent authorities. Thus, in this case, it is expected that the County Assembly will adopt the plan, which would contribute to its force.

The current practice of integrated coastal zone planning in Croatia justifies the 'indicative' approach to coastal planning in the Šibenik-Knin County. The concrete global practice contains just a few developed and/or implemented coastal plans focusing on climatic changes; thus, defining the methodological approach to this plan was somewhat like charting 'unknown' territory. In spite of this, it can already be assessed that the Coastal Plan has manifold benefits. The Coastal Plan represents:

- an orientation for managing many aspects of development in the coastal zone, especially its spatial planning;
- a basis for the protection of the coastal zone and valuable coastal and marine ecosystems;
- a platform for stakeholder (groups and individuals) participation in coastal zone management;
- the core of the integrated coastal zone planning and management system in the Šibenik-Knin County;
- an orientation for planning and managing of parts of the coastal zone which are vulnerable to climate-change effects and other disasters; and
- a strategic document which is a prerequisite for, inter alia, withdrawal of finances from EU funds.

When it comes to coastal resources, the management system should allow their long-term exploitation, which is particularly important in view of the climate-change effects that are no longer in the realm of probability, but have undoubtedly moved to the realm of certainty. Given that the effects of climate change emerge relatively slowly (although we have recently witnessed some sudden and significant adverse effects of climatic variability), though definitely with long-term prospects, it is important to inaugurate a management system that will ensure timely anticipation of all the effects, even though most of them will occur over a long period of time.

The Spatial Plan of the Šibenik-Knin County does not specify that a coastal plan is necessary; to a certain degree, this is understandable, bearing in mind that this issue has not been regulated yet by national legislation. However, the Implementing Provisions for the Spatial Plan of the Šibenik-Knin County stipulate that "*...for the purpose of developing documents relating to the monitoring of the spatial situation, and developing documents relating to spatial planning (or amendments thereto), research of and continuous monitoring of phenomena and processes... in the coastal and island zones and proposing measures for improvement shall be mandatory*" (Art. 176). Furthermore, Art. 147 of the Implementing Provisions specifies that "landscape zone: coastal zone and islands" is "an area of special values and features." In view of the above, the conclusion can be drawn that the Spatial Plan of the Šibenik-Knin County provides sufficient arguments for adopting a decision on the development of the Coastal Plan. With this plan, the Šibenik-Knin County wishes primarily to:

- elaborate a methodology for improving the management of the coastal zone and the protected coastal area in line with the Protocol;
- define a methodology of adaptation to climate change and their integration into spatial and other plans;
- use a methodology of landscape evaluation which is applicable to the purposes of spatial planning; and
- provide guidelines for the implementation of the County's Spatial Plan.

1.2 Scope

The scope of the Coastal Plan has been specified in line with the Spatial Planning Act (Official Gazette *Narodne novine* No. 153/13), and the provisions of the Protocol on Integrated Coastal Zone Management in the Mediterranean and the County's Spatial Plan. The main definition of a coastal zone is given in the Initial Report.

According to the County's Spatial Plan, which complies with the instructions provided in the relevant legislative act, the coastal zone of the County comprises all the islands, a coastal strip of width 1,000 metres from the shoreline, and a sea belt of width 300 metres from the shoreline. However, taking into consideration the nature and purpose of this plan, which is indicative and strategic, and based on the application of the ecosystem approach, a somewhat more flexible and wider boundary of the coastal zone or the scope of the plan has been proposed, in line with the instructions specified in the Protocol, signed and ratified by the Republic of Croatia. According to the Protocol, on the land, the coastal zone includes all the local administrative units bordering the sea. In the case of the County coastal zone, these are the municipalities and towns of Šibenik, Skradin, Vodice, Murter-Kornati, Pirovac, Tisno, Tribunj, Bilice, Primošten and Rogoznica. As for the sea, the Protocol defines that the scope of the ICZM is the external limit of the territorial sea, so this limit can also be taken as indicative for the Coastal Plan.

In addition to the above definition of the coastal zone, and with a view to respecting the integrity of the ecosystem, particularly the River Krka watershed area, the operational scope of the Plan has been expanded inland to include the whole watershed area of the River Krka. Figure 1.1 provides a chart showing the spatial scope of the Plan.



Figure 1.1: Chart showing the boundaries of the Coastal Plan

It should be noted that the principles of the so-called ecosystem approach were respected during the development of the Coastal Plan, since it has been accepted as the fundamental approach to environment management in the European Union and in the MAP. Furthermore, it should be emphasized that the approach of the ICZM is very close to the ecosystem approach, and, being much older, it was its predecessor in many respects. There is no uniform definition of the ecosystem approach, but the typical definition is taken to be that which acknowledges the complexity and interdependence of elements in an ecosystem, and which recognizes not only environmental goals, but also social, economic and institutional/management goals. This approach considers an ecosystem in its entirety, acknowledging cumulative effects of all the elements active within the boundaries of the ecosystem.

1.3 Methodology of the Plan's Development

The methodology of development of the Coastal Plan mostly follows the process proposed in “The ICZM Process: A Roadmap towards Coastal Sustainability“, developed by the PAP/RAC. The process consists of three basic planning phases:

1. Introductory activities;
2. Analysis and estimate of future development; and
3. Plan.

Figure 1.2 provides a schematic presentation of the process of development of the Coastal Plan.

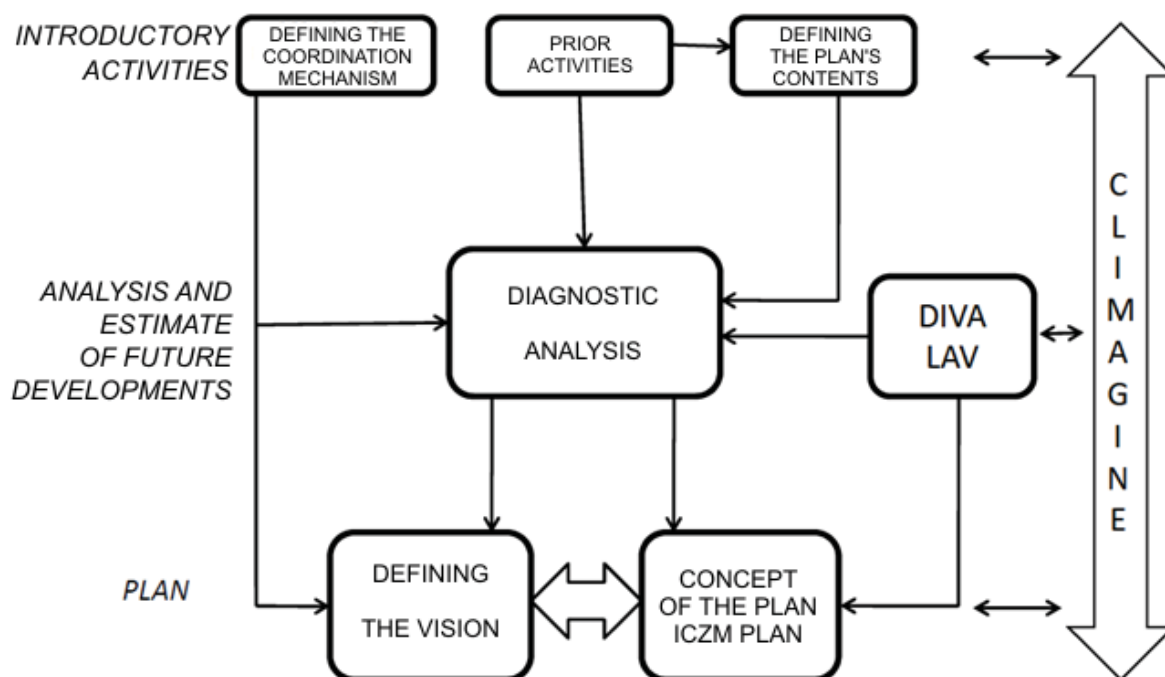


Figure 1.2: Schematic presentation of the development of the County's Coastal Plan

The development of the Coastal Plan has been a highly participatory process which has included a number of meetings and workshops. This aspect has been accentuated through the application of the “Climagine” participatory method.¹ The goal of this method was to identify the main dimensions and indicators of sustainability, with particular emphasis on the impact of climate change on the local community. The task has been carried out through individual interviews and discussions with local actors involved in the County's coastal zone management. Between April 2013 and spring of 2015, a total of four workshops were held,

¹ Another part of the GEF project “Integration of Climatic Variability and Change into National Strategies to Implement the Protocol on Integrated Coastal Zone Management”.

where participants expressed their views on critical issues pertaining to the County's coastal development, and those have been incorporated into this Coastal Plan to a significant degree. Analysis of social actors has resulted in the identification of around a hundred people who are directly involved in, or could contribute to, the improvement of the coastal zone management. Around sixty of them came to the workshops, though the number gradually decreased. Each workshop consisted of a presentation of the progress in the development of the Coastal Plan, and an educational part, in which selected experts presented topics relevant to the County coastal zone, especially from the viewpoint of climate change. Overall, a high level of communication has been established between the beneficiaries of the Plan and the team of experts which developed it. The final result of the "Climagine" participatory process was the identification of dimensions and measurable indicators, their sustainable values, and an understanding of the opportunities to achieve those values.

Besides the results of the "Climagine" method, it is important to emphasize that the method has proven very useful in gathering and facilitating discussions among various actors involved in the coastal management of the County. The response rate for the workshops and interviews was high, with pronounced participation (through discussions, questions...). In conclusion, it can be said that local actors do possess an initial understanding of the issue of climatic variability and change, although the lack of a systematic or organized network of actors and institutions regarding alleviation of, and adaptation to, those issues is problematic. Annex II provides more information about the results obtained using this method, and about the process itself.

Each of the phases and subphases in the development of the Plan has resulted in a corresponding document. In addition, during the development of the Coastal Plan, besides the "Climagine" method mentioned above, results of the following parallel activities implemented within the scope of the project "Integration of Climatic Variability and Change into Integrated Coastal Zone Management" have also been used, as they were directly relevant to the Plan:

- **Local Vulnerability Assessment:** A study which assesses the economic impact of climatic changes in the County. The document provided guidelines which were used in the development of scenarios within the planning of measures for coastal settlements;
- **Assessment of potential effects of sea-level rise for the Republic of Croatia:** The DIVA model was used to identify socio-economic effects of climate change for the whole Croatian coast;
- **Socio-economic analysis of Croatia's coastal zone:** The document was developed for the purpose of developing a comprehensive national strategy for coastal zone and maritime environment management. It contains a specific outlook on the effects of economic measures.

Within the framework of the development of the Coastal Plan, the following documents – which have been used in the development of the Draft Coastal Plan – have been produced to date:

- **Preparatory Report:** provides a definition of the issue, with a special discussion of the issue of climate change and climatic variability, and the methodological approach to the development of the Plan, as well as expected outcomes.
- **Scoping Report:** identifies priority issues to be dealt with by the Plan, and focuses the Plan on a reasonable number of important priority questions. The document identifies key actors, with the aim of establishing communication among them.
- **Diagnostic Analysis:** a document based on the guidelines provided by the earlier reports, analysing primarily those aspects of coastal management that are analysed in less detail, or not at all, in other documents (for example, climate-change effects). It discusses topics that are extremely important for the coastal zone as a specific spatial unit, and which are results of either deep analysis of certain aspects of a topic (in the case of the detailed analysis of the coastal zone's spatial development), or of a synthesis of several analytical layers (for example, vulnerability analysis). A detailed analysis of the visual exposure of coastal landscape in the County has also been done, and in it the input data for defining spatial-planning and urbanistic measures have been prepared on the basis of an adapted, robust method.

The input data have been complemented by an analysis of forest fires, and an analysis of the County's social actors. The latter is an empirical study, initially developed through interviews with some 20 preliminarily selected actors in the County's coastal management. The study has 'mapped' individuals, institutions and functions which are relevant today, and provided recommendations for coastal zone management.

- **Coastal zone Development Scenarios:** Several possible scenarios for the development of the County's coastal zone have been assessed: the Risk Scenario, the 'Through Competitiveness to Cohesion' Scenario; the 'Through Protection to Sustainability' Scenario. The suggested scenario will be used as the basis for solutions proposed in the Plan. The background for the assessment of the effects of climatic variability and change was provided by the results of a study done for this project using the DIVA method, and the process of integration of stakeholders into the Plan's development (the "Climagine" method).

It should be underlined that the County's Coastal Plan is not comprehensive, but rather integral. The generally accepted definition of the term 'integration', inter alia, does not assume comprehensiveness – that is, analysis of all the relevant aspects and identification of all possible interrelations – but deciding on the priorities and identifying their fundamental interrelations, or relations of cause and effect. The key issues, actions and effects to be emphasized during the development of the Plan were identified within the so-called 'scoping' phase. The number of potential issues that a plan can address can be very high. However, the time and financial resources that the Plan's developers had at their disposal, and the hierarchy of importance of individual issues, led to just a small number of potential issues which could be key for the procedure of the Plan's development and adoption of appropriate decisions. In other words, 'scoping' is an attempt to focus the Plan on a reasonable number of important issues. During this phase, three priority thematic areas were defined:

- Space as a key resource in the coastal zone;
- Expected climatic changes and their potential effects in the County; and
- Water management.

1.4 Goals of the Plan's Development

It has already been emphasized that the Coastal Plan is indicative, rather than normative, which means that this plan provides guidelines and proposals which can be incorporated into normative plans, such as, for example, spatial plans (of counties, towns and municipalities). Another important feature of the Coastal Plan is its primary orientation towards establishing the need to inaugurate the principle of integrated coastal zone management in the County. Therefore, this is primarily a management plan, and only then a development plan. With this in mind, the goals of the County's Coastal Plan are the following:

- Defining a management system for coastal areas, which can ensure the building of resilience of coastal systems to the impacts of climate variability and change, and direct development towards sustainability, through the implementation of the ICZM and ecosystem approaches;
- Identifying particularly endangered areas with regard to coastal processes, especially areas vulnerable to the impacts of climate variability and change;
- Proposing measures aimed at defining the policy of adaptation to the effects of climatic vulnerability and change; and
- Providing assistance in the formulation of sectoral policies and plans, and their integration in the policy of the sustainable development of the coastal area.

2 CONTEXT OF THE COASTAL PLAN'S DEVELOPMENT

The context of the development of the Coastal Plan is defined by several endogenous and exogenous factors. It is determined by the international and national regulatory bases (laws, agreements, plans, guidelines and initiatives), and also by certain problem areas (for example, climate-change effects), which can have direct or indirect impact on the character of the plan. In this chapter, the direct 'input' of individual documents will not be identified in detail; rather, the goal is to specify the context within which the plan is being developed, while the direct links will be referred to in the following segments of the plan.

2.1 National and international contexts of the ICZM

The fundamental international legal act that the Coastal Plan is based on is the Protocol on Integrated Coastal Zone Management in the Mediterranean. With the Protocol's entering into force, and especially with its ratification by several EU member states and the EU, integrated coastal zone management (ICZM) has been fully recognized in the Mediterranean, although still only at the regulatory level, while the practical implementation of the Protocol is expected in the near future; the development of this plan will certainly contribute to it. In its Art. 18, the Protocol provides for the development of, inter alia, coastal plans and programmes "*...which may be self-standing or integrated in other plans and programmes, [and which] shall specify the orientations of the national strategy and implement it at an appropriate territorial level, determining, inter alia and where appropriate, the carrying capacities and conditions for the allocation and use of the respective marine and land parts of coastal zones.*" Furthermore, it is important to emphasize that the Protocol is the first international legal act to propose a concrete instrument for the protection of, and adaptation to, the effects of climate change. In Art. 8(2)(a) of the Protocol, it is stipulated that "*... the Parties shall establish in coastal zones, as from the highest winter waterline, a zone where construction is not allowed. Taking into account, inter alia, the areas directly and negatively affected by climate change and natural risks, this zone may not be less than 100 metres in width...*"

Of the European documents, four directives should be mentioned here: on marine strategy, on marine spatial planning, on waters, and on the assessment and management of flood risks. In their own ways, each of these is directly relevant to the Coastal Plan, both in terms of its territorial scope, encompassing both land and sea, and in terms of its contents.

The Marine Strategy Framework Directive (MSFD) regulates measures aimed at achieving or maintaining a good status of the marine environment by 2020 at the latest. The MSFD is also a basis for the application of marine spatial planning (MSP), which thus becomes one of the fundamental instruments for the Directive's implementation. (The following paragraph provides a comment on the MSP Framework Directive). The MSP focuses primarily on the topic of improving the marine environment, and in many of its elements the MSP touches on the coastal zones, because many of the solutions proposed depend on influences that come from the land. The territorial scope of the MSFD includes sea waters covered by the sovereignty of the Republic of Croatia, that is, sea waters in which the Republic of Croatia exercises its sovereign rights and jurisdiction. The territorial scope of the marine part of the Coastal Plan is defined by the Spatial Planning Act as a strip with a width of 300 m from the coastline, and by the ICZM Protocol, which prescribes it to include the whole territorial sea within the territory of the County.

The Marine Spatial Planning Framework Directive (MSPFD) defines a framework for the MSP, whose goal is to achieve the sustainable growth of maritime economies, the sustainable development of marine areas, and the sustainable use of marine resources. The scope of application of the MSPFD comprises the marine waters of member states, excluding coastal waters falling under the relevant spatial plans. This means that the scope of application of the MSPFD is within the limits of the territorial sea, which also means within the territory

covered by municipal and town spatial and urban plans, since their territorial scope at sea extends to the external limit of the territorial sea, excluding, as stated above, coastal waters. In terms of geography, the territorial scope of the MSPFD largely corresponds to the scope of the MSFD and the Protocol, and it is also relevant for the maritime zone of the County.

The Water Framework Directive deals with processes in river basins, and in coastal waters, regarded by the Directive as an integral part of the water ecosystem. Given that water, as a resource, is one of the most important elements of the Coastal Plan, it is clear that this Directive also has significant influence over its development.

Finally, the purpose of the Directive on the Assessment and Management of Flood Risks is to set up a framework for the assessment and management of flood risks, with a view to reducing the adverse consequences for human health, the environment, cultural heritage and economic activity associated with floods.

The Spatial Planning Act (Official Gazette *Narodne novine* No. 153/13) contains a special part dedicated to the protected coastal area (PCA). The PCA encompasses territories of coastal local-government units. The planning in the PCA should:

- preserve and rehabilitate endangered areas of natural, cultural-historical and traditional value in the coastal area and hinterlands, and stimulate natural regeneration of forests and indigenous vegetation;
- define measures aimed at protecting land and marine environments, and protect drinking-water resources in particular;
- ensure free access to the coast, as well as passage along the coast, and ensure public interest in the exploitation of the maritime domain;
- preserve unpopulated islands and islets, primarily for agriculture, recreation, organized visits, and research, without forming construction zones;
- condition infrastructural development with protection and preservation of landscape values;
- restrict the sprawling of existing construction zones along the coast and their convergence, and plan new construction zones away from wooded areas; and
- rehabilitate abandoned mineral-resource exploitation fields and production sites, primarily through landscaping or assigning them tourist-catering and sports-recreational purposes.

All these goals correspond to a high degree with the goals of the Coastal Plan.

2.2 Spatial Plan of the Šibenik-Knin County

The Spatial Plan of the County was adopted in 2002. Since then, the Plan has been amended several times (most recently in 2011, with new amendments currently being drafted). The County's Spatial Plan is primarily a strategic plan, but it also contains a relatively detailed proposal for the use of space (Figure 2.1). The Plan aims to:

- achieve balanced economic development in the area;
- take into account the interests of the towns and municipalities within the County, and harmonize them with the interests of the Republic of Croatia;
- protect the space in all its aspects;
- identify the system of settlements;
- identify infrastructural systems; etc.

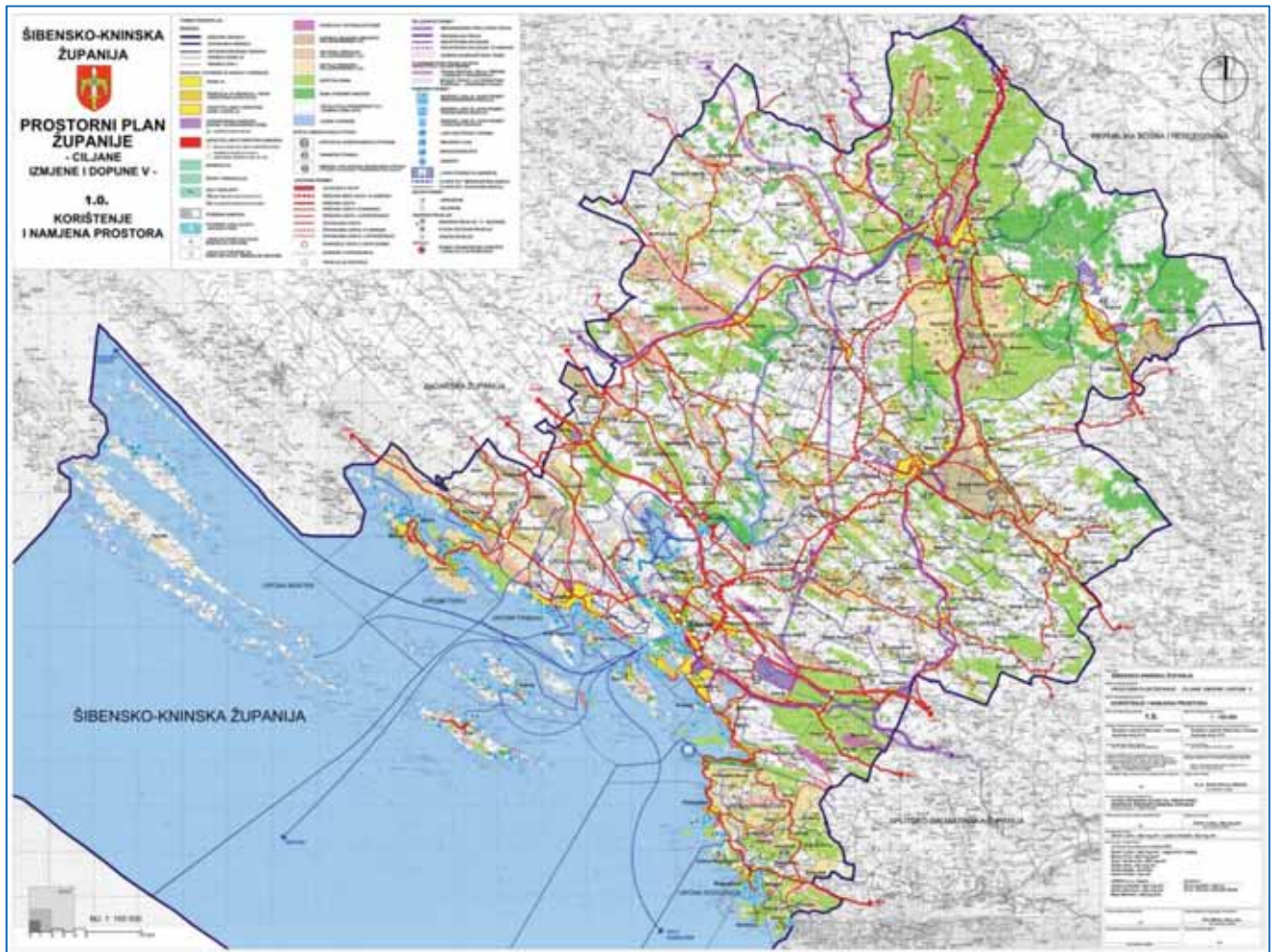


Figure 2.1: Use of space in the County's Spatial Plan

The Plan's development has been guided by the following principles:

- rational use of space;
- respect for natural and anthropogenic features of space;
- protection of natural values;
- improvement of the quality of life;
- promotion of integrated planning and management; etc.

2.3 Importance of climate change for coastal development

'Climate change' is defined as a state of the climate characterized by changes in the mean values and/or variability of its features which last for some time, most often for a decade or longer.² 'Climatic variability' is defined as variations in the mean state of the climate over short periods of time such as months, years, and now even decades. Climatic variability is most often attributed to natural phenomena, such as El Niño and La Niña.³ However, the definition has gradually changed, and climatic variability is increasingly seen as a phenomenon associated with climate change, i.e. as a consequence of anthropogenic activity.

² Parry M.L., O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson (eds), 2007. *Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA; USAID, 2007. *Adapting to Climate Variability and Change: A Guidance Manual for Development Planning*. U.S. Agency for International Development, Washington, DC.

³ UNEP, 2012. *GEO 5: Environment for the future we want*. United Nations Environment Programme, Nairobi, Kenya.

With some exceptions, the potential consequences of climatic variability and change have not yet been fully integrated in coastal zone management. Although the effects of climate change on coastal areas have been identified, the assessment of their effects on coastal and marine resources in the next several decades is a very difficult task, made more complex by the fact that coastal zones fall among those that are ecologically very dynamic, and also vulnerable. If we add to this disturbances caused by human activities, many coastal ecosystems will be faced with limited capacity to deal with the adverse effects of climate change.

The ICZM will have to address a range of practical questions, such as the effects of sea-level rise: erosion, floods, reduced drainage of water, higher salinity of coastal fresh waters, higher level of groundwater (which will compromise the foundations of coastal structures), loss of land along the coast, etc.). The strategy of adaptation to climate change should include the preservation of the remaining natural zones on the coast, and the reduction of risks for coastal structures built on lower terrain or in zones exposed to flooding or landslides.

All Croatian climate-change reports compiled over the past two decades estimate climate-change effects on the coastal zones. A large part of that information was used during the drafting of the Human Development Report for Croatia in 2008 (A Climate for Change), published by the United Nations Development Programme (UNDP). Within the framework of this project, an assessment was made of potential damage from sea-level rise. The assessment was made using what is currently the most highly acknowledged method for such assessments, DIVA (Dynamic Interactive Vulnerability Assessment). The results showed that around 320–360 km² of the coastal area could be jeopardized by flooding by the end of the century⁴; between 43,000 and 128,000 people could suffer from flooding each year, while the annual damage could reach US\$ 0.9 to 8.9bn. It is interesting to note that the areas most exposed to flooding are not those with the greatest number of people vulnerable to floods, nor are they the same as areas in which the greatest damage is expected. The area most vulnerable to flooding is the territory surrounding the delta of the River Neretva; the most vulnerable population lives in the Bay of Kaštela, while the greatest damage is expected in Zadar, Šibenik and the Bay of Kaštela. Interestingly, the town of Vodice also features among the ten top-ranked areas in which the greatest flood-related damage is expected, and it is ranked fifth in Croatia in terms of expected damage.

2.4 Brief overview of the economic situation in the County and its coastal zone

In 2011, the total gross domestic product (GDP) of the county was HRK 6.3 billion, or around EUR 865 million. This corresponds to around 2% of the national GDP. The income per capita amounted to HRK 58,955, or around EUR 7,930, which is about 77% of the Croatian average income per capita. The county's economic structure is mixed, and includes mining, manufacturing and trade, with a small share of agriculture. In official statistics, tourism is not listed as a separate activity, and its value is distributed over the majority of the activities mentioned above.

In terms of the development index of the RoC, in 2013 the Šibenik-Knin County was at the level of 81% of the national average. Although this figure is relatively low, it should be noted that the County has achieved progress in comparison with 2010, when it was at only 63% of the national average.

The economic dominance of the town of Šibenik can be observed: it generates around 78% of the total profits of all economic subjects in the County. The leading sector is manufacturing, followed by significant contributions from trade and catering and accommodation services (actually, tourism), and construction and property sectors. The Šibenik-Knin County was badly hit by the 2008 crisis, and its economy has still not recovered to its pre-crisis levels (Figure 2.2).

⁴ Zones exposed to extreme sea levels once in 100 years.

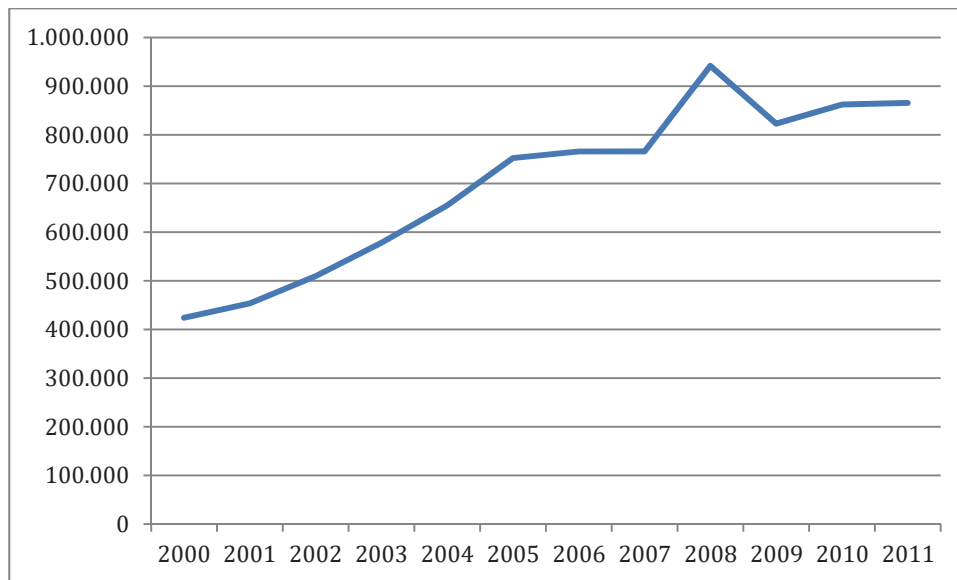


Figure 2.2: GDP growth in the Šibenik-Knin County (in € million)

The County's regional development strategy for the period 2011-2013 was focused on the development of the metal-processing industry, mining, tourism and the 'green' economy. One of the strategic goals was the creation of a "competitive economy based on foreign and domestic investment in tourism, traditional agriculture, and industry based on innovations and advanced technologies." The quantitative goals included a GDP growth higher than the national average, reaching an employment rate above the average for the Adriatic counties, increasing the number of tourists by 5% annually, increasing revenues by 10% annually, increasing exports by 15% in comparison with 2009, increasing the production of wine by 15% and of olive oil by 20%, and increasing the irrigated land surface by 300 ha.

II. SITUATION ANALYSIS

The purpose of the situation analysis is to contribute to a better understanding of the current state of development in the County's coastal zone. Emphasis is placed on those topics that have been identified as priorities during the Plan's scoping phase, and they are, primarily: the space as the basis of the economic development of the Šibenik-Knin County and its coastal zone; water as the fundamental natural resource of the Šibenik-Knin County and, one could say, the main factor of integration of the coastal area and the county's hinterlands; and climate change, whose manifestations or adverse effects could significantly influence future economic development, and the development of natural resources, in the Šibenik-Knin County, especially its water resources, and could diminish the possibility of sustainable development of the Šibenik-Knin County and its coastal zone.

It should be emphasised that this analysis is not comprehensive, in that it does not include all the topics usually addressed by development plans. Some of the topics relevant to an understanding of coastal development have been presented in a range of other planning documents in a completely satisfactory manner, especially in some strategic documents such as the Development Strategy of the Šibenik-Knin County and/or the Spatial Plan of the Šibenik-Knin County; therefore, it was concluded that it was not necessary to repeat the analysis of some topics elaborated in those plans as separate chapters of this document. This Plan analyses primarily those aspects of coastal development which, in other documents, are analysed in much less detail, or not at all (for example, climate change), and those topics which are very important to the coastal zone as a specific spatial unit, and which are results of either a deeper analysis of certain facets of an issue (as in the case of the detailed analysis of the coastal zone's spatial development), or of a synthesis of several analytical layers (for example, the vulnerability analysis).

Therefore, in terms of its topics, the situation analysis should be seen as a supplement to the existing strategic planning documents, and in terms of geography, as a detailed observation of the coastal zone as a specific unit which is very important to the Šibenik-Knin County. Finally, the issue analysed here is also a reflection of the priorities which are important for identifying the determining factors for future planning in the coastal zone of the Šibenik-Knin County, and those are water, space and climate change.

3 DESCRIPTION OF THE COASTAL ZONE OF THE ŠIBENIK-KNIN COUNTY

3.1 Excerpt from the County's Spatial Plan

The main feature of the space in the County is its diversity. The County covers a territory which includes various natural features: a continental and hinterland area, as well as a coastal and island one. The coastal and island area is characterized by an exceptionally high indentation of the coast, with numerous islands, islets and rocks, and by the particularly valuable archipelago of Kornati, the 'densest' island group in the European Mediterranean. The space is jeopardized by unplanned development along the coastline and by frequent occurrences of the spoiled appearance of old settlements on islands, on the coast and in the hinterlands, typical of their karstic and Mediterranean features, resulting also in major differences in their development stages. The main strategic determinant of the development of this region is tourism, which sets criteria and measures regarding the use of the coastal zone, and measures for the improvement of the quality of the space and the environment.

Based on its natural features, the territory of the county has been classified in the Mediterranean coastal and island part of Croatia (the peripheral coastal zone with islands), the most indented part of the Mediterranean coast, and the Adriatic Sea. Characteristics of the peripheral coastal zone with islands are:

- highly indented coast with many islands, islets and rocks (and the Kornati group of islands as the most valuable part), and endemic island flora and fauna;
- mostly rocky limestone coastline, pebbly and rarely sandy beaches, endemic flora on the coastal rocks;
- rivers of the Adriatic Basin (Krka, Zrmanja and Cetina with their tributaries) with endemic fauna;
- submarine springs, mouths of karstic rivers, natural lakes;
- great marine biodiversity (Mediterranean monk seal, dolphins, sea turtles); and
- submarine caves with deep-sea and relict fauna.

3.2 Population development in the coastal zone of the Šibenik-Knin County

The main indicator of demographic processes is the population trend based on data from the population census, for the whole territory of the county, and separate data for two spatial units: the protected coastal area (PCA), and the rest of the County, outside the PCA. Figure 3.1 presents these two spatial units and a chart showing the population trend. At the beginning of the period under examination, the population of the territory of today's PCA (10 coastal town and municipalities) was nearly 20,000 lower than that in the rest of the County outside the PCA, which territory is nearly twice the size of the PCA. Following the initial population growth in both spatial units and its culmination in 1961, the population at the county level started to fall, particularly in the territory outside the PCA, and the fall has continued to this day. In the PCA, the population grew until 1991, while thereafter it started to decline gradually. The precise data concerning the population trend are given in tables 3.1 and 3.2.

Table 3.1: Population trend per spatial unit within the Šibenik-Knin County

	1948	1953	1961	1971	1981	1991	2001	2011
Outside the PCA	83,052	86,775	87,964	83,109	72,284	67,475	35,402	34,159
PCA	65,306	70,630	76,793	78,090	79,844	85,002	77,489	74,626
County	148,358	157,405	164,757	161,199	152,128	152,477	112,891	108,785

Table 3.2: Population trend per spatial unit within the protected coastal area of the Šibenik-Knin County

	1948	1953	1961	1971	1981	1991	2001	2011
Hinterland	21,131	23,030	23,524	21,032	18,297	16,494	11,275	10,486
Coastal settlements	39,973	43,530	49,788	54,750	60,132	67,315	65,218	63,212
Islands	4,202	4,070	3,481	2,308	1,415	1,193	996	928

Figure 3.2 shows the population trend for the three spatial units within the PCA. The first consists of coastal settlements, the second of those settlements in the PCA that have no access to the sea, and the third comprises the populated islands within the County. The units are indicated in the map in Figure 3.2, while the chart shows the population trend over time. As noted earlier for the territory of the whole County, here, too, the population trend in the coastal area is very different from that in the County's hinterland, and it can also be observed that, as regards population, the territory of the PCA is rather inhomogeneous. The coastal settlements have seen a significant cumulative growth, although the population has fallen even there over the last two census periods. However, the remaining two units – hinterland settlements and those on the islands – have witnessed a significant drop in their populations. The population of settlements in the interior has halved, and that of the islands has decreased to less than one quarter.

Besides the data relating to population trends, data regarding population structure perhaps speak even louder about the complexity of this challenge. The 2011 population census showed that the population of Croatia was among the world's 15 oldest populations. The percentage of elderly population is continually on the rise. The median age of Croatia's population is 42.4 years, making Croatia the sixth-oldest EU state. The median age in the County is higher: 44.1 years. The proportion of people over 65 in the County is more than 20%, while the proportion of those over 80 is more than 5%. In addition, when it comes to net migrations in Croatia's counties, the County is ranked third; it is the only coastal county at the top of the board. The comparative data for the population censuses of 2011 and 1991 indicate that the population in the coastal area fell, and also that the population in urban centres on the coast dropped by 19%. This was the largest fall in population among all the Croatian coastal counties.

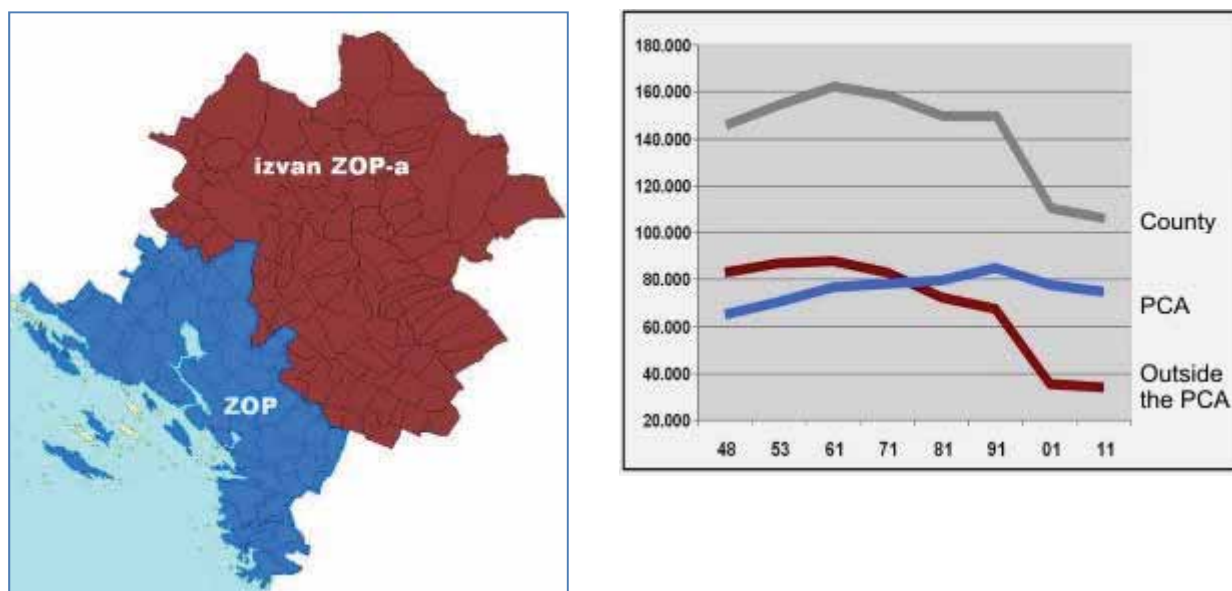


Figure 3.1: Population trend in the County and PCA between 1948 and 2011

The population trend described is clearly a result of several extensive processes, among which the most important are deagrarianization, urbanization and littoralization. Although these processes are not negative per se, their intensity has brought about a spatio-demographic imbalance, which has become irreversible in some rural parts of the County. Figure 3.3 provides a more precise picture of the spatial distribution of population in settlements, based on the population change index. A pronounced trend of population

concentration can be observed in several large settlements, especially those on the coast. Such settlements have seen multiple growth in their populations (led by the suburban settlements of Srma and Vodice). It is evident that, in this County as in the rest of Croatia, large settlements lead in economic, social and cultural development, and thus also attract the most educationally and reproductively vital population.

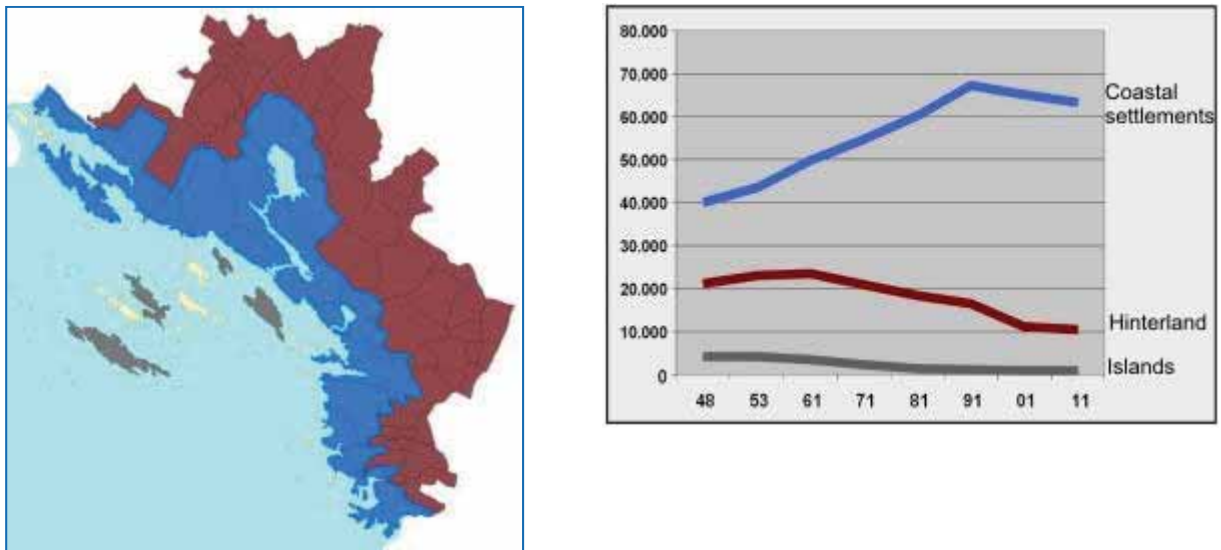


Figure 3.2: Population trend per spatial unit within the PCA between 1948 and 2011

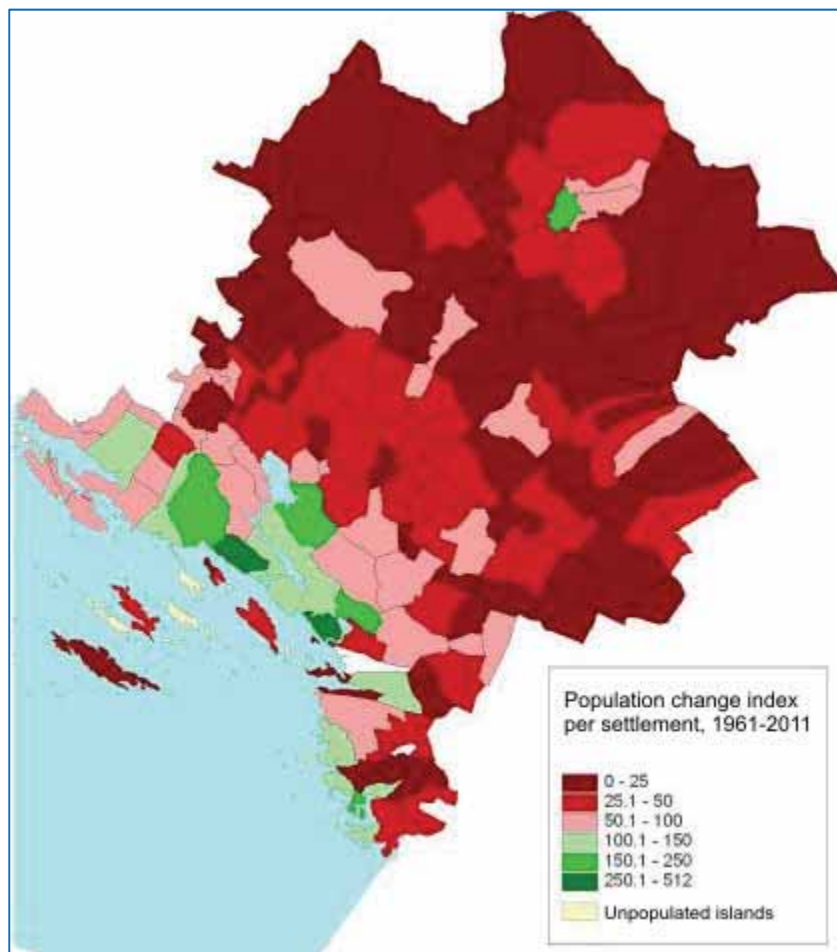


Figure 3.3: Population change index per settlement

3.3 Coastal morphology

From the geomorphological perspective, the coast is highly indented, characterized by karst, and mostly rocky, and it includes a number of inlets and bays. The island zone encompasses 285 islands, islets and rocks, the largest among them being populated. A special geomorphological feature of the County is the River Krka estuary, which reaches deep inland, resulting in seawater influence which can be felt as far as the Skradinski Buk waterfall. The total length of the coastline is 970 km.

The maritime part of the County covers the coastal segment and parts of the open sea. The coastal segment encompasses channels which are shallower in the coastal zone (for example, the Prvić Channel, which is up to 20 m deep), while the channels further from the coast are deeper (for example, the Žirje Channel, which is around 70 m deep). A specific channel area is that of the River Krka estuary, which is around 40 m deep in St. Anthony's Channel (*Kanal sv. Ante*) and becomes gradually shallower deeper inland, with a depth of around 10 m (Lake Prokljan) and less. The external section of the maritime part of the County includes parts of the Jabuka Pit, with depths of over 100 m.

The coastline is mostly rocky, but there are also numerous pebble beaches, and a few sandy beaches. In the largest part of the County, the gradient of the coastal slope is significant, except for the coast between Tribunj and Brodarica, and the northern side of the island of Murter, where the coastal gradient is gentle. In some areas, a very low coastal area reaches deep inland: for example in Zablacé and in the area of the lakes of Velika and Mala Solina, or the area of the Bay of Morinj. Several islands are also characterized by their low elevation: for example, Krapanj. These areas are critical as regards climatic variability and change, especially in case of a significant rise in sea level.

3.4 Water system

The waters of the Šibenik-Knin County belong mostly to the River Krka basin, with its coastal area and islands, and much less to the rivers Zrmanja and Cetina, the Lake Vrana basin, and torrents and groundwater drained in the area of Kaštela and Trogir (Figure 3.4). The catchment area of the River Krka and the Šibenik-Knin County includes surface waters of all categories: rivers, lakes, transitional waters, coastal waters and the territorial (open) sea.

According to the average water balance, the total freshwater resources of the Adriatic catchment area amount to $28 \times 10^9 \text{ m}^3$ annually, or $21,100 \text{ m}^3$ annually per capita. Within this territory, $14.22 \times 10^9 \text{ m}^3$ of own water is generated, amounting to $10,200 \text{ m}^3$ annually per capita. The average water availability per capita in the Šibenik-Knin County is around $18,000 \text{ m}^3/\text{year}$, which leads to the conclusion that this is a region rich in water resources. However, there is a general problem of water resources, including the groundwater in karstic areas, which is caused by long dry summers, when the capacity of natural sources is greatly reduced, and this is reflected in the flows of karstic rivers, which directly affect ecosystems in the low-lying and coastal parts of karstic regions. For example, in the month of August, the driest month, the total water availability per capita in the County is only around 250 m^3 . If we deduct from that amount the biological minimum ($5 \text{ m}^3/\text{person}$), the resulting water availability in the dry season is even lower and amounts to only around 130 m^3 per capita. In view of the above, in the dry season, the Šibenik-Knin County belongs among those regions with scarce water resources.

The situation is additionally complicated by the use of water for the purpose of water supply, leading to a high number of karstic sources that do not discharge into watercourses. This results in significantly lower flows in the river beds and undoubtedly adversely affects biological systems (flora and fauna) which are directly linked to the shallow underground and surface waters. A special case is that of zones in contact with the sea, because the reduced surface flows lead to a deeper and higher penetration of the sea, affecting biological systems and causing changes in them. Much of the high water during periods of intensive rain is accumulated to be used by hydro-electric power plants, which has also changed natural conditions, because

parts of karst fields and river gorges have been flooded. Nowadays, the overall situation is balanced, with its positive and negative impacts on earlier natural systems. Clearly, the expected climate change will modify the hydrological regime, and everything will change again and adapt to new circumstances.

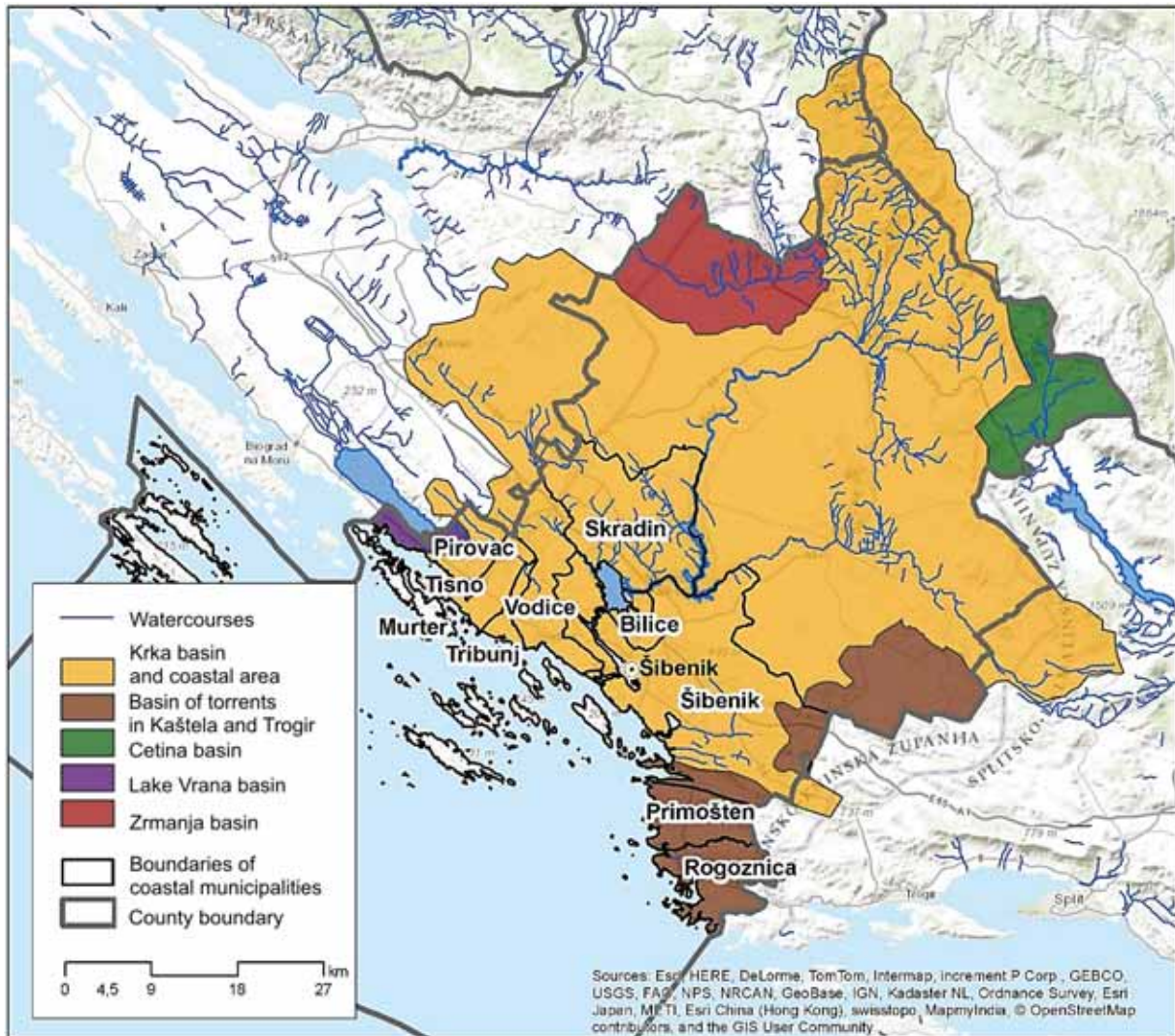


Figure 3.4: River Krka Basin

Based on the management plan for the waters in the Adriatic catchment area, the conclusion can be drawn that the condition of the River Krka catchment area is relatively good. No water body is a candidate for artificial water body or for heavily modified water body, which means that water bodies are natural/unmodified. The situation is good, although the control of sources of pollutants, both point and diffuse, is insufficient. A number of settlements have no waste-water treatment plants, and the majority of small settlements and peripheral parts of large settlements do not even have sewerage networks. Despite this situation, a contract signed with the EU foresees the construction of sewerage systems and waste-water treatment plants in all settlements/agglomerations in the County larger than 2000 Ne by 2023. Furthermore, it is expected that all illegal waste dumps will be rehabilitated, and that the construction of the Bikarac waste-management centre will be completed. With this, all significant sources of pollution would be eliminated, and the physical and chemical properties of the water would be even better. The following conclusions can be drawn for individual elements of the water system:

- **Rivers and lakes:** Generally, the hydromorphological situation is good in all bodies of water. Their physical and chemical status is also good, despite the fact that the majority of settlements within the catchment area have no waste-water treatment plants and that there are still solid-waste dumping sites that have not been eliminated and rehabilitated.

- **Transitional waters:** The ecological and chemical status of transitional waters downstream of Lake Prokljan is not good, while the condition of other bodies of water is good. This body of water is under significant pressure, and achieving a good status is in question.
- **Coastal sea:** It has been assessed that the condition of the coastal sea is good and that there is no risk to its good status.
- **Groundwater:** The condition of groundwater is good and there is no risk to their good status.

3.5 Natural systems

3.5.1 Marine biodiversity

The County's coastal zone features significant biodiversity, and for this reason some areas within it have been recognized as national parks (Kornati, Krka) and significant landscapes (the Žut-Sit island group, the Krka Landscape – lower course, and the Channel – Šibenik Harbour). Besides, nearly 20 smaller areas and micro-locations have been recognized as habitats of endangered species and included in the ecological network of the Republic of Croatia, developed in line with the protection standards for ecological networks under the EU's Natura 2020. An overview of protected areas and sites foreseen for tourist scuba-diving activities because of their significant biodiversity is given in Figure 3.5.

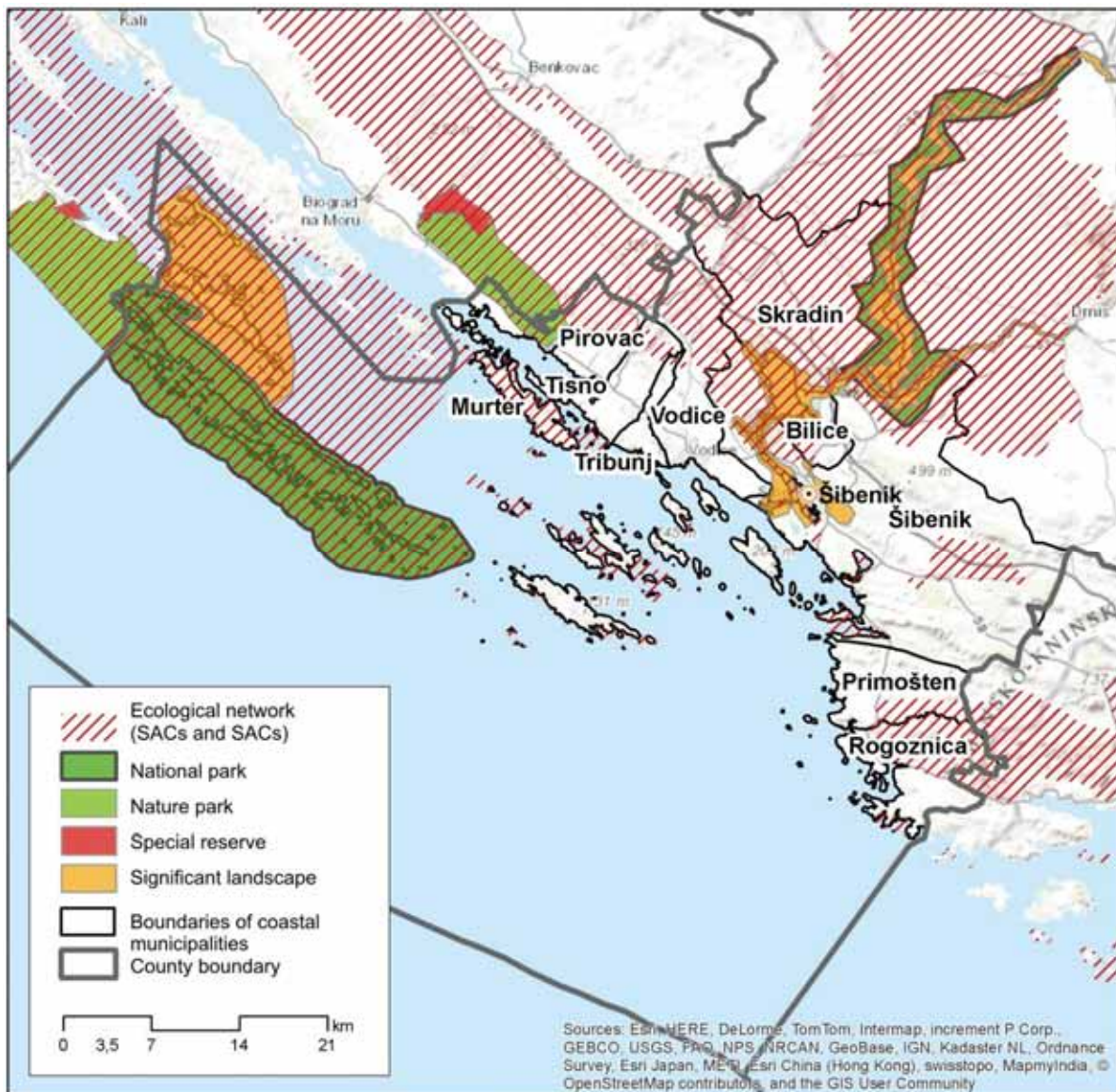


Figure 3.5: Ecological network, national parks, nature parks, special reserves and significant landscapes in the Šibenik-Knin County

In the coastal zone, the most adverse impact on biological and landscape diversity is caused by development, or rather overdevelopment, with particularly negative trends in the past several decades. Construction affects marine and land ecosystems and the environment both directly and indirectly. Infilling of the coastal area directly destroys immovable and barely movable organisms and changes the type of substrate, which affects landscape diversity and modifies the type of community and organisms living in such habitats. Because the infill material is washed away and eroded from the coast, the structure of the sea bottom and sediments are changed in a wider area, affecting the living conditions of sessile organisms inhabiting it.

Significant as generators of pressure on marine biodiversity are urbanized and tourist locations, including their waste waters, which change the biogeochemical properties of coastal areas. In this respect, particularly vulnerable is the River Krka estuary, which is rather enclosed, and this can result in a high concentration of pollutants, reduced levels of oxygen in deeper strata, and dying out of certain species.

Despite the pressures, the state of marine biodiversity in the territory of the County is good, especially in external parts of the coastal waters, which are less susceptible to pressures coming from the land. In the lower estuary of the River Krka the condition is worse, due to increased pressures on bodies of water. Certain coastal and marine zones are teeming with life, and, as such, they should be preserved for the future, which would be the basis of the County's economic development, especially in the field of recreational tourism. The best example is the Kornati National Park, with several thousand species of flora and fauna inhabiting its islands and the sea, and especially important areas covered by seaweed – habitats for a number of benthonic and pelagic species. One such example is the bottlenose dolphin (*Tursiops truncatus*), which lives in the Kornati area, and can be exploited for tourism, in a fashion similar to that employed in the surroundings of the islands of Cres and Lošinj.

The prominent marine biodiversity in the maritime part of the County, and especially in the area of the Kornati islands and the Žut-Sit island group, makes underwater tourism a feasible activity; it should be stepped up, while maintaining the high level of protection of biodiversity, as a basis for such tourism.

3.5.2 Areas protected in respect of water resources

For the purposes of this Plan, protected areas are all areas thus proclaimed pursuant to certain regulations, with the aim of ensuring particular protection of surface waters, groundwater, and unique and valuable ecosystems that depend on water, and especially:

- Areas intended for abstraction of water for human consumption (sanitary protection zones);
- Areas suitable for the protection of economically significant organisms;
- Areas for bathing and recreation;
- Areas prone to eutrophication (sensitive areas) and areas vulnerable to nitrates from agricultural sources;
- Areas intended for the protection of habitats or species and landscapes, where maintaining and improving the status of the waters is an important element of their protection, according to the nature-protection regulations;
- Areas with poor water exchange in coastal waters.

Two national parks are located within the coastal zone: Krka and Kornati (Figure 3.5). In addition, in this region there is the potential to revitalize water and water-related habitats. All such areas have certain needs relating to the quantity of their waters, and their morphological, physico-chemical and chemical status.

Environmental needs are also addressed indirectly through a classification of waters based on their sensitivity. The criterion is the water's sensitivity to eutrophication, and ecological demands. This cumulative criterion is determined by the quantity and physico-chemical condition of the waters, and by the features of the habitat. All surface waters in the County have been classified as sensitive waters, because they are all karstic waters used for water supply, and also with a view to protecting habitats and birds.

4 IDENTIFICATION OF KEY PROBLEMS OF THE COASTAL ZONE

4.1 Sustainability of spatial development

The subject of the coastal zone sustainability analysis is the impact of urbanization resulting from change of use, i.e. from the physical occupation of space (both land and sea) in the County's coastal zone, for various human needs and activities.

4.1.1 Quantitative use of space and rational use of coastal urbanized land

In an analysis of the anthropogenization rate of a certain territory, the basic insight is obtained from the percentages of total built-up areas in the total land surface of a given spatial unit. At the level of local government units in the PCA of the Šibenik-Knin County, the percentage ranges from 2.8% (for Skradin and Tisno) to 22.6% (for the municipality of Murter, excluding unpopulated islands), based on the built-up land data for 2011. The average percentage of built-up land is 4.9%, and it is not particularly high in absolute terms, but if we take into consideration the average population density of 80 inhabitants/km² (permanent residents), the percentage is by no means low. Therefore, a better indicator is the surface of the built-up part of the construction zone within the settlement per person. This indicator ranges from 393 m²/person (for the Town of Šibenik) to the extremes of 1,278 and 1,303 m²/person (for Rogoznica and Skradin). The PCA's average stands at 548 m²/person. Besides the rare and dispersed construction typology, such high values are caused by a large proportion of apartments for occasional use, i.e. apartments with no permanent tenants. If the data are corrected by making an assumption about the occasional population (and taking 2 persons per accommodation unit for occasional use), the resulting range varies between 191 m²/person (in Murter and Tribunj) and 940 m²/person for Skradin, while the value for Rogoznica, for example, with its high percentage of occasional residents, drops from 1,278 to 259 m²/person. According to the valid spatial development programme of the Republic of Croatia, the upper ceiling for the use of construction zones (built-up land) to achieve a rational settlement development is set at 300 m²/person. If those indicators are calculated for the coastal settlements, the resulting average percentage of built-up land is 6.8% (while for local-government units it is 4.9%), which is an increase of around 40%. As far as the built-up land surface per capita is concerned, it ranges from 437 m²/person to more than 5,000 m²/person (in Skradin, Gračac, Zlarin and Rogoznica Oglavci). The high values demonstrate an irrational approach to the construction of settlements and the use of land for their development. The consequences of such an approach are manifold, and not merely environmental, and they include:

- Dispersed construction, which requires a much longer road network and is much more expensive for the provision of municipal services;
- Unnecessary use of other categories of land, especially agricultural and woodland;
- Higher costs of energy and fuel, and consequently higher environmental pressure; and
- Loss of the traditional physiognomy of compact settlements, especially those on the coast, and spoiling of the original landscape values, which are particularly important for regions with high ambitions in tourism.

The analysis of the 'consumption' of land in the coastal region of the County also shows a high presence of apartments for occasional use, or settlements for secondary residence. Of all the coastal counties in Croatia, the Šibenik-Knin County exhibits the highest increase in apartments that are not used for permanent residence. The majority of them, around 98%, are apartments for leisure and recreation, and those rented to tourists. Interestingly, more such apartments were built between 2001 and 2011 (19,285), than in the entire period before 2001 (16,948), which is a unique case among all the counties on the Adriatic coast.

Figure 4.1 shows that the percentage of apartments for occasional use is greatest in coastal settlements, as can be expected, especially in Pirovac, Srma and several settlements within the municipality of Rogoznica. With the exception of the Krka estuary, in nearly all the settlements on the coast the percentage of apartments for occasional use is higher than that of apartments for permanent residence.

Another important indicator has to do with the construction zone as an instrument of spatial planning, used to regulate the development of settlements. The total construction-zone surface in the surface of the local government unit within the PCA on average amounts to 9.4%. The built-up land within the construction zones makes up 52.6% on average, which is barely above the acceptable minimum of 50%. Only in Murter does the built-up (or used) land amount to 86.4%, which, according to the Spatial Planning Act, entitles it to extend its construction zone. In Skradin and Šibenik, the percentage of the built-up land in the construction zone is under 50%. All these data regard the total construction zones. However, if we take into consideration only the construction zones within mixed settlements, i.e. settlements in which permanent residents live, then the average percentage of built-up land is somewhat higher: around 59%. If the same indicator is calculated for zones dedicated to economic activities, the average percentage of built-up land is only 26.1%, which is also indicative of a low level of interest and the economic decline of the region. The map in Figure 4.2 shows the level of built-up land in coastal settlements within the PCA.

The value of the average built-up-land indicator for the buffer zone in the PCA (excluding the unpopulated islands) is 10.6%, and just for the buffer zone on the land and the island of Murter it is 13.1%. At the level of the whole local-government units within the PCA, this indicator amounts to 4.9%, and at the level of coastal settlements to 6.8%. These indicators are the best illustration of the pressure on the narrow coastal strip and of the need to introduce a spatial-restriction regime. On the other hand, the percentage of the total construction-zone surface within the 1 km strip in coastal settlements (considering only the land parts of the local-government units and the island of Murter, and excluding other islands) represents an indicator of the planned built-up land and amounts, on average, to a very high 21.6%. If other populated islands are also taken into consideration, the value of this indicator is 17.6%.

The consumption of coastal land and the consequent loss of natural appearance (anthropogenization), lead to a loss or spoiling of natural, landscape and ecological values, and also to a diminished potential for the development of high-standard sustainable tourism. In other words, the weakening of other economic sectors increases the pressure exerted on the space as a tourist resource, while at the same time the overdeveloped and inadequately urbanized space loses the attractiveness necessary for the development of high-quality, high-income tourism.

Similar analyses have been done for the coastal strip of 1 km (Figs 4.3 and 4.4), which is, in terms of its nature, ecology and landscape, the most sensitive, and exposed to the greatest pressure for construction, primarily of accommodation units for occasional residence.

The European Environment Agency provides data on the built-up land (or urbanization-grade indicator, or land-take indicator) for coastal strips to widths of 10 km and 1 km. (Data are available for 1990 and 2000, while the data for the County are for 2011). The 10 km strip corresponds very well to the territorial scope of the municipalities and towns within the PCA, which makes the indicators comparable. Figure 4.5 reveals that countries such as Spain, France and Italy display a similar correlation between the built-up land in the two strips, and that it amounts to around 2.5. This means that the coastal strip of width 1 km contains a percentage of urbanized surface that is 2.5 times as high as that of the strip of 10 km. However, if we compare the absolute values of these indicators, and if we 'correct' them using the average population density, which is 3-4 times as high in the coastal zones of those countries as it is in the Šibenik-Knin County, we will see that the use of land for the purpose of urbanization in the Šibenik-Knin County, and along the entire Croatian coast, is relatively high. Particularly worrying are the indicators of planner urbanization (the uppermost red line in Figure 4.5).

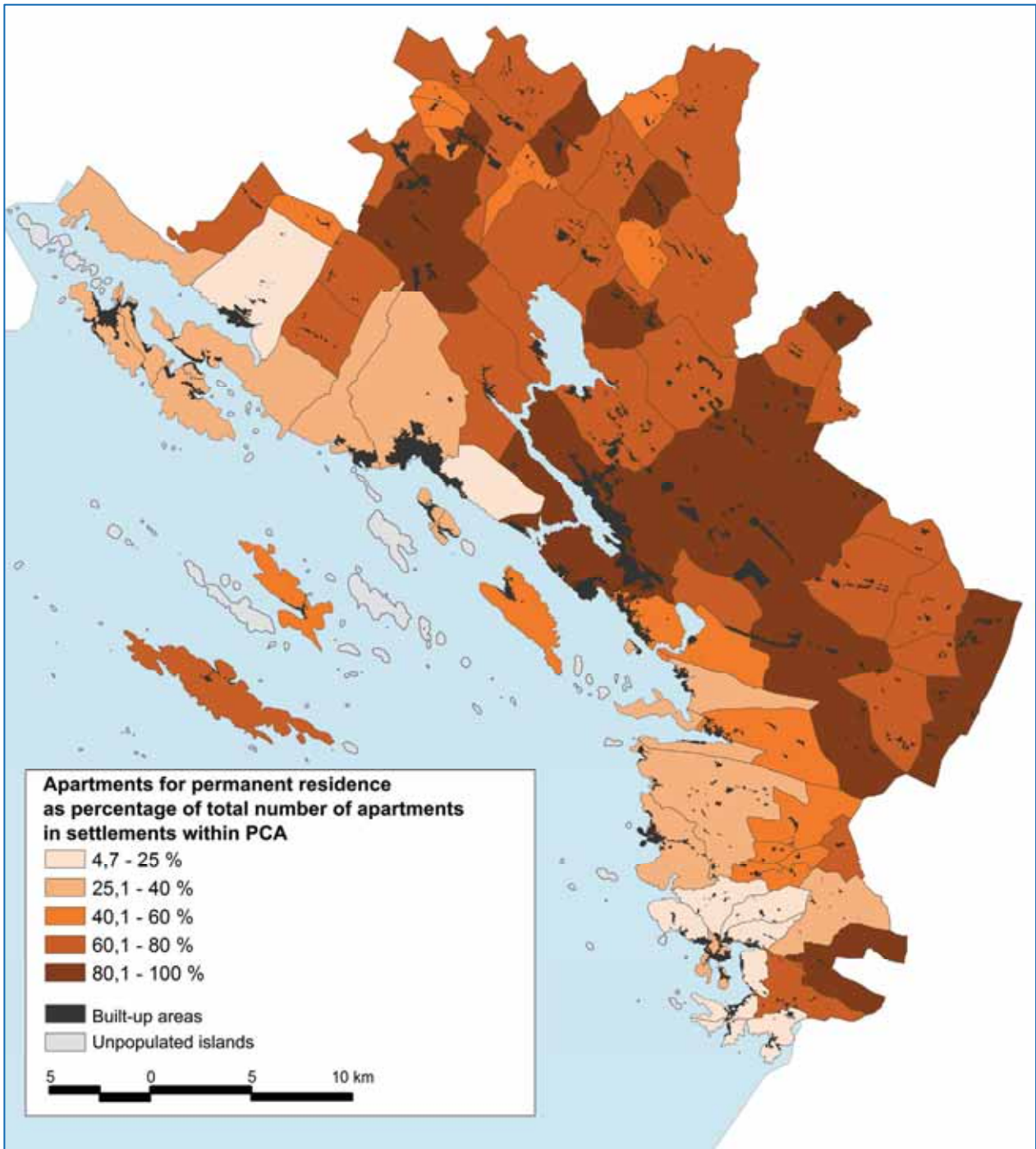


Figure 4.1: Homes used for permanent residence in settlements within the PCA

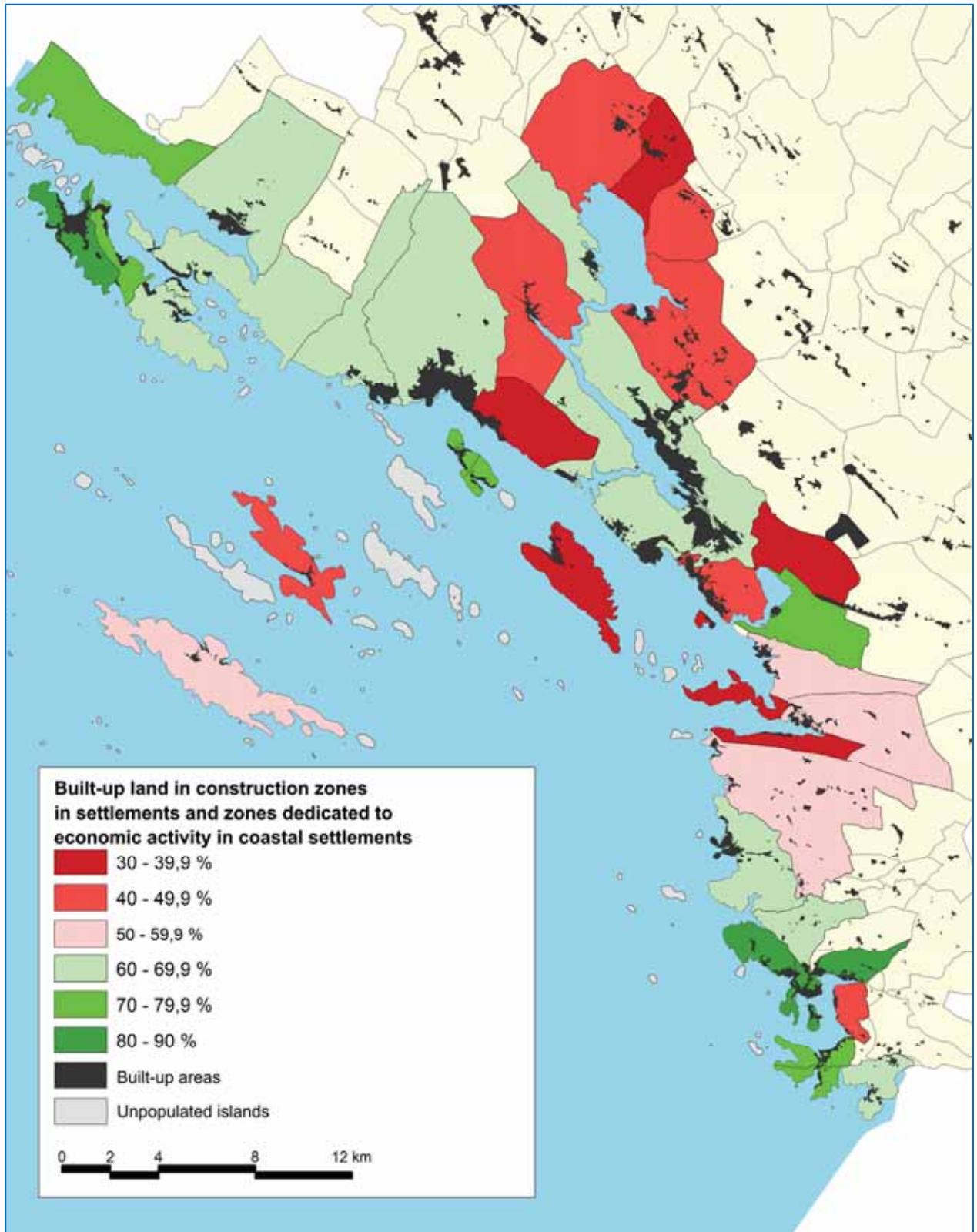


Figure 4.2: Percentage of built-up land in construction zones in coastal settlement

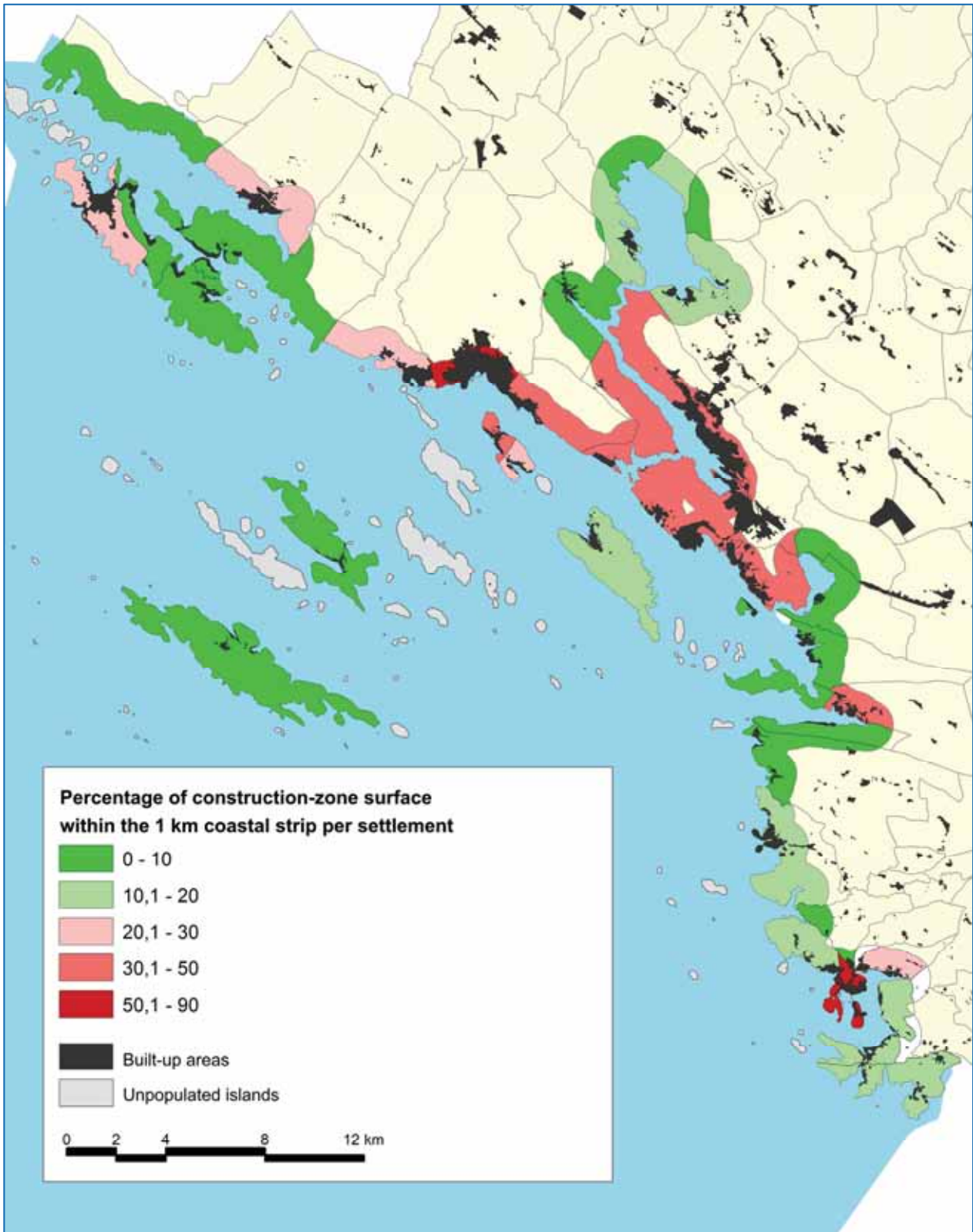


Figure 4.3: Share of construction zones in the coastal strip of 1 km

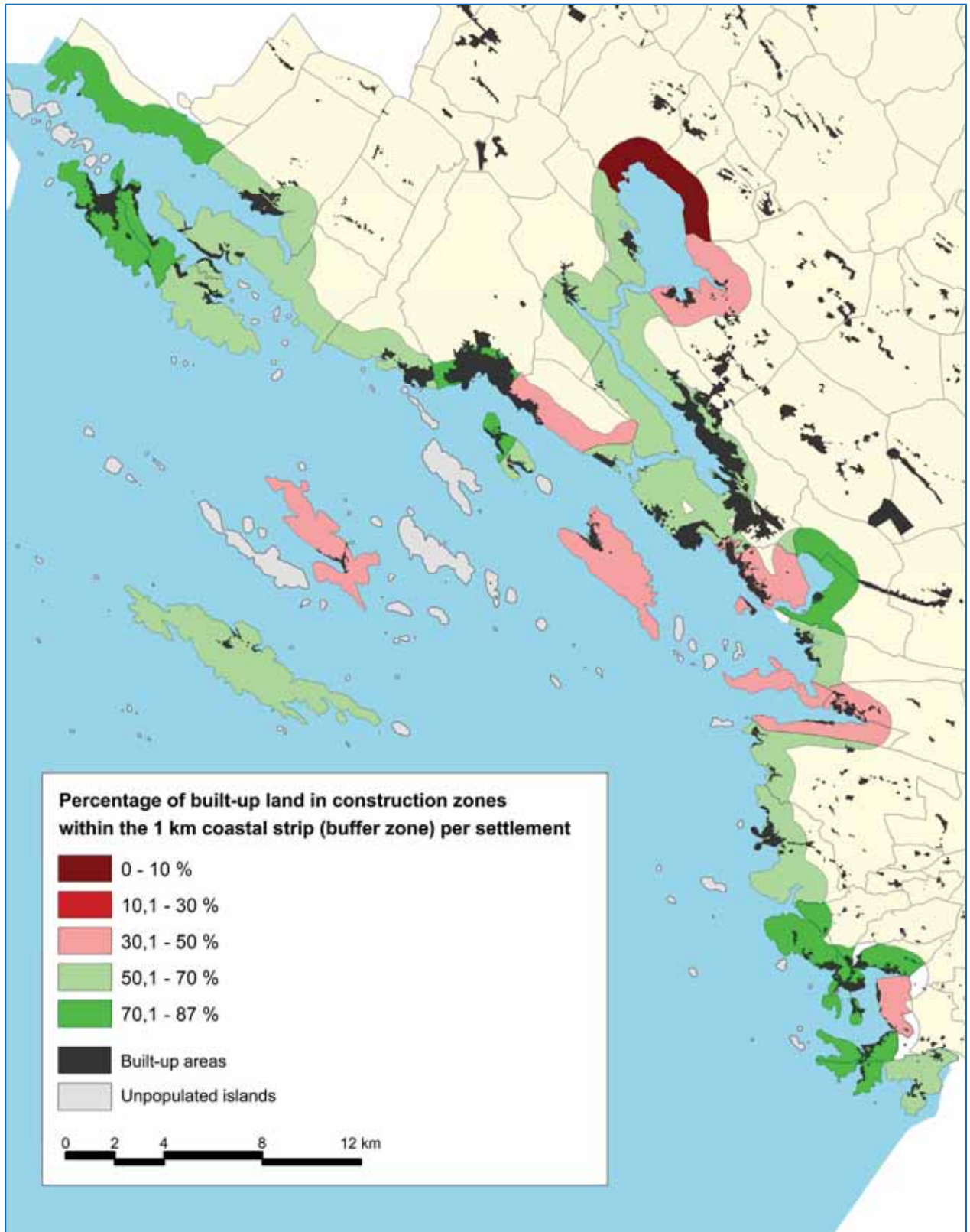


Figure 4.4: Share of built-up land in construction zones in the coastal strip of 1 km

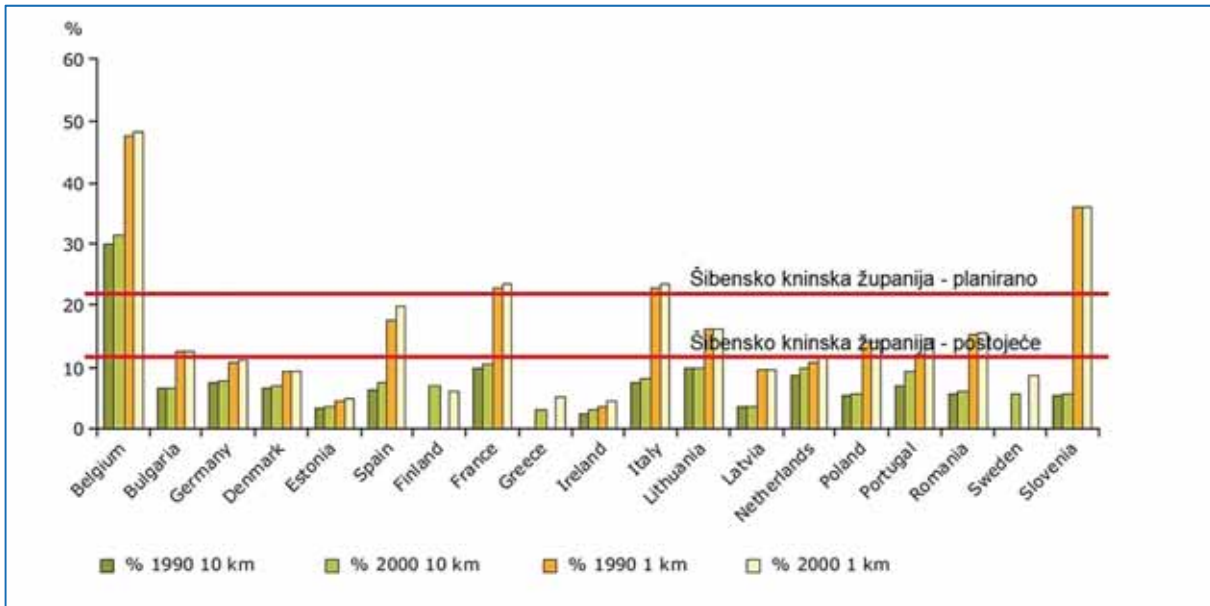


Figure 4.5: Comparison of planned and built-up land in coastal zone strips of 1 km and 10 km, 1990–2000 trend (source: European Environment Agency, complemented by data for the County)

The third indicator of sustainability of spatial development is the urbanization of the narrowest coastal strip, i.e. of the coast itself. Indicators for the percentage of the coast planned to be included in construction zones in the total length of the coastline in a settlement are given in the continuation (Figure 4.6). For the purpose of this analysis, the coastline has been generalized with a view to avoiding an unrealistic increase in the length of the coastline that would be a result of anthropogenic interventions (ports, marinas, wharfs etc.) The indicators have thereby been objectivized, and they now provide a realistic picture of the level of urbanization in the narrowest coastal strip. The length of the coastline thus generalized is around 367 km, and does not include unpopulated islands. Of this, around 103 km, or 28.1%, is within construction zones. A length of 78 km has been built up. This makes up 28.1% of the whole coastline, and 76% of the coastline within construction zones (103 km). Another interesting indicator is that of the land take per hectare of construction zone in settlements (Figure 4.7). Here, we can observe a broad range of values, from 5m to 70m of the coastline per hectare. Although this indicator is affected by some natural factors (relief, inaccessible coast), and the inherited, traditional settlement formation, it is also largely a result of choices made in spatial-planning documents, and a consequence of uncontrolled and illegal developments.

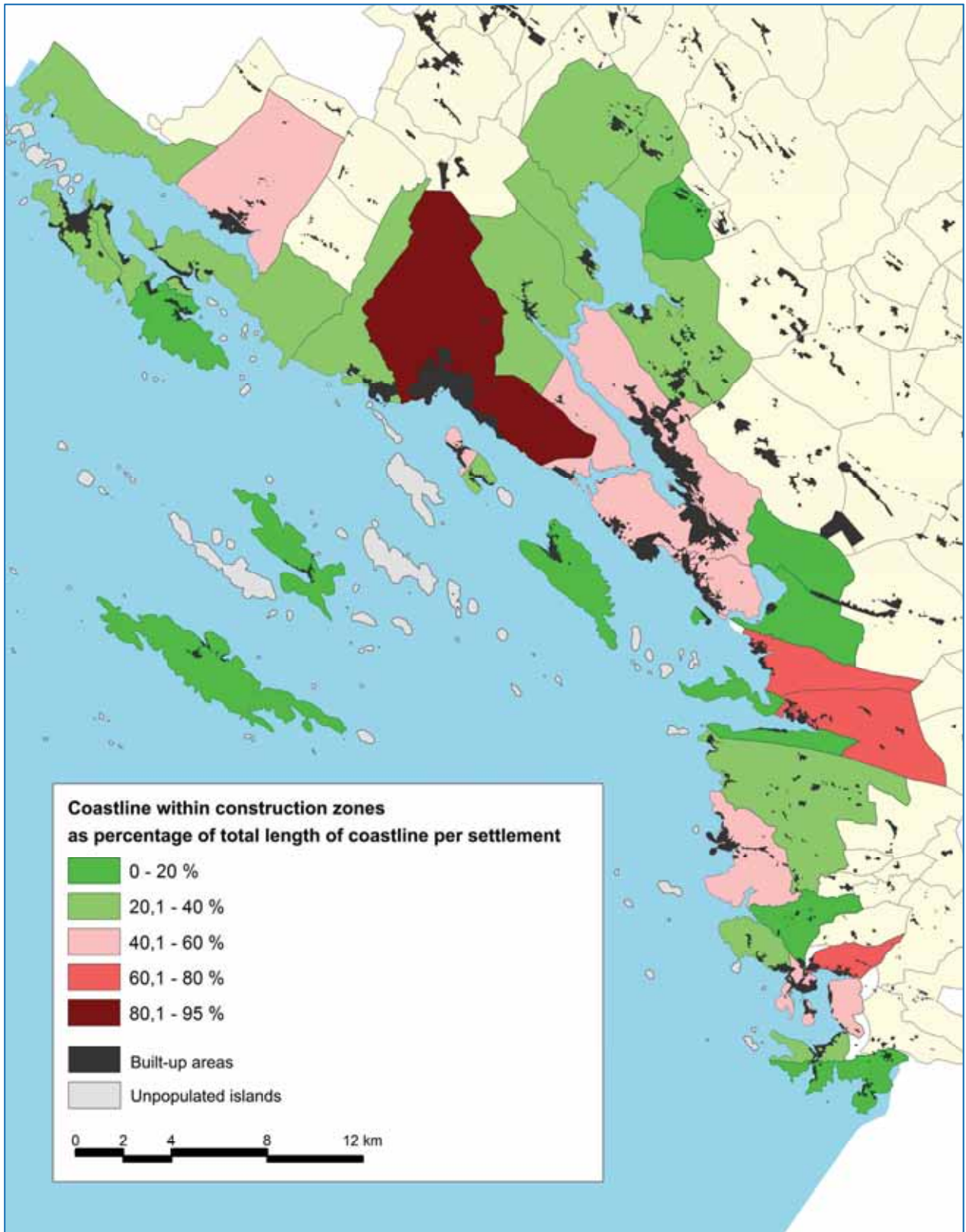


Figure 4.6: Indicators of anthropogenization of the coast

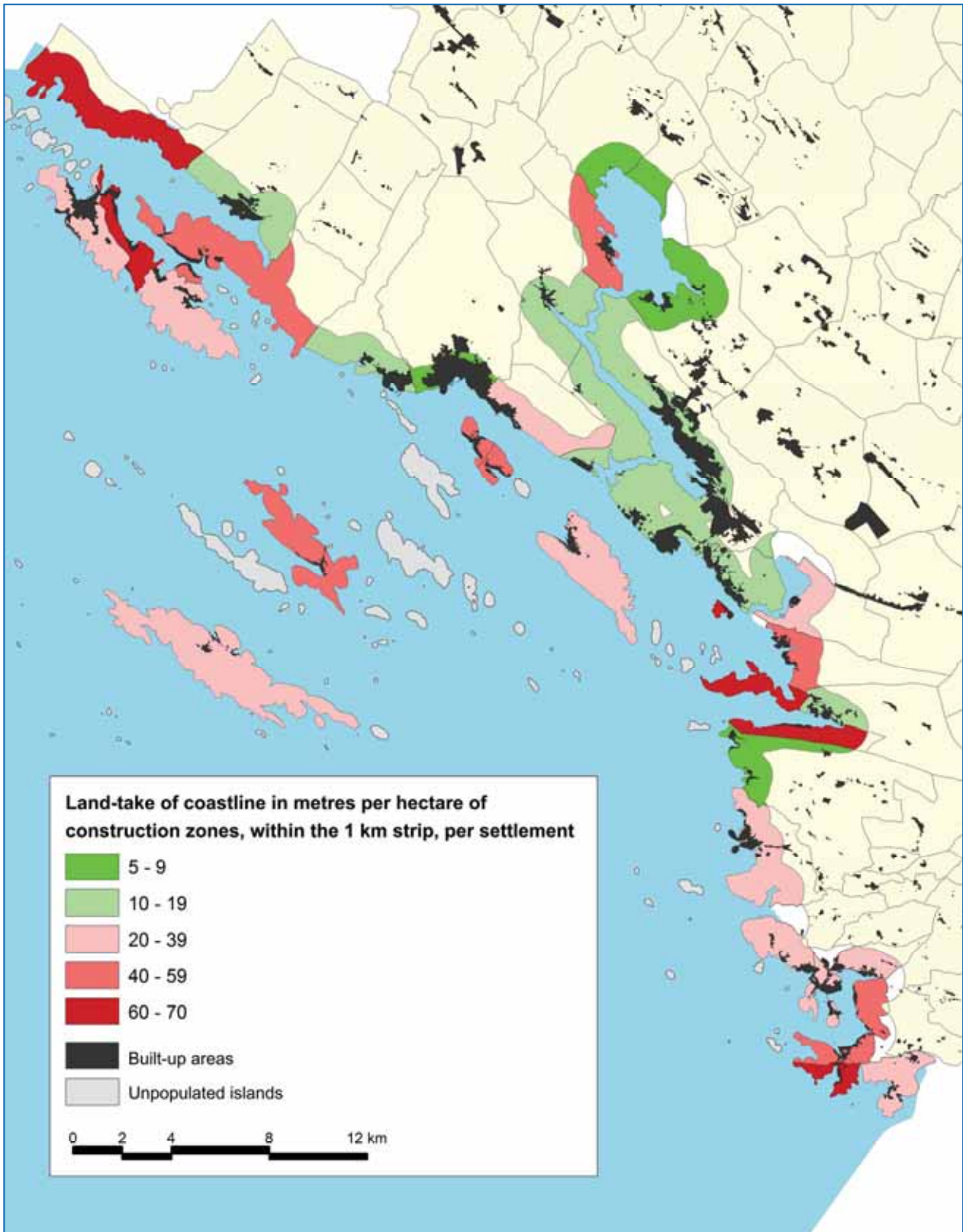


Figure 4.7: Indicators of the land-take of the coastline, i.e. of linear development along the coast

The analysed indicators suggest that the land-take is relatively high, especially in the narrow coastal strip. What is more worrying is the function the valuable land is dedicated to, and the quality of its development. The highest pressure is exerted by the construction of apartments for occasional use in the narrow coastal strip, often in positions which are very valuable. As a consequence, the level of urbanization of the coastal strip of width 1 km is high, and if the planned construction zones were to be built up, the natural and landscape values would be seriously jeopardized, resulting in an adverse effect on the development potential for high-quality tourism. It is worth mentioning that the unpopulated islands have been left out of the indicator calculations; if they were included, the situation would certainly be somewhat better, and the level of natural appearance of the coastline would be higher, especially from the point of view of nautical tourism.

From the perspective of real needs of the local population, the construction zones in settlements are generally oversized. (Spatial reserves allow for a population twice the size of today's). Spatial plans have hard times fighting back the pressures to proclaim new construction zones, especially for occasional residences, and it is clear that the spatial-planning sector is not strong enough to resist the pressure of all those who would like to profit from such development, which can easily be described as 'unsustainable'.

4.1.2 Municipal infrastructure and quality of built-up space

Even though the above analytical criteria suggest that the total land-take is within the limits of real needs and sustainable development aspirations, and even if the choice of land for urbanization takes into account the vulnerability and suitability criteria, the final result – the built-up and developed space – can be unsatisfactory. This analytical criterion regards the functional and physiognomic-morphological features of the built-up environment and the municipal infrastructure in it. An important element of the functionality of a settlement and built-up environment is the system of public spaces (including the roads used to lay down infrastructural systems) and public contents. The physiognomic-morphological features regard the quality of spatial design, compositional values of the settlement matrix, and respect shown for the initial landscape values and valuable elements of the local traditional settlement typology. The vegetation, and especially public green spaces (parks, tree-lined avenues), also represents an important element of the functional development, proper shaping and protection of a settlement's environment. Finally, the architectural design of individual buildings and their immediate surroundings is also an important element of assessment of the quality of a built-up area.

The analysis of the causes of unsatisfactory quality of built-up space leads to the fact that there are no instruments of land policy which would have, as their task, to secure spaces of public interest in settlements, and to ensure a just distribution of rights and obligations among all the landowners. It is nearly impossible to achieve a high quality of settlement reproduction without such instruments (for example, urban land consolidation), except for those cases in which big investors implement isolated comprehensive projects. Such projects are rare, while the majority of interventions, even on very valuable sites, consist of small individual interventions. In such situations, given the lack of land-policy instruments and of a high-quality urban plan, it cannot be expected that the spatial-planning solutions will be satisfactory. A question can even be raised as to whether it makes sense to draft numerous urban development plans that cannot be implemented, or are implemented only partially, while they are financially costly and time-consuming. The spatial situation in the County is a good illustration of the thesis that, while the Adriatic coast is the most valuable resource of the Republic of Croatia, it is also a victim of the weakness of the spatial-planning system, and especially of the lack of a land-policy instrument.

4.1.3 Spatial and development planning at the service of sustainable spatial development

The analyses presented above have provided an assessment of the situation as regards the sustainability of spatial planning. In this section, we will briefly analyse to what extent the spatial-planning system is used to ensure the necessary conditions for sustainable spatial development. Specifically, we will comment on the

functioning of the system, following the same groups of criteria that have been analysed in previous chapters of this Plan, considering the following aspects:

- Land-take and rationality of the use of space: The problem of overdevelopment and irrational use of space is not new, and it has been recognized as one of the most acute problems of the spatial-planning system in the national documents that are still in force: the Spatial Planning Strategy and Programme of the Republic of Croatia. The obligations regulated by these documents were not respected in practice until the adoption of the 2004 Regulation on the Protected Coastal Area, which established some specific, quantifiable indicators, or obligations, which called for a review of construction zones in the spatial plans of units of local government. The specific measures have yielded results in the form of new spatial plans, drafted since the Regulation was adopted. Some quick analyses have shown that, in the case of the Šibenik-Knin County, the construction zones have been reduced by 10-15%, which is a valuable contribution to the sustainability of the use of land. Taking into consideration the demand for space in the Šibenik-Knin County based on its demographic development, the current construction zones should clearly satisfy needs over the next several decades.
- Urbanization processes and vulnerability of coastal landscapes: The value and potential of a large part of the space in between the construction zones for various purposes is high, and such space has not been sufficiently recognized by formal protection regimes or by spatial plans. This is true of all the municipalities and towns in the coastal zone of the County. The preservation and design of such space are very important for the coastal zone's image and its attractiveness to tourists. Spoiling such space in general, and especially through the planning of stand-alone construction zones away from the settlements and through inappropriate dotted developments away from construction zones, will directly affect the quality of tourist development and positioning of the County in the future tourist market. The identification of valuable open areas of coastal zones which should be excluded from urban development in line with the criteria described is also prescribed in Art. 8 of the Protocol on Integrated Coastal Zone Management.
- Quality of built-up space: The infrastructure and quality of a number of recently developed areas along the coast are deeply unsatisfactory. There are many parts of coastal settlements whose development have been planned, but the contents provided in them, their design and infrastructure are not satisfactory. The main cause of this, and especially of the inadequate public spaces and contents in settlements, is the lack of land-policy instruments, and especially of urban land consolidation. The problem of illegal construction should be addressed, especially construction which goes against spatial plans, and which has destroyed some of the most valuable coastal sites in the County. Although illegal activities in the space, as such, fall outside the scope of the spatial-planning system, the fact is that the spatial-planning system should have, inter alia, efficient instruments aimed at eliminating this phenomenon.
- Development planning and space: One of the key issues in the coastal zone is the lack of a diversified and spatially dispersed economic structure. Such a situation is probably a consequence of insufficient capacity for designing and implementing a modern development strategy which would activate the available resources and spaces, and reduce the burden on the narrow coastal area. Bearing in mind the dependence on tourism and related activities, a rational development strategy for the County should strongly support protecting tourist attractions and their rational use. The same applies to the protection of land for high-quality tourist projects, especially hotels and mixed-use resorts. The development planning should make better use of diverse economic instruments, with a view to making easier decisions in the field of spatial planning and resolving dilemmas concerning the allocation of high-quality sites for various anthropogenic purposes. This regards primarily the evaluation of the economic impact of different uses of space, particularly from the point of view of public interests (jobs, tax revenue, resource exploitation rate). It is odd that the growth in occasional residence, in which, in the last census period, the Šibenik-Knin County was ranked first among all the counties) is not mentioned in the analyses of the County's development strategy.

4.2 Maritime-zone planning

Together with the Zadar County, the Šibenik-Knin County features the most indented coastline in Croatia. With its 250 islands and islets, and 2 national parks, this is an exceptionally attractive nautical region, making up around 28% of the total revenues generated by nautical tourism.

Figure 4.8 shows the immense growth in the number of ports for nautical tourists on the Croatian side of the Adriatic: from 2,131 moorings in 1980 to more than 16,000 moorings in 2010. According to the spatial plans of the counties on the Adriatic, by around 2015 this number should grow further, to more than 41,000 moorings. The number of vessels transiting through nautical ports has grown from 8,349 in 1980 to around 206,000 in 2010. Of this number, 45,000 vessels, or around 22% of the total number, were in the Šibenik-Knin County. These aggregated data for the whole Croatian coast are also indicative of the Šibenik-Knin County, which is often visited by nautical tourists due to its central location, though they are not statistically registered in this county. Although it is clear that the planned increase in the number of nautical moorings will not materialize, it can realistically be expected that the number of moorings will continue to grow, resulting in increased pressure on the marine environment. In contrast, the number of stationary 'land-based' tourist capacities of the Šibenik-Knin County, as with the number of bed nights in them, makes up less than 8% of the total number for the whole of Croatia, which is an indication of the County's marked specialization in nautical tourism.

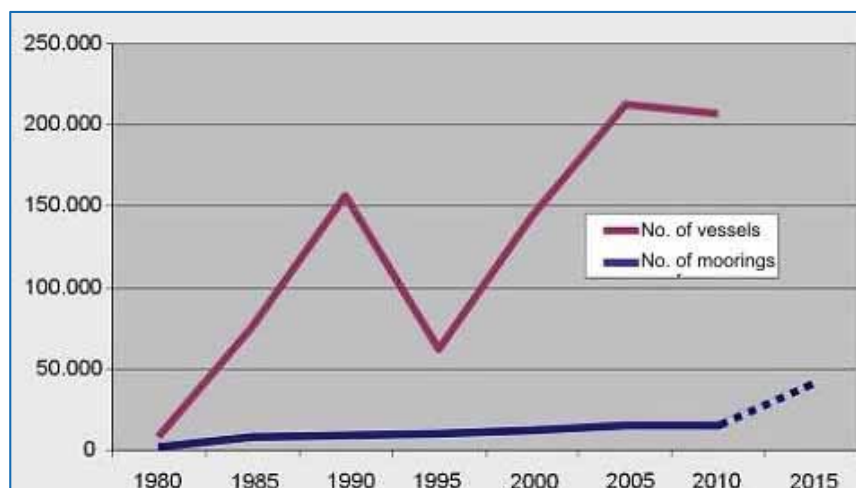


Figure 4.8: Development of nautical tourism on the Croatian coast since 1980, shown as an increase in the number of moorings in nautical ports and the number of vessels transiting through them

Some of the pressure on the marine environment caused by nautical tourism is a consequence of insufficient equipment and capacities of collecting devices for various waste materials; it is therefore necessary to identify zones in which vessels will not be allowed to release any waste materials. The River Krka estuary, up to the town of Skradin, is a typical nautical route which should be a candidate for a no-discharge zone for waste from vessels. Furthermore, in many cases vessels are moored in meadows of *Posidonia oceanica*, although defining mooring zones and setting up anchoring buoys in them could help alleviate, or better control, this situation.

Šibenik is one of about twenty destinations for international cruising ships on the Croatian coast and islands. The reconstruction of port infrastructure will result in increased activity in this sector, which creates large quantities of waste water, bilge water, various solid and hazardous waste, and ballast water, and there is a potential risk of their being released into the marine environment.

There are two types of conflict relating to the use of the marine environment. The first is conflicts between various activities, i.e. between the ways in which a sea surface unit and the marine environment are used. The second group of conflicts relating to the use of the marine environment is a result of the impact one

activity has on another one, if they use the same or nearby maritime space. This type of conflict is particularly significant for marine areas which traditionally belong to the public domain, and where their use for several purposes is a generally accepted practice. There are some interesting examples of conflicts within the same sector, or within the same type of use. One of them comes from the sector of nautical tourism. When nautical tourists' vessels are not moored in nautical ports (and other ports which they are allowed to use), they need to secure a safe anchor, especially at night. Traditionally, they anchor freely using their own anchoring systems. In recent years, the number of anchorages has grown which have buoys fixed to the sea bottom in various ways – for which concessions have been issued. Conflicts between concession-holders and nautical tourists erupted when 2013 amendments to the relevant Ordinance on Conditions and Maintaining Order in Ports introduced a ban on free anchoring within a 300 m zone surrounding the installed buoys in concessioned anchorages. So this conflict arises from a regime establishing some rights within the same kind of sea use. Petitions with thousands of signatures have been sent to the Ministry of the Sea, Transport and Infrastructure, asking for this provision to be abolished.



Figure 4.9: Illustration of the territorial scope of anchorage prohibition around the anchorage between the islands of Kaprije and Kakan in the Šibenik-Knin County. The small rectangles mark zones that are really needed by the anchored vessels.

Due to the increase in the number and scope of activities at sea and their impact on the condition of the marine environment, maritime-environment spatial planning is also becoming a necessity. The experience and methods applied in spatial planning on the land are not fully applicable to the sea, due to the more complex character of maritime areas (their three-dimensional nature, and multi-purpose use), making it necessary to develop suitable techniques and tools. Maritime spatial planning can be implemented at various levels, but it is generally advisable to engage in it at the national and regional levels.

4.3 Pressure on the water system

In the Šibenik-Knin County, water is abstracted on the River Krka, while the used (waste) water is discharged mainly into the coastal sea or transitional waters, and to a small extent also into the River Krka (town of Knin, municipality of Drniš, and other settlements upstream of the Krka National Park). The most important element of the protection of fresh waters is that relating to drinking water. In line with this regulation, the whole catchment area upstream of the Skradinski Buk waterfalls is classified into several drinking-water protection zones, from the 2nd to the 4th sanitary protection zones (Figure 4.10). In the County, there are two water-management areas (WMA): those of Šibenik and Knin. The biggest problem of these water-supply systems is major real water losses, which exceed 30% of the total amount of abstracted water, and the insufficient amount of water during extremely dry summers.

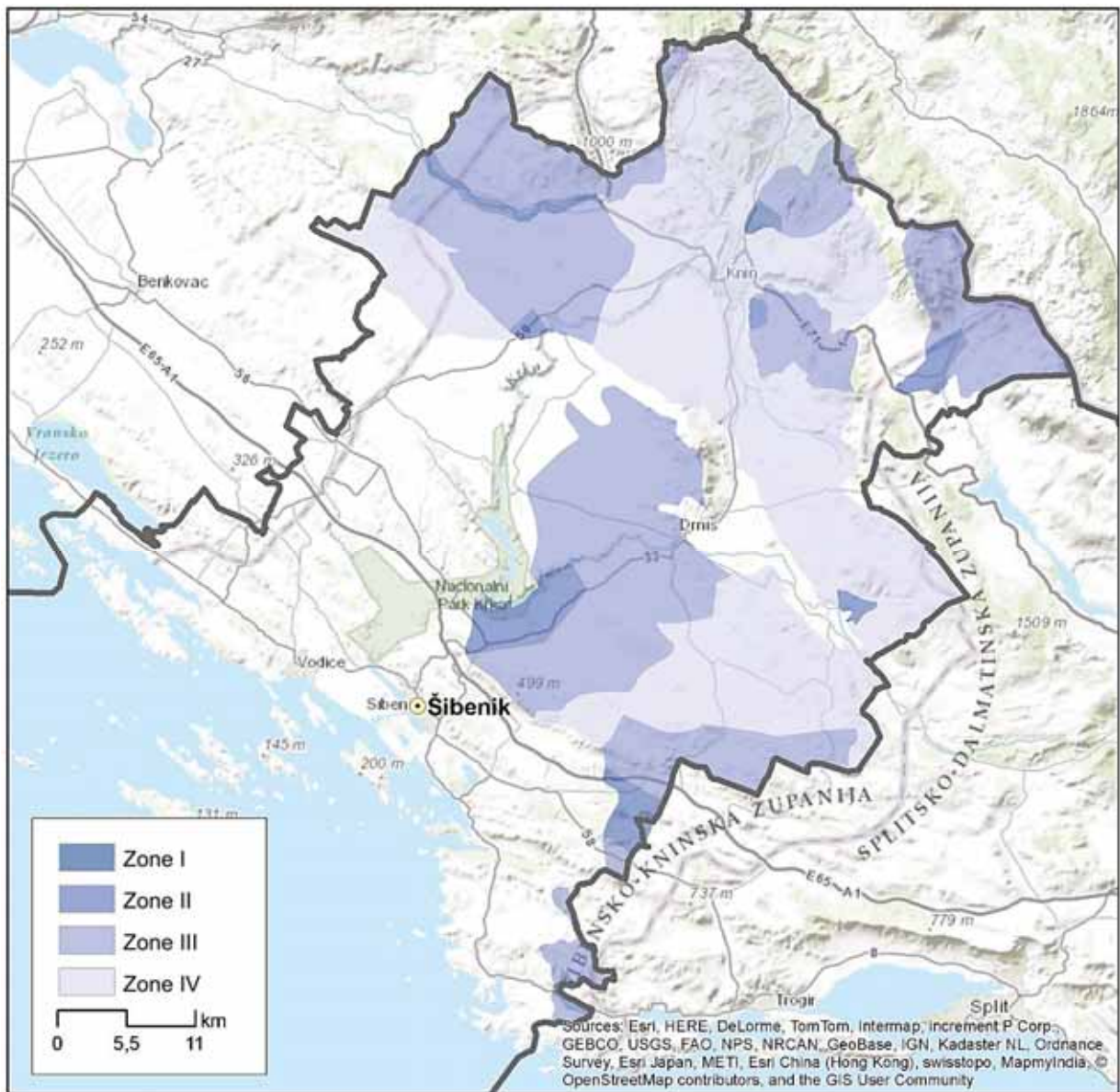


Figure 4.10: Water sanitary-protection zones

The annual water-use index is low, around 0.82%. For this reason there is no major conflict of different users of water concerning the available amount of water in the coastal zone. The average annual level of use of this resource is below 10%, so water is not considered to be a limiting factor for development, but rather an available resource important for development. One of the factors that have contributed to such a situation is a poorly developed irrigation system and industry. The largest user of water is the public water-supply system, supplying water to the local population, tourist facilities and industry. The capacity of the current water-supply system is satisfactory, and the regular water supply has not run into any major difficulties. However, water use depends very much on the season, given the seasonal character of the County's tourism. For the same reason, the seasonal water-use index is moderate, at a level of 6.7%. Another reason for such a situation consists of the climatic features of the region, and higher use of water during periods with higher temperatures. The use of water supplied by the public water-supply system is twice as high in August as it is in November. For this reason, the level of use of this resource during the dry months is moderate, around 13%, and it is believed that, in this period, water is a limiting factor for development. Any further growth in the tourist economy will bring an increase in these values. The same can be said of agriculture, because the demand for water is highest during hot, dry summers. If irrigation systems were to be developed, the seasonal use of water would increase further, and so would conflict with other users. In summer months the level of use can

be higher than 20%, and as such it demands measured and comprehensive water management, all with a view not to jeopardize the sustainability of use of the water resources.

In the territory of the Šibenik-Knin County, a significant hydropower potential is present in the watercourses of the Krka, Čikola, Krčić, Butišnica and Radljevac. The total power of the current hydroelectric plants is 62.3 MW, with an annual output of around 160 GWh. Within the territory of the Krka National Park, there are three hydroelectric power plants (Jaruga, Miljacka and Roški Slap), accounting for 55.36 MW of power (89% of the hydropower installed in the County) and an annual output of around 142 GWh (88% of the hydropower produced in the County). The abstraction and regulation of the water flows to serve the needs of the hydroelectric power plants in this region is significant in certain seasons. The problem arises in summer, when the flows are minimal. In order to preserve a minimum flow of water through the Krka National Park, the operation of hydroelectric power plants is restricted, and the Jaruga hydroelectric power plant usually does not operate at all during summer.

In recent years, fish and shellfish farming in transitional waters has been significantly intensified. In the territory of the County, a total of 32 concessions for shellfish farming have been awarded to date, as well as 5 concessions for fish farming in transitional and coastal waters. According to the concessions awarded in 2012, the total surface dedicated to shellfish farming in the County was 268,921 m², while 14,887 m² was dedicated to fish farming. Data concerning the quantities of fish and shellfish produced in these sites are currently not available. An indication can be provided by estimates that a capacity of around 50 t/year makes a salmonid farm with a surface area of 3,000 m² economically viable, and a capacity of 30 t/year does so for a salt-water fish farm with a surface area of 2,500 m². As for shellfish, it has been estimated that the economically viable capacity per farm of 3000 m² is around 70 t/year for mussels, and 8 t/year for oysters grown on a farm of 2,400 m². Most shellfish farms are located in transitional waters, in the mouth/estuary of the River Krka downstream of Lake Prokljan as far as Šibenik Bay (Figure 4.11). Given that the water surface in question is relatively small, the pressure is very significant. If we take into account the buffer zone established around the shellfish farm, the resulting space in the transitional zone which is open for other activities is small. When it comes to the coastal waters, in view of their large surface area, the use of sea surface for the purpose of mariculture is not intensive, and the pressure on coastal waters is not great.

Each year more than 4.5 million bathers are present in the County's coastal zone, 90% of them during summer. Using the sea for bathing (Figure 4.12) and various recreational activities generates sea pollution, and its most adverse effect is felt by the coastal ecosystems (located within the 200 m coastal-sea belt). At sites in which the coastal sea is used intensively, biological diversity has been much reduced. Given that, for the time being, tourism is still a seasonal activity, part of the biocoenosis recovers during winter, but only to be endangered again in the following season.

Point sources of pollution by municipal waste water include urban agglomerations, containing comprehensive systems of sewerage and treatment of municipal waste water, and these are currently present and planned for the future. Nowadays around 50% of households in the County are linked in to the sewerage systems, and even fewer are connected to the treatment plants. In the coastal zone, waste water is released directly into the sea through underground pipes of various lengths. In the area of transitional waters, a small treatment plant exists in Skradin, as in Šibenik. However, the connection rate is insufficient, and much of the waste and overflow water ends up in the sea without any treatment. In the River Krka basin, the situation is similar. For the time being, there are neither treatment plants nor comprehensive sewerage systems there, and all waste water ends up in the river, transitional waters and the coastal sea, either directly or indirectly through groundwater.

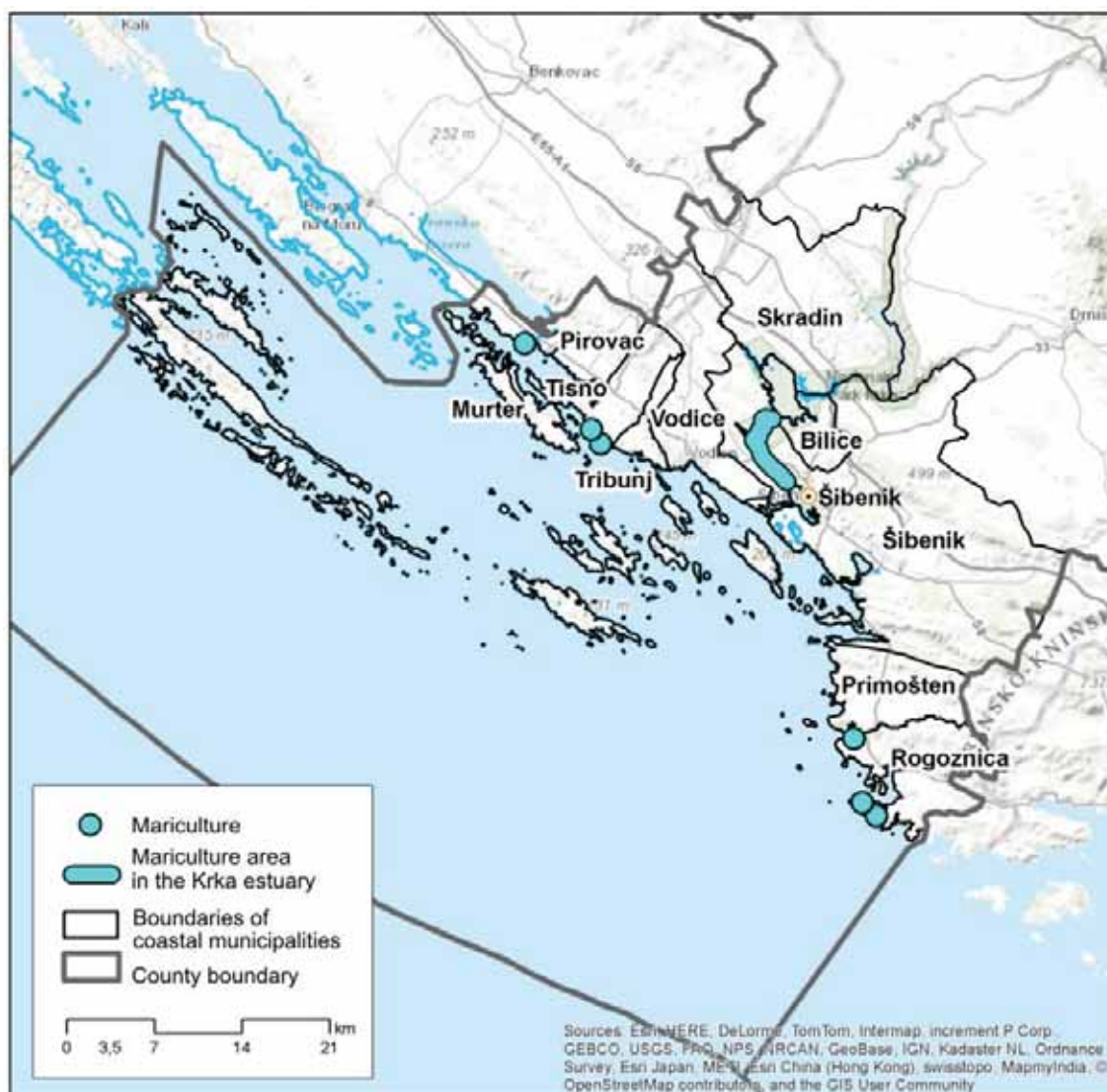


Figure 4.11: Distribution of fish and shellfish farms in transitional waters and the coastal sea

All these settlements and towns are located in the coastal zone, and they do not have adequate waste-water treatment plants or completed systems for collection of waste and rain water. Thus they currently generate much of the pollution in the water area of the River Krka, and especially of the Krka National Park and transitional waters. The impact is highest in summer, when the water flows are lowest. However, the situation is gradually improving, as sewerage systems and treatment plants are being constructed in Knin and Drniš; they should be completed by 2015. A treatment plant is also being installed in the Betina-Murter agglomeration. According to a contract signed with the EU, the situation should change significantly by 2023, and the pressure of the point sources of pollution will be much reduced.

The planned maximum daily load of all the treatment plants in the County is 264,700 PE, and of those in the coastal zone 229,700 PE. This load includes the industrial load of the municipal sewerage systems. With an assumed average plant efficiency of 70%, it has been estimated that the maximum daily charge of the waters in the County will be around 4,135 kg BPK₅/day. Flows from the area upstream of the Krka National Park will contain around 315 kg BPK₅/day (3rd grade of waste-water treatment). Such a load should not be a threat for the waters in the national park and the coastal zone. However, the bacteriological pollution could still be high, if the treated waste water is not disinfected. Significant industrial point pollution sources are generally connected to public sewerage systems. Still, some industrial zones, such as Podi, are not connected to a public sewerage system, but rather have their own small plants or septic tanks. The TLM plant in Šibenik has its own treatment plants and outlets.

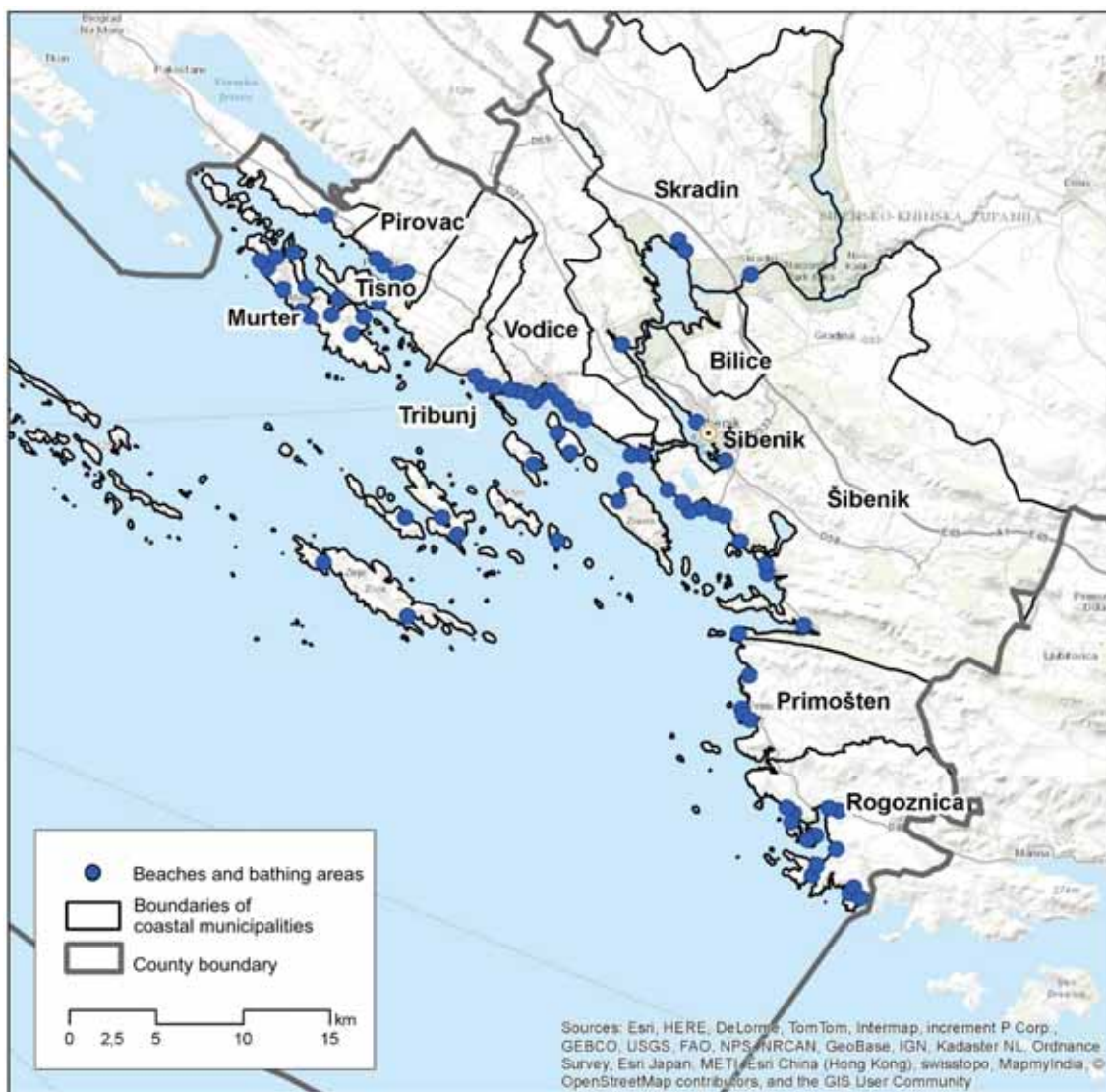


Figure 4.12: Distribution of beaches and bathing zones in the coastal sea

Land cultivation and animal herding are significant as sources of pollution only in the inland part of the County. Tilling and herding activities in the narrow coastal zone and on the islands are insignificant. However, such activities are significant even in the coastal zone and in its hinterland within the basin of the Krka National Park, where drinking water is abstracted. Important farming land can be found primarily in the surroundings of Knin and Drniš. The majority of it is covered by vineyards (around 6,000 ha), orchards (around 6,000 ha), vegetable and arable crops (around 26,000 ha). Fruit and vine growing can be a significant source of pollution because of the frequent application of plant protection products. Unfortunately, various protection products are increasingly used also in the production of vegetables. All such products wash off and end up in fresh and transitional waters, and eventually in the sea. Data on the total sales of protection products are unavailable, and it is hard to estimate the quantity that ends up in the water. In any case, this load should be taken into consideration because of its influence on the quality of water abstracted for human consumption, production of sea food (shellfish and fish), and its impact on the biocoenosis of the Krka National Park and the wider region. Animals are raised in the entire River Krka basin. Animal farming is mostly extensive and consists primarily of sheep farming and domestic animals kept in the vicinity of residential buildings, primarily for household use, but also for sale. In this region, domestic animals generate a load equivalent of around 250,000 PE, twice the size of the permanent population of the County. This is dispersed pollution present over a large territory, mostly disintegrated and consumed in the food chain, and only a small part of it ends up in the water, primarily with the first rains following a dry season.

Point pollution sources also include landfills for municipal solid and other waste. In this region, there used to be several wild landfills, and illegal dumps of municipal solid and other waste, including slaughterhouse waste (Figure 4.13). Landfills can be found all over the County, including the islands. However, their concentration is highest in the watershed area of the Krka National Park, and in the watershed area of the River Krka. This suggests that the fresh water of the River Krka, and also the transitional waters, are threatened. We can say that the coastal sea is not loaded with this type of water pollution.

It should be assumed that the situation has improved over the past several years, since much effort has been invested in improving the system of managing municipal and other waste, including the construction of the regional waste-management centre of Bikarac. The rehabilitation programme for illegal waste dumps was prepared in 2010. But if all the old, illegal waste dumps are not systematically rehabilitated, which means that the waste must be collected, extracted and moved to organized landfills, they will keep being sources of water pollution for a long time, especially in the basin of the Krka National Park (including the water abstracted for human consumption), and further downstream of the transitional waters. This karstic basin is very inefficient in terms of water retention and purification.

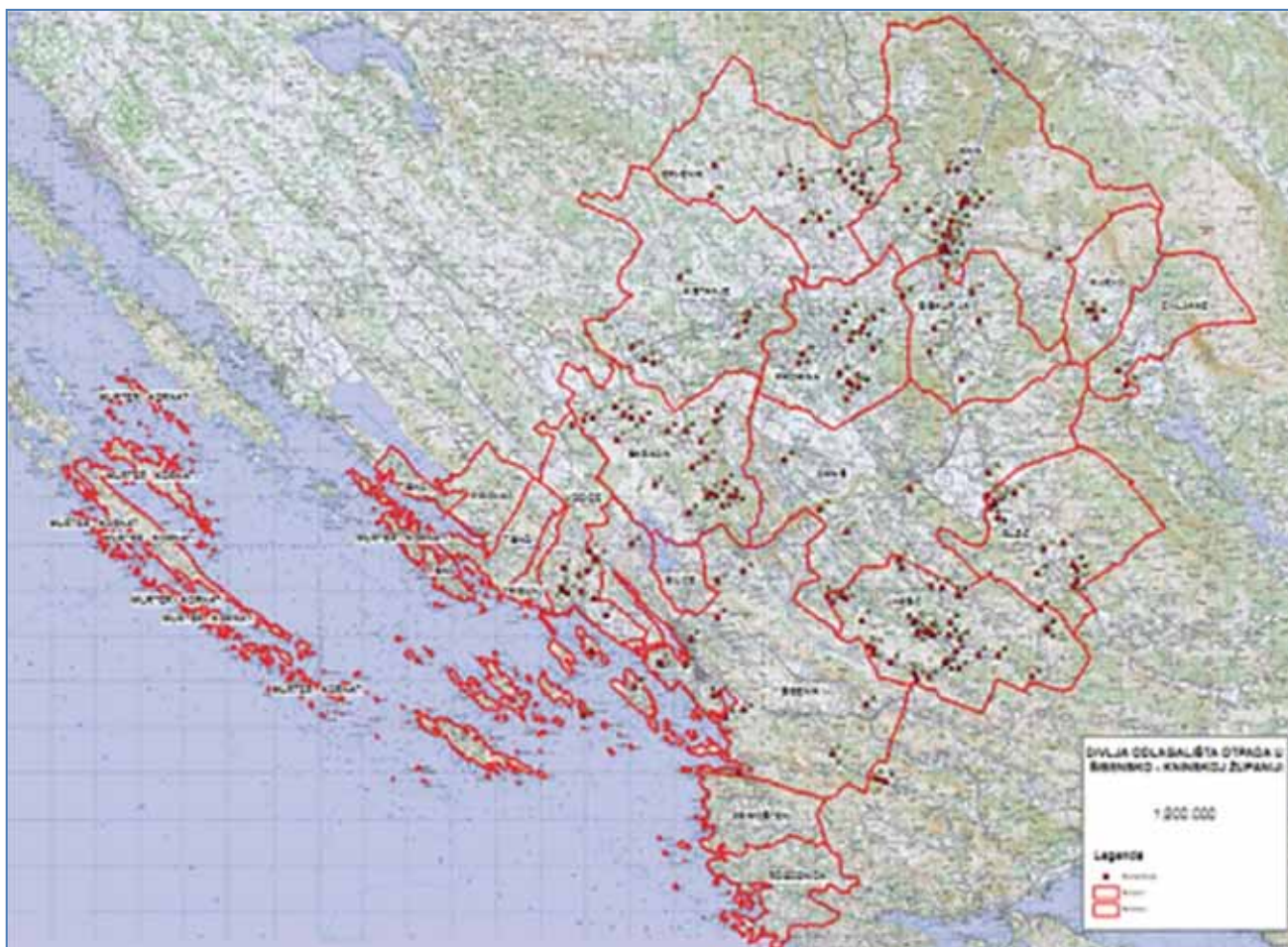


Figure 4.13: Current polluters upstream of the Krka National Park

Sailing in the waters of Šibenik and the River Krka estuary is very intensive, especially in summer, when many vessels cruise between the Krka and Kornati national parks. In this region, there are numerous ports, marinas, moorings and anchorages which are very attractive to yachtsmen. There are also regular ship and ferry lines linking the islands with the coast, and those running along the Adriatic coast. The maritime transport and vessels generate diverse sea pollution which threatens the quality of the water along the navigation routes and in stand-still locations. A special problem is caused by chemicals used as antifouling coatings for ships and various structures. Such substances pollute the environment and water-filtering organisms. The pollution

generated by ships' engines and waste thrown into the sea exerts strong pressure on the coastal waters in the whole River Krka estuary and in the coastal sea.

In the territory of the Šibenik-Knin County, there are 22 ports for county-level public transport, and 31 ports for local-level public transport – 22 of those are located in the same waters as the county-level ports, and 9 are situated in separate locations. 18 ports have the status of special-purpose ports, 12 of which are dedicated to nautical tourism. Maritime transport changes significantly with the season, and it is most intensive in the June-September period.

The pollution load and the pressure on the waters are structured strictly hierarchically, depending on the water characteristics, i.e. on the local hydrological cycle. There are several main spatial units in which the pollution problem emerges, and several sub-units within each of them:

- a. River Krka: 1st level is the watershed area of the Krka's source, or of Krčić, Butišnica, and Radiljevac and Kosovčica (territory of the town of Knin, municipality of Kijevo); 2nd level is the watershed area surrounding the Knin Plain and Biskupija (territory of the town of Knin, municipality of Biskupija); 3rd level is the watershed area downstream of Knin to the source of Miljacka (municipalities of Ervenik and Promina); 4th level is the watershed area of the Skradinski Buk waterfalls (municipality of Kistanje, towns of Drniš and Skradin).
- b. River Čikola: 1st level is the watershed area of the source of the River Čikola, or Vrba (municipalities of Ružić and Unešić); 2nd level is the watershed area of the River Čikola to Drniš (town of Drniš and municipality of Unešić); 3rd level is the area of the Čikola gorge, to the lakes (towns of Drniš, Šibenik and Skradin).
- c. Transitional waters of the River Krka, between the Skradinski Buk waterfalls and the sea beyond St. Andrew's channel (towns of Drniš, Šibenik and Skradin, and part of the town of Vodice).
- d. Coastal sea: 1st level is the sea in the Šibenik channel; 2nd level is the rest of the coastal sea.

The flood-protection system comprises protection against flooding of the River Krka, protection against torrents and draining of karstic fields. Interventions on the River Krka are restricted to some short sections of the watercourses upstream of the Krka National Park. The coastal zone and islands are threatened by many unregulated torrents and by inadequate developments which have cut many torrent courses. In the River Krka basin, flooding presents a problem in the area upstream of the Krka National Park, and occasional flooding also occurs in low-lying karst fields that the River Krka and its tributaries flow through (plains of Kosovo Polje, Petrovo Polje, Crivačko Polje, Ostrovičke Bare, Morpolača, Trolokve), and in certain locations along the torrent courses. The area most vulnerable to flooding in the River Krka basin is the Knin Plain, threatened by the Krka, its tributary Butišnica and numerous torrents. With a view to protecting the town of Knin, a separation dyke of 2 km has been built; it separates the Butišnica river bed from the Krka, and directs the mouth of the Butišnica further downstream from where its old mouth on the Krka used to be. An embankment has been built to the right of the river bed, and the narrow centre of Knin is now protected from the 100-year high-water record. Since 1981, the water accumulation of the hydroelectric power plant of Golubić on the Butišnica has also had a positive effect on the flooding. A major problem for flood protection is the deposit brought by the Butišnica to the Knin Plain and the area further downstream, which hinders the drainage of water from the Knin Plain. The deposit needs to be cleared away regularly, to maintain a satisfactory flow of the watercourses. For the time being, the level of flood protection in the territory of the Knin Plain is still unsatisfactory, with much of the agricultural land being regularly flooded. Downstream of the Čavlina Buk waterfall on the River Krka, no regulation or protection interventions have been made, except for those on some small torrents which occasionally flood the area surrounding short sections of their banks.

In the area of transitional waters (Lake Visovac), there are two torrent watercourses, Čulišić Potok and Rupe, which have not been regulated and cause damage to agricultural land between the village of Rupe and the Krka. The Goduča, Jaruga and Krivac brooks are partially regulated, and the surrounding agricultural land is flooded occasionally. On the Skradin Plain and in the town of Skradin, the torrents of Mokrica, Jujava and Rivina Jaruga cause major damage, which has been somewhat reduced with the construction of protective structures, but not completely eliminated.

In recent years, an increased number of floods have affected the coastal settlements in the County. The floods occur along torrent courses and in urban centres. In urban centres, low-lying parts of settlements are flooded more and more often due to the rising sea level. Actually, the biggest floods, and those that have caused the greatest damage in the coastal zone, have occurred in settlements. Such floods appear during periods of high precipitation, at times of cyclones and low pressure, as a consequence of a great inflow of torrent waters from the settlement's hinterland, surface water in the settlement itself, and high sea level. The floods are a result of unregulated torrents and systems of surface-water drainage within the settlement, and of low-lying coastline. They are also caused by the continuous rise in sea level, and the ever-increasing dynamic oscillations of the sea. Such floods undermine the built-up coastline and its stability, structures raised on the seashore, and urban infrastructure within the coastal zone. They also disturb the operation of the sewerage systems, causing sea pollution and problems in the systems' functioning. Floods wash off the pollution present on the coast, causing further uncontrolled pollution of the sea. The economic, social and environmental consequences of floods are ever-growing, and for this reason the problem should be analysed in detail. It is important to mention that the expected climate change will significantly escalate this problem.

An analysis of recorded sea levels which have resulted in coastal flooding has established that, in certain coastal areas, the sea level may rise between 0.7 m and 1.2 m. For this reason, all built-up coastline which is lower than that is already being flooded. A detailed analysis of all built-up coastal areas will identify the impact and planned effect of the sea-level rise caused by climate change.

Currently, the main problems affecting water protection in the Šibenik-Knin County are:

- Waste water from settlements and industry, and diffuse pollution sources, primarily illegal waste dumps and traffic;
- Intensive use of transitional waters from the Skradinski Buk waterfalls to the Šibenik channel (tourism, mariculture, seafaring, accommodation, industry, agriculture, etc.);
- Low capacity of water resources in summer, i.e. the minimal flows during summer in the whole basin, and especially in the territory of the Krka National Park, and there especially at the Skradinski Buk waterfalls. This problem is environmental (biodiversity), social (water supply) and economic (hydropower);
- Insufficient water for irrigation;
- Occasional shortage of water supplied to the population in summer, and the lack of replacement abstraction from other water sources. Any major pollution incident in the River Krka could significantly jeopardize the water supply in the County's coastal zone. This makes the system vulnerable, and consequences could be substantial.

4.4 Climate change and variability and their impact on the coastal zone

Global warming results in climate change (long-term growth in average temperatures and extreme climate phenomena), as well as rising sea levels and storms (physical impact on the soil, ecosystems, flooding and salinity). The coastal zone bears the cumulative brunt of such impacts from both the hinterland and the open seas. The expected climate-induced changes in Šibenik-Knin County will generally confirm with climate change in the Adriatic coastal belt and global trends within individual parameters (e.g. air temperature and sea level).

4.4.1 Climate pressures

Climate change and variability in the County's coastal zone are the result of changes proceeding at the wider regional and global levels. The most important elements of these changes are: growth in air temperatures, changes in the precipitation regime, changes in the wind regime, elevated sea levels, the higher surface temperature of the sea, increased salinity of the sea and changes in phenomena such as storm surges and tides (Table 4.1).

Table 4.1: Values of global temperature and precipitation changes and estimated trends for Šibenik-Knin County

Scenario		2030	2050	2100
Globally (IPCC)				
Temperature		+0.3 to 0.7°C	+0.4 to 1.6°C	+0.3 to +4.8°C
Sea level		9 to 17 cm	16 to 34 cm	27 to 97 cm
Šibenik-Knin County				
Temperature	Annually	+0.7°C	+1.7°C	+4.2°C
	Winter	+0.3°C	+1.0°C	+3.2°C
	Spring	+0.4°C	+1.2°C	+3.8°C
	Summer	+1.0°C	+2.5°C	+5.0°C
	Autumn	+0.8°C	+2.3°C	+4.6°C
Rain	Annually	- 2%	- 4%	- 7%
	Winter	+ 3%	+ 6%	+ 10%
	Spring	- 2%	- 3%	- 4%
	Summer	- 5%	- 20%	- 30%
	Autumn	- 6%	- 9%	- 15%
Sea level		9 to 19 cm	17 to 38 cm	30 to 114 cm

Long-term measurements of surface air temperatures indicate that in the entire coastal belt in the Croatian section of the Adriatic, including the territory of Šibenik-Knin County, air temperatures are rising. The values shown in the table were obtained on the basis of several regional climate models (Croatian Meteorological and Hydrological Service, ICTP, CNRS-GAME). The air temperature growth trends forecasted by regional climate simulations for the County's territory will continue to be positive. Thus, in the 2011-2040 period, the air temperature increases of approximately 0.4°C in the winter and approximately 1°C in the summer period have been foreseen in relation to the 1961-1990 period. During the 2041-2070 period, this increase has been forecasted at approximately 1.5°C in the winter and 2.8°C in the summer, while in the 2071-2100 period these increases will be approximately 3.5°C in the winter and 5.0°C in the summer.

The intensity of changes in the precipitation regime has thus far been somewhat lower, with a general trend of reduction in total precipitation in the coastal zone. Regional climate projections for the next several decades simultaneously foresee a reduction in precipitation in the summer and autumn seasons. Climate projections for the County's territory in the latter half of this century foresee slower increases in precipitation in the winter seasons and a much more notable drop in precipitation in the summers, which will be the result of a shift in cyclone trajectories toward the northern parts of Europe.

Changes in the wind regime over the territory of Šibenik-Knin County obtained with the help of regional climate models include reduced wind speeds, particularly in the summer and autumn seasons. However, at the same time, increased differences in air and sea temperatures are expected to cause an increase in day-night circulation above the coastal zone itself, which climate models still cannot properly reproduce. The reduction of winds in the summer seasons will therefore probably be of a lesser intensity. At the same time, no significant changes in the wind regime during the winters are expected.

Sea-level rise has been more rapid in recent decades, running at approximately 30 cm over 100 years. Record sea levels have been recorded in the past several years, and they are an indicator of the changes proceeding

and which will continue in the coming period. Projections of changes in the mean sea level indicate a further rise in the County's territory, at increments higher than previously. In the worst-case scenario, this change could reach up to 1 meter in the next 100 years, while the medium-range scenario foresees a sea-level rise of approximately 50 cm. These figures represent the mean values at the global level, while projections for sea level rise in the territory of the central Adriatic Sea have not yet been generated. It should also be stressed that the amount of flooding in coastal zones is not linearly dependent on sea level rise, rather the threats to coastal zones multiply increases with specific sea level rise, depending on the capability of coastal infrastructure to adapt to these changes.

Increased sea water temperature has been recorded in the surface of the Adriatic at 1 to 1.5°C over 100 years. Projections of the future climate in the Adriatic indicate that sea surface temperatures over the next several decades will grow an additional 1-2°C, while in the 2071-2100 period they will be 2.5-3°C higher than in the 1961-1990 period.

Increased salinity of the Adriatic Sea is a result of reduced river inflow and precipitation, and increased evaporation of the sea's surface. This is particularly notable in the coastal zones of Šibenik-Knin County, where the changes are approximately 0.4-0.5 ppt. Since lower precipitation and higher air temperatures have been projected in the future climate, particularly in the summer months, further increases in salinity have also been foreseen in the coastal zone, modelled at values of approximately 0.6-0.7 ppt. higher than in the latter half of the century than today. At the same time, due to the projected increase in extreme winter precipitation events, over brief periods there may be lower salinity values in the estuary of the Krka River, which may have an impact on the shellfish farms in that area. Climate change will lead to growth in salinity variables in transitional waters. In the future salinity will increase in the summers and decline in the winters as compared to the current situation.

Changes in storm surge phenomena (drastic sea level rises due to deep cyclones) and the height of surface waves caused by winds will not be more common in the future climate. A moderate decline in total storm surges and average height of major waves, but not in the intensity of the most extreme events, has been foreseen during autumn and winter months due to diminished average cyclonal activity in this part of the year.

4.4.2 Impact of climate change in coastal zones

The expected impact of the aforementioned climate pressures involves many aspects of the environment, as well as human activity and coexistence with the environment. This primarily pertains to water and water management, either in the sense of potable water or seawater, and the potential flooding of coastal zones, and the consequent impact on coastal infrastructure and buildings and coastal erosion. Climate change will affect the production of food and rural development, both in terms of humankind specifically – i.e., agriculture, fisheries and aquaculture – and the entire food chain, i.e., biodiversity on land and at sea. It will also affect other economic activities, such as tourism, port activities, transportation, supply and demand of energy, and other activities to a somewhat lesser degree. Climate change will influence both human health and ecosystem health. Extreme situations – storms, floods, droughts, and heatwaves – constitute special risks which demand heightened caution and new approaches. For the coastal zone, a particular threat is the higher risk of wildfires.

4.4.2.1 Impact of climate change on water, water management and water infrastructure

The expected changes will impact the hydrological regime, mean sea level rise and the physical, chemical and biological features of water. Changes in the hydrological regime will lead to changes in the size and distribution of surface waterways, primarily in the Krka River's watershed, and the capacity and levels of the groundwater basin of the Krka River and beyond in the entire coastal belt and the nearby islands. These

changes in mainland water will influence transitional ('brackish') waters and the coastal sea which are the ultimate destination of mainland waters, and particularly significant changes are expected in the zone of mixing, where fresh, mainland waters come into contact with seawater.

The impacts of change will be directly reflected in coastal ecosystems, as well as constructed infrastructure systems, buildings and activities, and indirectly through feedback in the socio-economic sectors of the coastal zones (the demand for water and food, natural resources) in the entire Krka River basin. Changes and impacts will differ all along the coast depending on the traits of the coastal sea and the hydrological system of mainland waters, the geometry of the geohydrological system, local hydrogeological parameters, and human activity. Finally, climate change will also influence the microbiological characteristics of the water captured for human consumption and waters used for recreation. By the same token, in the summers a rising sea level will lead to increased chlorides in the groundwater due to the reduced inflow of fresh water, thus increasing risks to the health of humans who drink this water. Higher surface temperatures on the coastal sea will be conducive to the development of other organisms which may be harmful to human health.

The County's typical coastal units and the water resources that climate change will impact more significantly are:

- the Krka River basin;
- the Krka River estuary, Prokljansko Lake together with the enclosed sea of Šibenik Bay to the point of contact with the open sea at the exit from St. Anthony's Channel, and together with the local coastal hydrological system (groundwater in these areas and local springs);
- islands (external and internal);
- open and sheltered inhabited (developed) shores, and
- bays/inlets and inhabited (developed) shores.

The especially threatened sections of the County's coastal belt from the standpoint of water resources are:

- Estuary of the Krka River from the Krka National Park to St. Anthony's Channel: the threat levels pertain to safety of the water supply, human health, security of life, safety of property, performance of economic activities at sea and in the coastal zone, sustainability of ecosystems in the national park and the river's mouth, and other concerns. This area is hydrologically, oceanographically, topographically and therefore ecologically quite complex, with a considerable pace of change during the course of any year due to its specific climatic and karst hydrological features and the specific nature of the contact with the open sea in St. Anthony's Channel. These features were in turn conducive to the corresponding development and growth, socio-economic activities, cultural heritage and other aspects of life in this unique area.
- Developed/inhabited coastal zones, with particular emphasis on the wider environs of Šibenik (Brodarica, Zabláče), and then the settlements in the wider environs of Vodice, Tribunj, Pirovac and Rogoznica. The threat levels pertain to: security of life, safety of property, and performance of economic activities at sea and in the coastal zone. Old low-lying harbours and all buildings and structures adjacent to them are exceptionally threatened.
- Islands: the threat levels pertain to: security of life, safety of property, and performance of economic activities at sea and in the coastal zone. The low-lying islands (Krapanj), old low-lying harbours and all buildings and structures adjacent to them (Zlarin, Prvić, Kaprije, etc.), and the outlying islands exposed to the effects of the open sea (Žirje) are exceptionally threatened.

Due to the increased variability of climate quantities, reduced precipitation and river inflows, and rising air temperatures (and the resulting increased evapotranspiration), the reduced capacity of potable water sources during dry periods (in the summer months) have been forecasted. Additionally, according to forecasts there will be increased tourist pressure on the coastal zone and islands in the County, which will lead to higher temperatures, water consumption and the consequent higher demand for potable water. This

will increase pressure on potable water sources, which may not be able to meet demand, so that solutions will have to be found to alleviate this problem and reduce risk. The most threatened areas will be those with the highest need for water during the summer, and this means those with the highest tourist capacity, as well as towns and settlements with a high concentration of both local residents and tourists, such as Šibenik, Vodice, the island of Murter, Pirovac, Primošten and Rogoznica. Additionally, the islands, most notably the outlying islands (Žirje, Kaprije), will be especially hard-hit by this problem due to their specific features and the constraints on increasing the capacity of water supply facilities.

Sea level rise will multiply increase the frequency and intensity of flooding in coastal zones. The duration and extent of flooding will increase in the coming decades, but particularly in the latter half of this century. Coastal flooding will impact human activities in the coastal zone, as well as human health and safety and the stability of coastal infrastructure (roads, pedestrian thoroughfares, docks, etc.) and residential and other buildings in the coastal zone. Sea level rise and the related coastal groundwater will influence the urban infrastructure (water supply, sewage, electrical power, etc.) and its sustainability and operation. The functioning of the wastewater and precipitation drainage system will become particularly problematic, as its capacity will be overburdened, especially the coastal discharge of spillover and precipitation waters. The impact on maritime traffic will also be considerable, because the height of berths has not been adapted to a significantly higher sea level.

The highest sea level rise, oscillations and wave action will be felt in the coastal cities and towns, such as Šibenik (Dolac), Vodice and other, smaller coastal and island settlements built over a hundred years ago, where the infrastructure has not been adapted to already recorded rises in the sea level. Additionally, low-lying coastal areas and islands (e.g., the island of Krapanj, the area from Zabláče to Tribunj) will be considerably more affected by sea level rise. The impact of sea-level rise, high and low tides, waves and especially storms will be felt on both the undeveloped and developed coastlines, where the previous beaches will be flooded, with intensified erosion and loss of individual sections of the coast. Coastal erosion will be more drastic at those sections of the coast that are exposed to tidal action and which do not have a rocky substrate, at sandy beaches and sandbars, and artificially raised sections of the coast, which will be threatened by seepage of seawater into their foundations (e.g. parts of Vodice, Murter, etc.). Changes in the temperature regime will ultimately result in changes in the water regime. Sudden and extensive changes in extreme weather, more abundant precipitation over short periods and the related floodwaters, longer droughts and the associated reduction in resource capacity and soil saturation have been projected. Sudden and abundant precipitation will generate abrupt and immense torrents, particularly on steep coastal runoff zones (torrential streams and gullies). These waters will flood and threaten anything downstream, thus everything situated in the coastal belt. Inhabited (developed) areas in the hollows of coastal hills will be especially threatened. The damages could be quite substantial. In uninhabited sections of the coast, these waters will convey immense quantities of debris into coastal zones and thus regenerate coastal deposits that tidal action will pull into greater depths. Floods will also occur in the Krka River's watershed, and this means that during floods there will be a threat of uncontrolled washing and conveyance of impurities from the watershed into water resources and the coastal zone. In this sense, the lake in Krka National Park will be particularly threatened by waters from the wider environs of Knin and Drniš.

4.4.2.2 *Impact of climate change on the frequency and intensity of wildfires*

The general perception is that the territory of Šibenik-Knin County is under particular threat and that wildfires are becoming more severe, with greater damage and larger surfaces engulfed, and longer-lasting than in the territories of other coastal counties.

In Šibenik-Knin County, forests are classified into four degrees of wildfire risk (table 4.2). Forests and forest lands classified in the first degree (highest wildfire risk) are relatively few in the coastal belt in comparison to the other degrees.

Table 4.2: Types of forests based on wildfire risk (ha)

Forest management district	1 st degree	2 nd degree	3 rd degree	4 th degree
Drniš	0	24,477	19,754	4,691
Knin	0	44,272	20,503	3,470
Šibenik	661	10,192	12,997	8,724
Šibenik-Knin County	661	78,941	53,225	16,886
Coastal belt	26,554	295,586	189,016	34,748

Over a ten-year period (2003-2012), an average of 745 wildfires per year was recorded, but out of this average, the years 2011, with 911 wildfires, and 2010, with 316 wildfires, stand out. In the 1994-2001 period, an average of 518 annual wildfires in open spaces has been recorded. During this period, the stand-out years were 1994 with 87 open-space wildfires, 2000 with 910 wildfires and 2011 with 911 open-area wildfires. As a rule, a higher number of wildfires also means an increase in the surface area consumed by fire, except in 2012, when a smaller number wildfires in comparison to the preceding year engulfed twice the surface area. The data trends from the 1994-2012 and 2003-2012 periods show an increase in the number of wildfires and the number of open-space wildfires (figure 4.14).

The open-space wildfire and burned surface damage statistics in the 2003-2012 and 1994-2012 periods (figure 4.15) indicate a rising trend. The year 2000 was one of the worst not just in Croatia, but also in Europe and the entire world.

Numerous sources are virtually unanimous in expressing the view that climate change is leading to an increase in the number and intensity of wildfires everywhere in the world, thus including the coastal zone of Šibenik-Knin County. It has similarly been noted that the wildfire “season” is beginning earlier than normal. While some wildfires may be attributed to anthropogenic influences, it is evident that they are a result of the fact that wildfires are very sensitive to climate change, particularly because higher temperatures increase the dryness of combustible materials and reduces relative moisture, which is a fact wherever precipitation is lower. As to anthropogenic influences, it is important to stress that existing land-use planning is often conducive to the occurrence of wildfires. This is a dual link. First, the unsuitable structure of land use, such as transforming forests into agricultural or other lands with less vegetation, increases greenhouse gas emissions. Second, land-use planning which neglects the fundamental principles of fire protection (high density, absence of transversal paths, etc.) increases damages when wildfires do break out.



Figure 4.14: Open-space wildfires and average surface area burned per wildfire, 2003-2012

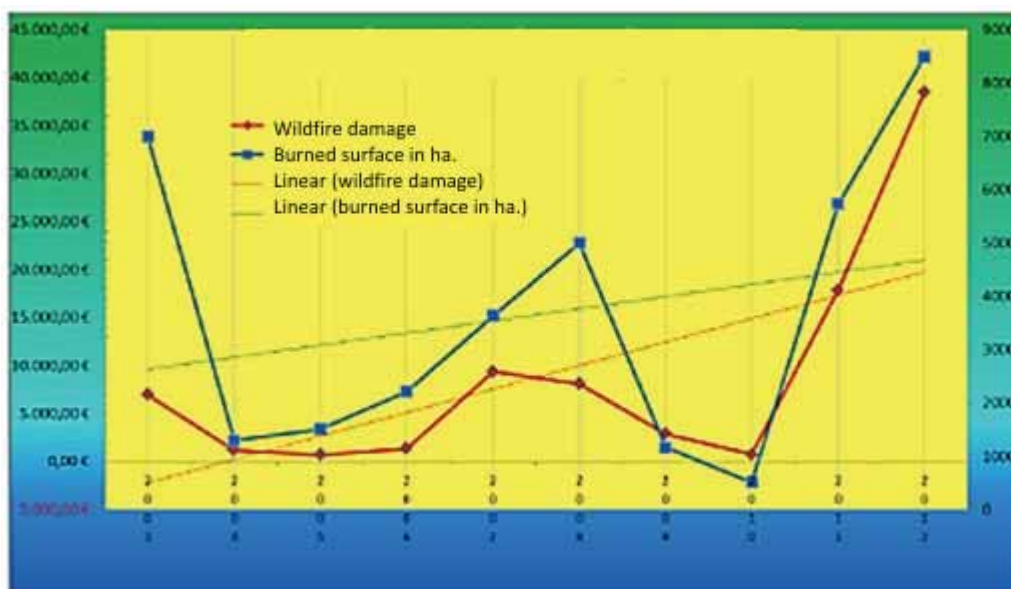


Figure 4.15: Wildfire damage (in €) and burned surfaces, 2003-2012

4.4.2.3 Other influences

Reduced precipitation and riverine flows, increased temperatures and solar irradiance and the resulting increased evapotranspiration will threaten agriculture, particularly crops requiring higher quantities of water for cultivation and growth. Higher air temperatures will also influence the selection of crops that it will be possible – and which will be economically feasible – to cultivate in the County’s territory. Changes in the temperature regime will also have an impact on the phenology of plants, i.e., changes in the growth cycles and ripening of crops. This will result in increased irrigation, which will in turn lead to conflicts over the use of limited water resources. Even though the County is not characterized by large agricultural tracts, the impact of climate change on agricultural activities will be felt in karst fields and flatlands, such as the fields surrounding the towns of Drniš and Knin and other, smaller karst fields (e.g. Dubrava, Donjepolje, Miljevci plateau, etc.) in the coastal hinterland.

Changes in sea temperatures and salinity, freshwater inflows and nutrient-rich salts can have both positive and negative effects on mariculture. Thus, the projected rise in sea temperatures may have a positive effect on cage farming of tuna and gilthead because they are better adapted to higher water temperatures, which are conducive to faster growth and accelerated reproduction. On the other hand, increased salinity in the Krka's estuary will have a negative impact on shellfish farms in that area, as will notable rises in temperatures, which have an extremely negative effect on some species of shellfish (oysters, for example). Additionally, extremely long-lasting and high inflows of fresh water during periods of extreme precipitation can cause die-offs of mussels at farms in the Krka River estuary. The impact of pollution that could also unintentionally come into contact with shellfish as a consequence of extreme events, such as floods in upstream areas (Knin) or in nearby coastal settlements, should also not be overlooked.

Climate change will also alter the composition and abundance of individual plant and animal species both on land and in inland bodies of water, and in the sea. Changes in plant phenology and the impact on their adaptability to a new climate regime with higher temperatures and less precipitation in the summers will largely dictate the level of change in overall biodiversity, since many animal species are linked to specific plant species and habitats. Rising temperatures in the sea will facilitate the expansion of warmth-loving fish and other species which have already been observed in the Adriatic's open waters. Reduced river inflows will lead to a reduction in the area of coastal waters, so these species will appear in higher numbers in the coastal zone. The Krka River estuary is an area where climate change will have the greatest impact on biodiversity. Other organisms and their impact on human and animal health, such as mosquitoes and other disease carriers, should also not be overlooked. At the same time, changes in temperatures as well as the regime and quality of mainland waters, especially still waters, will result in changes in the balance of nutrient-rich salts, lower oxygen concentrations, increased biological activity and oxygen consumption and so forth, which will ultimately result in altered biotypes and biocoenosis of mainland waters. The changes will be particularly problematic in lakes and at the mouth of the Krka River. The question arises as to whether and how rapidly the expected changes will affect tufa barriers and their stability. Such changes can also be expected in other parts of the coastal waters, where algal blooms may occur (especially in enclosed inlets adjacent to settlements).

The higher temperatures expected in Šibenik-Knin County in the summer period may have a negative impact on tourism. Excessive heat may cause tourists to begin bypassing the area during the hot summer months. This will naturally have negative repercussions for a large portion of the population which earns either direct or indirect income from tourism. Since it is to be expected that all of the negative consequences of climate change, such as shortages of potable water, wildfires and heatwaves that can result in health problems and the ensuing increased pressure on health-care institutions, will culminate in the summer months, all of this could contribute to a decline in the attractiveness of the wider area during that period. On the other hand, it is possible to expect pleasant weather in the spring and autumn months, given the expected rise in temperatures.

The expected sea-level rise, as well as instances of storm surges, will have a negative impact on most harbours due to the unadapted height of berths. Securing and docking vessels along the shore may become impossible during storm surges. This will certainly be vital to the port in Šibenik, Šibenik's shipbuilding industry and other low harbours and marinas in Šibenik-Knin County.

Many negative effects on human health will include increased mortality caused by heatwaves, increased risks of food poisoning and vector-borne diseases, as well as increased mortality caused by injuries sustained during floods. Indirect health risks include effects on water, wastewater and the energy infrastructure caused by extreme weather. A noteworthy, and potentially positive, effect is lower mortality due to cold temperatures.

4.5 Landscape value

An analysis of Šibenik-Knin County's landscape value was conducted for the belt extending 1 km from the coastline. Landscape units and landscape samples were recorded in the analysis based on data from CORINE LandCover. An evaluation of landscape units was prepared on the basis of assessments of reference examples of landscape samples and information on the use/level of development of an area. Areas already recognized as valuable landscapes, defined as natural and cultural heritage areas, were taken into consideration. The overall landscape value was determined as a set of assessments of landscape units and natural and cultural heritage areas. The most vulnerable landscape areas are those areas valuable due to the features of the landscape sample and visually very exposed. The next step in the analysis was to overlap the models of visually exposed more valuable landscapes and data on the use of an area. The objective of the analysis was to ascertain (potential) conflict areas in comparison to planned development areas in areas of more valuable, visually exposed landscapes.

Greater or lesser visible/valuable landscape areas inside developed areas were analysed. More valuable areas can be characterized as conflict areas. These areas can be specially treated in procedures to amend spatial planning documentation such that in case of major reserves of developed lands they become areas for their reduction and restoration as agricultural or forest lands. In order to achieve this, it would be advisable to analyse existing urban planning measures and application thereof and amendments thereto, such as: the minimum allowable percentage of green surfaces, the greening obligation, definition construction boundaries, stricter limitations on the height of structures, definition of permissible colours of façades and shapes and colours of roofs. In these areas, particular care should be dedicated to comprehensive urban planning, architectural and landscape architectural solutions, particularly in the management of the relief and greater use of (indigenous) vegetation.

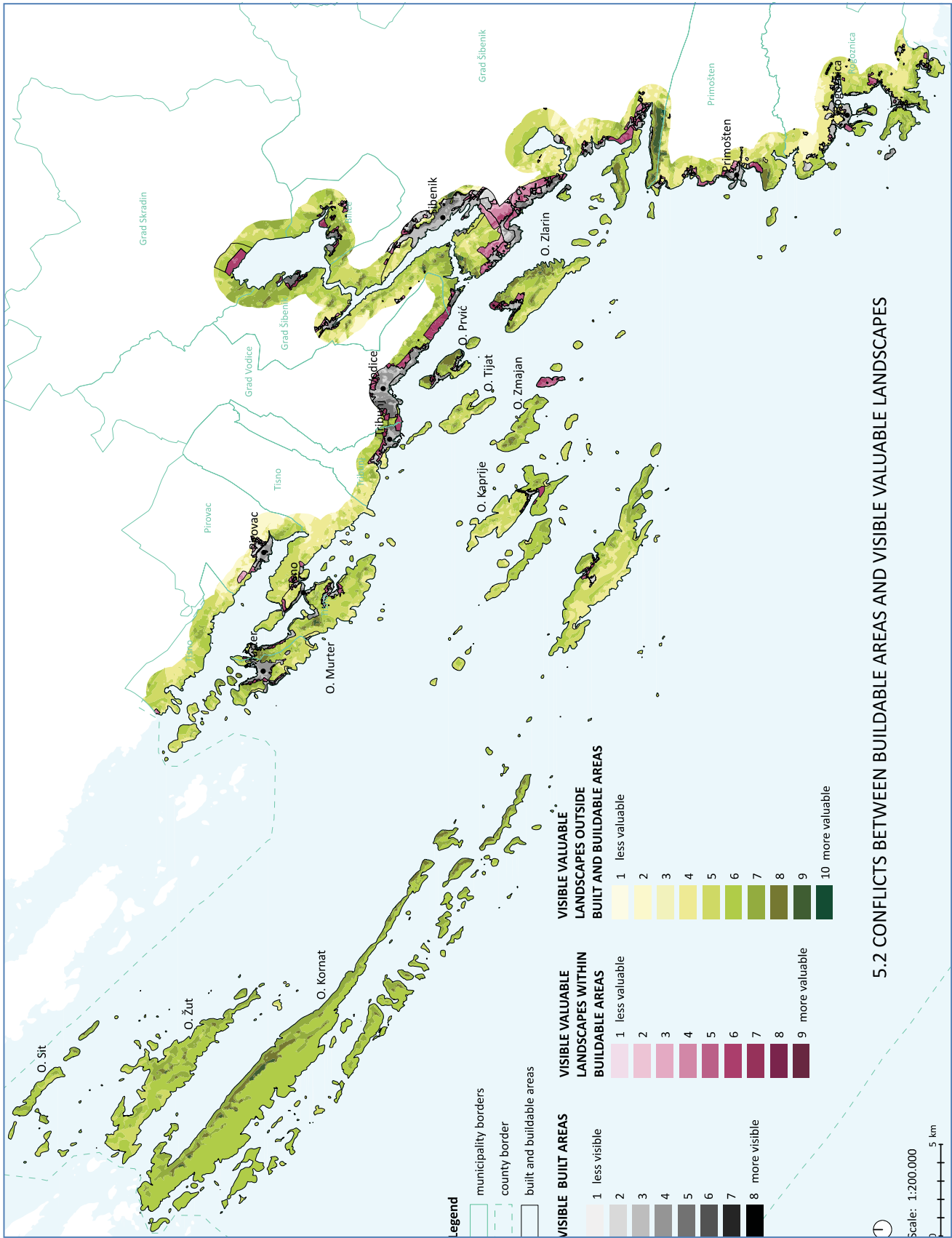
The following may be specified as conflict areas:

- west of the settlement of Murter, west of Betina and the area north and south of Jezera on the island of Murter;
- around Hartič and north of Tisno;
- around Tribunj and Vodice;
- south of Grbelj on the island of Prvić and part of the area around Prvić Luka;
- surroundings of the settlement of Zlarin on the eponymous island;
- around Muna on the island of Žirje;
- the settlements of Srima, Jadrija, Raslina, Vrulje, Bura, Stubalj and Šparadići;
- between the city of Šibenik and the settlements of Zablaće, Blato and Brodarica.

Greater or lesser visible/valuable landscape areas outside of developed areas were analyzed. In more valuable areas, it would be desirable to:

- prevent future re-zoning into construction land and avoid construction of infrastructure;
- define reasonable uses of the area and the appropriate urban planning measures in case the above is not possible (due to other spatial planning reasons), and preparation of comprehensive urban planning and landscape architectural solutions; and
- introduce measures to preserve and develop significant landscape features accompanied by promotion of traditional forms of agriculture, prevention of overgrowth, etc.

Figure 4.16 presents the results of an analysis of conflicts between development areas and valuable visually exposed landscapes in the belt extending 1 km from the coastline.



5.2 CONFLICTS BETWEEN BUILDABLE AREAS AND VISIBLE VALUABLE LANDSCAPES

Figure 4.16: Conflicts between development areas and valuable visually exposed landscapes

4.6 Coastal zone management

The institutional framework or institutional organization to manage resources can be most broadly defined as a system of legislation (formal laws, regulations and procedures) and informal conventions, customs and norms that dictate behaviour in the use of certain resources. The definition of so-called “governance” would not be far from these definitions. Within the context of the Coastal Plan, it seems to us that it would be most acceptable if governance were defined in the broadest terms as “...formal and informal arrangements, institutions and other factors which determine: how resources and/or the environment (in the broadest sense) are used; how problems and opportunities are defined, analyzed and evaluated; how behaviour is assessed as acceptable or unacceptable; and how rules and sanctions influence the formula for resource use.”⁵

Integrated management of Šibenik-Knin County’s coastal zone has not been institutionalized, which, after all, is also the case with the remaining coastal counties in the Republic of Croatia, and in many other EU member states or Mediterranean countries. The Republic of Croatia, as a long-time signatory to the Barcelona Convention and more recently as an EU member state, has, by ratifying the Protocol, undertaken the commitment to organization an institutional ICZM system. Currently, at the national level there is only an interdepartmental body for ICZM and it mainly plays an advisory role. Additionally, the spatial planning system, through the development of planning documents at all levels, practically provides a framework for intersectoral coordination. It remains to be seen whether this interdepartmental ICZM body can, or must, evolve in the future to assume a more “formal” character as a relatively independent body, perhaps even with some legislative authority, or whether it should continue to function in an advisory capacity, but with some firmer authority than it has now, which would serve as a lever for the integration of parts of the existing institutional resource management systems.

An entire range of bodies managing coastal resources operate in Šibenik-Knin County at several levels. Within the context of complementary “Climagine” activities, an analysis was conducted concerning stakeholders, i.e. social actors as the study conceptually refers to them. Specific societal actors in coastal management were identified and articulated in the analysis. Both existing and potential future actors, i.e., those only vaguely discernable today, were considered therein. According to the study results, the initial fundamental diagram of societal actors for the Šibenik-Knin County Coastal Plan is as follows:

- Order (“formal” actors): regional and local governments (the County and its towns and municipalities in the coastal zone) with all accompanying activities and professional services; national (republic-level) institutions such as Krka and Kornati National Parks, and certain others which do not have their stations, branches or similar offices here, such as the National Safety and Rescue Administration (112), the national forest management bureau (Hrvatske šume), etc. as well as institutions for the production and dissemination of knowledge (education and research).
- Civil society (“informal” actors): associations and civic initiatives; and active, public and locally influential and effective, meritorious individuals.
- Production of goods and services (business sector): maritime economy (construction of vessels; development of coastal, harbour and other technical installations on or adjacent to the sea); fishing, shellfish harvesting, fish farming and Mediterranean agriculture; production of goods and services in the tourism and hospitality industry in coastal cities and municipalities; and production of goods and services (all other forms).

A diagram presenting the actors can be seen in figure 4.17.

⁵ Mahon R, et al. “A governance perspective on the large marine ecosystem approach,” *Marine Policy* (2008), doi:10.1016/j.marpol.2008.07.013

5 VULNERABILITY OF THE COASTAL ZONE

Coastal zones are particularly vulnerable, because the exposure to hazards exists from both land and sea, while the risks are considerable due to the high natural and socio-economic value of coastal zones. It should be stressed that these hazards are not solely tied to effects of climate change, although these are becoming increasingly apparent, either directly (rising sea level, storm surges, floods, droughts) or indirectly due to events occurring elsewhere, farther from the coastal zone, but with consequences felt downstream in the coastal zone (flooding rivers, changes in the seasonality of natural phenomena, quality of water drainage, etc.). Given the fact explained in earlier chapters, that Šibenik-Knin County is a place with marked links between the coastal zone and the hinterland, with water as the linking element, then it is clear that the vulnerability of Šibenik-Knin County's coastal zone has many facets.

5.1 Index of coastal zone vulnerability

The coastal zone is the County's most valuable resource, but also a resource that is most threatened by climate change. So the parameters for computing vulnerability were selected such that they describe climate change impacts in the coastal zone. The objective of this analysis is to obtain a simple overview of the vulnerability of the County's coastal zone with climate change impacts on the most important coastal resources already present now, and to take into account the effects from various sources on natural and developed resources, the population and the activities conducted in the coastal belt. The selected method for computing the vulnerability index allows for a free choice of parameters that describe influences and resources and may be adapted to the area and management level for which it is being applied. The parameters are divided into three categories. The first category describes the natural features of the coastal zone, e.g., the firmness of soil (vulnerability to erosion) or sea level (vulnerability to flooding). The second parameter category describes the forces which operate in the coastal zone, including the height of waves and the appearance of tidal waves in bays. The third category describes the socio-economic features of coastal zones, such as settlements, tourist zones, ports, cultural heritage, etc. Each parameter is accorded a vulnerability index from 1 to 5 based on the vulnerability of the coastal zone. An index of 1 means that coastal vulnerability is low, while an index of 5 means that it is high. A cumulative or consolidated index is obtained by adding the vulnerability indices.

The coastline in the County's territory may be divided into the mainland coast, the coasts at the Krka River estuary and the coasts of inhabited and uninhabited islands (figure 5.1). The length of the coastline has been derived from data provided by the State Land Survey Administration.

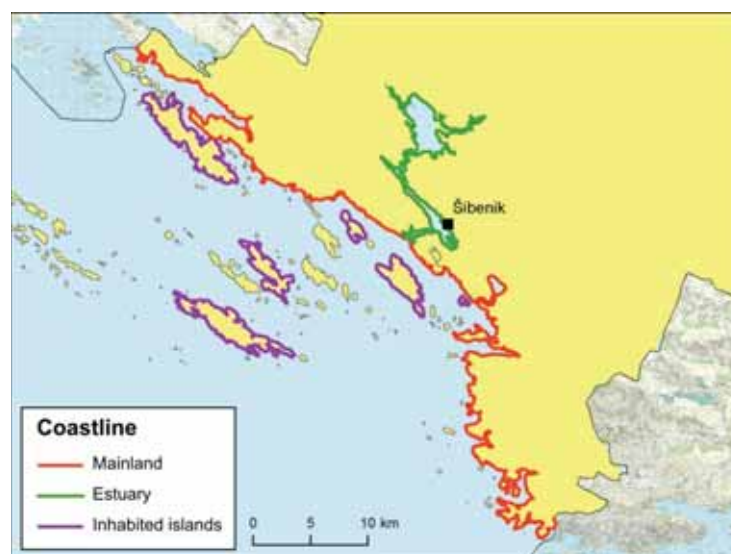


Figure 5.1: Mainland coast, estuary of the Krka River and coasts of inhabited and uninhabited islands in Šibenik-Knin County

The total length of the County's coastline is 962.34 km, but the vulnerability analysis encompassed the coastlines of the mainland, estuary and inhabited and uninhabited islands with a length of 478.85 km (approximately 50% of the total coastline). This is a part of the coast in which some form of human activity and/or protection is possible, i.e., where the effects of vulnerability may also have some economic consequences. The coasts of uninhabited islands, islets, and reefs were left out of the analysis.

5.2 Cumulative vulnerability

Adding the vulnerability indices of all parameters yields the cumulative vulnerability which is sub-divided into three classes: high, medium and low vulnerability (table 5.1). A simple overview was therefore obtained, showing the vulnerability of the County's coastal zone as a result of already present climate change effects on the most important coastal resources.

Table 5.1: Vulnerability indices and length of the coastline for cumulative vulnerability

Sum of vulnerability indices	Cumulative vulnerability	Length of coastline (%)
17-26	High	79.68 km (17%)
12-16	Medium	134.55 km (28%)
6-11	Low	264.62 km (55%)
Total coastline (mainland, estuary, inhabited islands)		478.85 km

Figure 5.2 depicts the spatial distribution of vulnerability in the County's coastal zone. Vulnerability in the coastal segments is shown in greater detail in Appendix 1 to this Plan. High vulnerability extends over 80 km or 17%, medium over 135 km or 28%, and low vulnerability over 265 km or 55% of the coastline under consideration. Although it is difficult to compare these quantities with another coastal county, because no such analysis was conducted in other counties, or with some similar territory in the Adriatic, Mediterranean or elsewhere in the world, it may be concluded that these are exceptionally high numbers, particularly when one speculates as to the funding necessary to reduce vulnerability, including adaptations to climate change. The most vulnerable coastal zones are: the Murter-Tisno line, the Tribunj-Brodarica line with the island of Krapanj, the area of the city of Šibenik, Morinje, Grebaštica and the area of Rogoznica on the Zečevo-Ražanj line.

5.3 Conclusion

The coastal zone of Šibenik-Knin County is a complexly structured area which is exposed to hazards of both natural (primarily due to climate change) and socio-economic origin, which affects its vulnerability to a considerable degree. The vulnerability analysis was not unambiguous and encompassed a multifarious group of hazards. The analysis has shown the following:

- the coast is mostly rocky with steep shores, which thereby lessens the impact of climate change;
- rocky, external and uninhabited islands are exposed to high waves;
- meteotsunamis (known locally as *šćiga*) which appear in inlets threaten settlements and landscaped shores;
- as much as 47% of the coast is occupied by housing or economic activities, or there are plans to make it so, which considerably increases the vulnerability of the coast; and
- the existence of a high number of historical settlements on the coast increases its vulnerability.

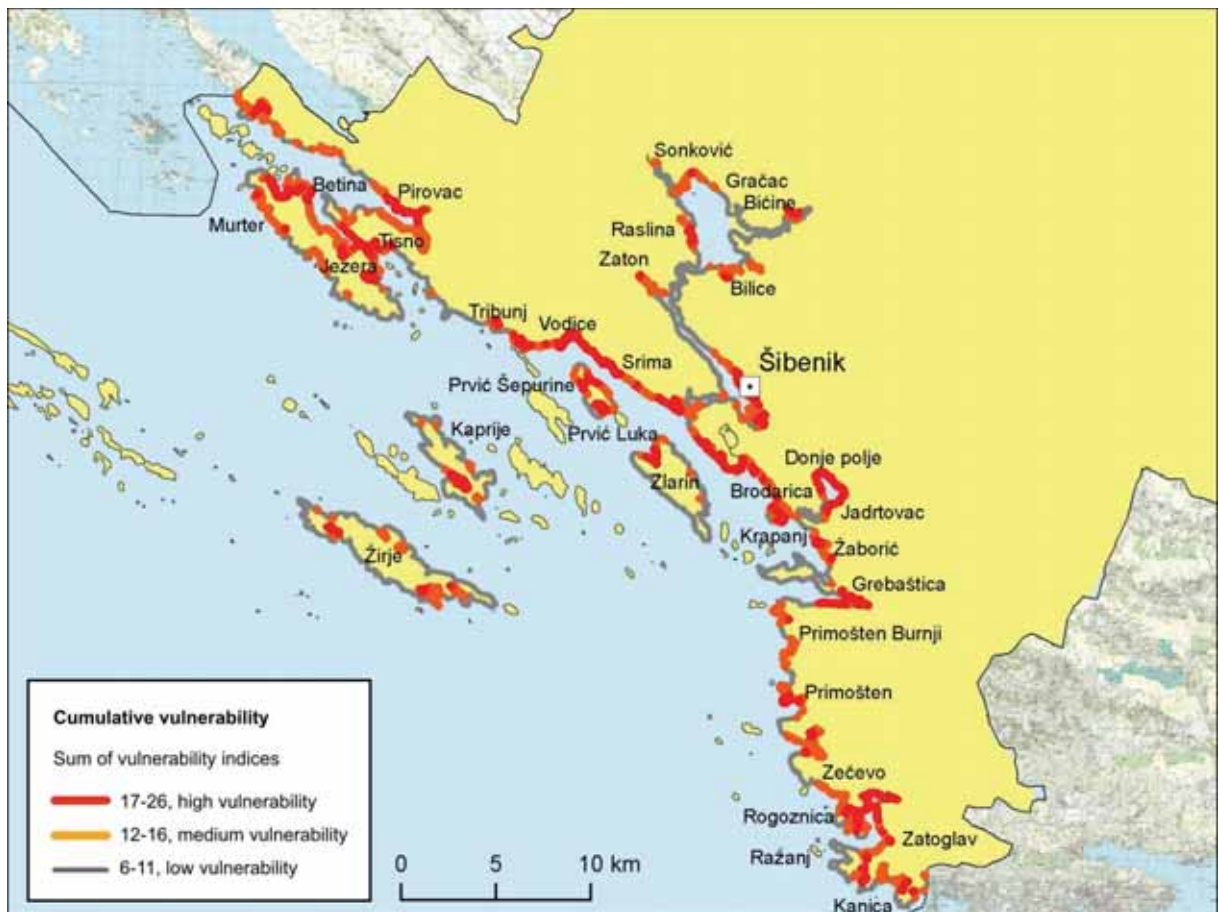


Figure 5.2: Spatial distribution of cumulative vulnerability in Šibenik-Knin County

III. COASTAL PLAN

The Coastal Plan consists of two parts. The first part, which may be designated as strategic, defines the framework within which the plan will proceed. It defines the vision which constitutes the first step toward the plan. Briefly, it portrays the County's coastal zone as we want to see it in the future. After the vision, development and management scenarios for the coastal zone are defined. The scenarios provide a framework for developing the plan, but there is no expectation that they will be consistently transformed into planning proposals.

The second part of the plan is more detailed. First, precise framework management policies are proposed for three priority themes distinguished during the preliminary (scoping) phase: water resources, spatial development and adaptation to climate variables and change. As already explained in the introductory part of this document, the Coastal Plan is an indicative rather than normative or regulatory plan. Keeping this in mind, detailed planning solutions will not be proposed, but rather a list of measures that can be incorporated into other developmental and spatial plans. These measures will be shown separately for each coastal settlement.

6 VISION AND SCENARIOS

6.1 Vision

Defining a vision for development of the coastal zone is the first, strategic step toward defining the planning proposal that should lead to the desired condition of the County's coastal zone in the future. The vision is the result of integration of a series of forces that were formulated in the preceding phases of developing the Coastal Plan, such as the priorities which the plan should address, previously identified problems, threats and challenges in the coastal zone, preferences of the most important stakeholders (largely determined during the *Climagine* workshop), the need to fulfil the commitments Croatia assumed when it joined the European Union and ratified the Protocol, etc. Particular attention when defining the vision was dedicated to the need for adaptation to the effects of climate variability and climate change. In this vein, the following vision for the Šibenik-Knin County coastal zone has been proposed:

Šibenik-Knin County's coastal zone is an area inhabited by people aware of its specific features and the value of its natural resources, people who appreciate the area in which they live, and from which they derive their strength and inspiration, developing in harmony with it. Their well-being rests on the reasonable and well-planned use of resources through institutional mechanisms that ensure equilibrium and take into account how the use or protection of one resource affects the status of another; on adaptation to and further prevention of the negative impact of climate variability and change; and on building resilience of the coastal zone to the consequences of calamities and anthropogenic influences, all with the objective of long-term, higher quality and more fulfilling living conditions.

6.2 Scenarios

The growing complexity of social phenomena demands a modification of conventional approaches to planning, particularly at the strategic level at which this plan is being developed. This is a long-term plan which should greatly anticipate the changes that can be expected in a complex and uncertain (not in the physical sense) future. Resting on a platform of knowledge acquired in the phase of situation analysis and assessment, we turn to the future and consideration of potential developmental paths which are more prone to uncertainty and with many more possible outcomes than could be represented by the precise projection and implementation of only a single, secure future. Keeping this in mind, the scenario method is the tool most often employed in such situations. The preparatory report foresaw the drafting of scenarios for the development of the County's coastal zone, and this was, in a certain sense, as a transitional phase that leads us from the situation analysis to the definition of more concrete proposals for the establishment of an integrated management system for the County's coastal zone.

The general definition of a scenario as used in environmental planning and management, including the ICZM, is that they are overviews of potential future situations which are plausible but with certain assumptions being made. Some define them as a structured statement of possible futures. Thus, a scenario is not simply unfettered contemplation of the future, rather it is a depiction of a sequence of linked and logical steps that takes us to certain likely outcomes in the future. Scenarios describe futures which, under certain conditions, may come about, and not those that will certainly come about. Scenarios are essentially alternative and dynamic narratives that contain the significant elements of the future of the system under scrutiny. Scenarios are comparable models of future development, with a particular focus on management and planning. The purpose of drafting scenarios is to research the effects of management and planning measures inside a specific developmental model in a certain area or system. By comparing scenarios, we can define the necessary character and intensity of planning measures.

The system we are researching is Šibenik-Knin County's coastal zone which, naturally, does not exist in isolation, but is in turn part of a wider system. Scenarios also help us more closely analyze the drivers of change, discover their implications to existing developmental paths and formulate possible options for action with the aim of implementing that scenario which appears most likely to us at a given moment. Scenarios are always done in groups, and each of them follows from different sets of initial precepts. In this sense, a scenario is not a plan, but rather a tool that helps us select the best option at a given moment, on which our plan is then based. However, scenarios are not an instrument to monitor the plan. For even if events move in line with the best and most desirable scenario at a given moment, but then changes arise in the fundamental precepts or a significant change occurs in the general situation, we can either have at our disposal another scenario that suits these altered circumstances or we can construct a new one that will correspond to the current initial precepts. At that moment, this other scenario can also serve as the basis for amendment of the plan.

The process followed in the development of scenarios for the Coastal Plan – keeping in mind its indicative character – was a simplified form of the so-called exploratory scenario, which is based on a combination of prospective and projective scenarios.

The chronological horizons for drafting scenarios for the development of the County's coastal zone were the following:

- For integrated coastal zone management and spatial planning: up to 2030 – this horizon coincides with the standard chronological horizon of spatial plans recently drafted or currently being drafted;
- For “predictable” and medium-term climate change: 2050 – this year is considered reasonable because climate change is expected to be apparent within this time-frame;
- For other, long-term climate change: 2100– this year generally coincides with the IPCC's scenarios, particularly because the consequences of rising sea levels (which are now already certain) will be visible.

6.2.1 Coastal zone development scenarios

Definition of the scenarios rested on a certain number of foundations, primarily those which gave the scenarios a strategic dimension. These were first and foremost the Šibenik-Knin County Spatial Plan and the Šibenik-Knin County Development Strategy. Another vital foundation was the Mediterranean ICZM Protocol, because it provides the basic framework for coastal development and protection of the coastal zone and the wider coastal area. The foundations for the effects of climate change and climate variability were the result of the Local Vulnerability Assessment done for this plan, and a study done for the needs of the project entitled “Integration of climate variability and climate change effects into integrated coastal zone management,” which used the DIVA model. Even though these latter studies encompassed the entire coastal zone of the Republic of Croatia, some conclusions vital to the County's coastal zone could be derived from them.

Three scenarios were developed:

- Risk scenario;
- Competition-to-cohesion scenario; and
- Protection-to-sustainability scenario.

Key precepts were defined for each potential scenario, dependent upon the general orientation of each scenario. The description of each scenario was compiled pursuant to the following dimensions:

- drivers: fundamental factors that prompt the development of scenarios;
- impact on natural resources
- degree of spatial cohesion: impact on spatial processes;
- socio-economic development;
- adaptation to climate change; and
- management.

6.2.1.1 Risk scenario

This scenario assumes the continuation of the current trends in coastal zone resource use, particularly its physical space. The continuity in such practices would result in dubious economic effects, while in the coastal zone's space it would practically result in an economic monoculture (tourism), which would be highly exposed to the capriciousness of the global market. This scenario is characterized by above-average use of natural resources, while the economic effects would not serve as a significant factor for the improvement of the economic structure. The scenario implies the considerable exhaustion of non-renewable natural resources, which may also include physical space. The risk scenario can also be designed as a "pessimistic" scenario, because it does not assume any notable improvements in status in a situation in which economic trends in the County's coastal zone worsen considerably, largely also due to the economic structure that deteriorated in the transition period because it could not meet new socio-economic challenges.

This scenario is characterized by the following indicators:

- significant consumption of coastal space;
- deterioration of the economic outlook;
- decline in the population in the hinterland and on the islands while the coastal demographic concentration is retained;
- domination of "sun-and-sea" tourism both as an economic activity and the fundamental driver of urbanization in the coastal zone;
- increased exposure to climate change and variability risks;
- excessive extent of construction development zones based on want and speculation rather than the proven need for balanced spatial development;
- construction on undeveloped lands with declining compactness of these areas;
- notable overdevelopment ("apartmentalization") of tourist zones accompanied by deficient spatial organization;
- seasonal pressures on infrastructure;
- significant protected areas that are relatively well-managed and which constitute a sound supplement to tourism content; and
- a higher number of wildfires.

The features of individual dimensions of this scenario are:

Drivers

- tourism, but at a relatively low level, remains the primary driver of development; and
- real estate sales.

Natural resources

- Water: increased pressure on waters, particularly the transitional waters and near-shore sea; the waters remain in good condition, but in case of higher pressure, considerable deterioration in the quality of water is expected; jurisdiction and conflicts over limited water resources, particularly in the summer periods; increased threats and damages due to extreme situations involving waters and the sea, and the inflow of waters from the hinterland during heavy storms.
- Sea: a slight deterioration of the situation (pollution of the sea at individual locations) due to increased pressure and insufficient controls, as well as an inadequately constructed sewer system; frequent flooding of the coastal infrastructure; moderate damage to facilities (seepage in the foundations of waterfront structures and breakwaters/piers, erosion of filled beaches) due to inadequate maintenance; necessity of increased investment in maintenance of the functionality of coastal infrastructure; moderate threats to the coastal cultural heritage and structures.

- Air: increased industrial activity that would pollute the air is not expected, but dispersed urbanization and the attendant growth in traffic will lead to increased harmful emissions and air pollution; if industrial activity does increase, enforcement of air quality protection measures is expected.
- Soil: smaller agricultural surfaces due to depopulation of the hinterland; reduced pollution of the soil and water from agricultural production.
- Biodiversity: very threatened in the coastal belt due to overdevelopment; small to mid-level threats at sea due to fishing and higher sea temperatures; moderate to very threats on land due to direct and indirect effects of human activity (agriculture, fires, development of new infrastructure and buildings); small to moderate threats in protected areas (national parks, marine parks) that are under surveillance.
- General assessment of natural resource use: longer-lasting exhaustion of natural resources, particularly non-renewables; expansion of construction development zones for non-productive purposes; medium to high energy dependence.

Socio-economic development

- Population: light to moderate deterioration (negative natural growth rates, impoverishment and emigration of the population); moderate immigration of wealthier and more elderly people from the EU.
- Tourism: a dominant activity; relatively high level of physical growth; increased consumption of resources and capacity, while the impact on GDP declines; investment uncertainty.
- Investment in protection: reduced investments in resource protection and development; ineffective and irregular functioning of the urban water supply infrastructure due to insufficient funding for renewal and development.
- Industry: deteriorating situation (closure of some companies without the opening of new ones).
- Energy: light to medium deterioration of the situation due to increased consumption without the introduction of new less expensive and environmentally acceptable sources (e.g. natural gas, higher share of renewables, etc.).

Spatial cohesion

- Coast-hinterland relationship: growth of coastal settlements in the demographic and economic sense, regression of settlements in the hinterland and on the islands; threatened economic links between the coast and hinterland.
- Space: slight deterioration of the situation in the coastal zone (overdeveloped areas which can be neither maintained nor equipped with the proper utilities); high share of abandoned areas in the hinterland; poor spatial cohesion causes major infrastructure costs.
- Landscape: reduced extent of valuable landscapes due to unchecked spread of developed areas; increased negative effects on biological landscape features; loss of cultural identity.

Adaptations to climate change

- Minimum actions undertaken to adapt to climate change effects; spatial plans do not take into account the need for adaptation in the sense of use of space and adjustments for a higher sea level; no measures are implemented to reduce the impact of extreme weather.

Management

- Non-demanding; interventions for significant changes in conditions are minimal; opportunistic planning.

6.2.1.2 “Competition-to-cohesion” scenario

This scenario brings together several levels which may appear contradictory at first glance. When speaking of competition, what comes to mind first may be the situation characterized by the neoliberal economic concept wherein “the market regulates everything,” even though in reality such a course is fraught with uncertainty. On the other hand, the concept of cohesion may seem to be the polar opposite of competition,

as it implies harmony between all social and physical elements, and the relevant processes are not exposed to the volatility of the market. However, the convergence of these processes may be achieved through a degree of solidarity which helps in the actualization of the path from enhanced competition to increased cohesion. The idea here is that competition is not an exclusive objective but rather simply a means to achieve economic growth as the prerequisite for achieving cohesion and spatial and social equilibrium.

According to the definition of European spatial policy, competitive growth and the accompanying employment rates are essential to a country, as are smaller administrative units, which start at a very low position or are at the very bottom of the socio-economic crisis amplitudes and which require, particularly in the first phase, high economic growth in order to make up for economic shortcomings, whereby they contribute to the competitiveness of participants in the economy. However, this development of competitive acumen and the analogous creation of added value in this case implies a high degree of technology use, a high level of energy source use, a diverse economic structure but also specialization, and efficient use of social capital, and rational use of space and other natural resources. Competition generates high economic growth. The negative repercussions may include somewhat higher environmental pollution, which can be offset by increased investment into its protection (and this could be one of the opportunities for raising internal competition), as well as certain undesirable social changes and, in a situation marked by reduced natural population growth, increased immigration, which often originates even outside of the country's borders.

Cohesion should be a successive phase of competition, because it emerges on the increased material base of a given area. In the case of tourism, for example, this would mean the development of tourist destinations in the County as an integrated tourism product, dependence on the local economy, more accommodation types and standards, and the vigorous development of the overall and tourism infrastructure. Cohesion implies more robust development in the coastal zone's hinterland, based on polycentric urban growth and the analogous grouping of economic activities, and the maintenance of the County's island population. Cohesion also implies a considerable elevation of the level of environmental protection and the quality adaptation to the effects of climate change.

This scenario is exceptionally demanding from the management standpoint, because it implies very well-formed and integrated development strategies, and the involvement of all interested stakeholders in their preparation and implementation. Responsible and very active management is the *conditio sine qua non* of this scenario.

This scenario can be recognized by the following features:

- it is suited to areas requiring rapid economic growth;
- new products and services are created with intense use of social capital;
- high growth in the competitiveness of local economic factors;
- increased added value follows increased competitiveness, resulting in enhanced social and spatial cohesion;
- control of pollution and enhanced environmental protection, which is the result of increased investment that follows on the heels of higher competitiveness;
- more rational use of natural resources;
- growth of highly-accumulative forms of tourism with a considerably improved accommodation structure;
- significant improvement of the general infrastructure;
- a preference for development in undeveloped construction zones instead of setting aside new construction zones while earlier ones are left incomplete; and
- growth of "green" and "blue" economies.

The features of individual dimensions of this scenario are:

Drivers

- development of a destination tourism product, tourism with several accommodation types and standards;
- polycentric growth of economic activity;
- development of synergy between economic activities; and
- high GDP growth.

Natural resources

- Water: improvement of the situation (minimum contamination because the sewer systems are generally well-developed) and water is managed so that there is a steady supply even in the summer months; higher rates for water-related services; jurisdiction and conflicts over limited water resources due to increased demand; sound water planning and management necessary.
- Sea: a sound condition is achieved (minimum contamination because the sewer systems are generally well-developed in coastal settlements); minimum damage to the coastal infrastructure due to hazardous events because the waterfronts, shorelines and beaches are mostly pre-planned and developed; adequate protection of the coastal zone and the cultural heritage.
- Air: maintenance of sound conditions; industry does not pollute the air due to a high degree of filtration and controls.
- Soil: an increase in cultivated agricultural surfaces as an activity complementary to tourism; a part of the population returns to the land due to the increased demand for local produce; potentially higher soil contamination.
- Biodiversity: may be threatened by increased economic activity, but the manner of using the coastal belt, sea and interior is controlled; increased and adequately funded biodiversity research; increased protection of places recognized for heightened biodiversity.
- General assessment of natural resource use: potential increase in natural resource use, but controlled use of non-renewables; increased degree of technological solutions reduces the level of pollution.

Socio-economic development

- Population: improvement of the situation (population aging is halted, no mass emigration of young people, living standards rise); stabilization of island populations; possible arrival of higher number of seasonal residents from neighbouring countries; potential non-acceptance by the location population; moderate immigration of people and their partial integration into society.
- Tourism: considerable improvement of the structure of the tourism product; improvement of the tourism infrastructure; increased share of activities complementary to tourism; linkage between tourism and local agriculture.
- Investment in protection: considerably increased investments in protection result in a higher degree of protection despite more intense economic activities; increased investment in the water infrastructure, particularly with regard to protection from floods, wildfires and droughts.
- Industry: improvement of the situation (opening of companies); development of small and medium-sized businesses; considerable creation of added value; high level of technology; increased investments in environmental protection.
- Energy: increased consumption but generally from newly-installed cheaper and environmentally acceptable sources.

Spatial cohesion

- Coast-hinterland relationship: linking the coast and the hinterland with complementary economic systems results in growth of the coastal hinterland's population and polycentric development; sustainable revitalization of rural homesteads and development of rural tourism in the coastal

hinterland; islands retain their character and develop activities which stabilize population growth; high level of spatial cohesion facilitates the feasibility of public transportation and lower infrastructure costs.

- **Space:** advantage to construction in undeveloped sections of existing construction zones; improved situation (developed areas are equipped with utility infrastructure and are well maintained) through urban restoration and transformation; repurposing and renewal of developed construction zones; more intensive use of construction areas; construction of compact settlements.
- **Landscape:** a cautious attitude toward the landscape with respect for its scenic, natural and cultural value; the landscape also becomes an economic resource.

Adaptation to climate change

- Major undertakings for adaptation to the effects of climate change; spatial plans take into account the need for adaptation in the sense of use of space and adjustment to the rising sea level; improved measures in preventing the outbreak of wildfires and protection from them.
- Protection of ecosystems to reduce the likelihood of floods, surges and other hazards;
- Increased resilience of coastal settlements and coastal and marine ecosystems to hazards.

Management

- An active approach to management that is quite complex and requires a high level of engagement by all stakeholders; the most complex management scenario.
- Increased resilience of coastal settlements by organization of the management system that will reduce the risk of extreme weather.
- Integrated management enables the creation of synergy between socio-economic development and environmental protection.

6.2.1.3 “Protection-to-sustainability” scenario

This scenario assumes the existence of a solid economic structure based on the results of rapid growth if preceded by the competition-to-cohesion scenario; very strict application of environmental protection measures; increased resilience of the ecosystem; and a low level of consumption of space and other resources. This could result in slower economic growth, but increased quality of life. Even though it should not be entirely excluded as a developmental option for the County’s coastal zone at this moment or in the near future, there is a general consensus that this scenario would be more suited to very highly-developed countries which experienced long-term and stable growth and economic development with a high value-added rate, so that this scenario could be afforded. Economic growth is largely based on the introduction of “green” and “blue” economies in the coastal areas. The drivers of development in this scenario are the general consensus on protection of natural value and the consequent lower economic growth accompanied by a higher quality of life. As a result of protection of the quality of resources, their value – especially that of space – grows.

It is noteworthy that in this scenario, as in the competition-to-cohesion scenario, the environmental protection element is key, although to a lesser extent in that previous scenario as compared to this one. Another vital aspect is that after reaching maturity in implementation, the competition-to-cohesion scenario normally transitions into the protection scenario and leads to higher sustainability.

This scenario is not as demanding in the management sense as the competition-to-cohesion scenario. However, in this scenario the management structures introduce very strict regimes for the protection of physical space and insist on the highest environmental standards, which may lead to a significant decline in economic growth over the short, and possible even the medium term, while only over the long term, when “green” and “blue” economics begin to bear fruit, can higher economic growth rates be expected. This, however, should not constitute a barrier to its acceptance, because this scenario otherwise sets forth from the assumption of an already attained higher degree of development as an initial precept.

The features of individual dimensions of this scenario are:

Drivers

- Strict protection of the environment, nature and physical space; and
- low to medium-level GDP growth rates.

Natural resources

- Water: improvement of the situation (no contamination because the sewer systems are well-developed) and water is managed so that there is a steady supply even in the summer months; considerable investments in the water infrastructure and the attendant higher water service rates.
- Sea: maintenance of sound conditions, especially of the marine environment in compliance with the EU Marine Strategy Framework Directive (no notable contamination, sewer systems are well-developed); waterfronts, shorelines and beaches are protected and developed with reduced risks from extreme weather; comprehensive monitoring system installed.
- Air: maintenance of sound conditions; industry does not pollute the air due to lower intensity and high degree of purification and control.
- Soil: increase in cultivated agricultural surfaces (a part of the population returns to the land due to increased demand for local produce); organic farming takes up considerable tracts and generates increased income; tourism consumes the bulk of production.
- Biodiversity: well-preserved, because economic activity is moderate, with adherence to high environmental protection standards; use of the developed coastal belt, the sea and the interior is controlled; increased funding for biodiversity research and protection; increased protection of places recognized for heightened biodiversity.
- General assessment of natural resource use: rationally and strictly controlled use of natural resources and physical space with slower economic growth but high environmental protection standards; considerable investments in environmental protection.

Socio-economic development

- Population: stable growth (population aging is halted, no mass emigration of young people, stabilization of island populations, living standard is suitable and becomes a factor of attraction that reduces emigration); moderate immigration of people and their complete integration into society; population increases more rapidly than in the risk scenario but not enough to alleviate deficiencies from the past.
- Tourism: limited tourism growth, but with considerable improvement of the accommodation and amenity structure; considerable growth of eco-tourism which, however, does not generate the corresponding rise in revenues; limited use of space; reduction of over-construction of rental accommodation capacity; renovation of tourism facilities instead of construction of new ones.
- Investments in protection: considerable, but not to the detriment of economic growth, as they may also become a driver of economic growth.
- Industry: advanced technologies are utilized with minimum harmful effects on the environment; slower GDP and employment growth.
- Energy: limited growth of consumption but with cheaper and environmentally acceptable sources (e.g. natural gas, a higher share of renewables, etc.); growth of own production from renewables – high degree of sustainability; encouragement of energy efficiency.

Spatial cohesion

- Coast-hinterland relationship: improvement of cohesion between the coast and the hinterland; polycentric growth based on activities complementary to coastal tourism; reduced pressure by the population on the coastal zone, partly as a result of slower population growth.

- **Space:** reduced or limited planning of construction development surfaces that were not used for their stated purpose; encouragement of urban renewal and construction of compact settlements; restoration and recultivation; limited repurposing of agricultural lands.
- **Landscape:** maximum protection and recovery of high-quality landscapes.

Adaptation to climate change

- Major undertakings for adaptation to the effects of climate change; spatial plans take into account the need for adaptation in the sense of use of space and adjustment to the rising sea level; implementation of measures to alleviate the impact of extreme weather; improved measures to prevent the outbreak of wildfires and protection from them
- Improved resilience of the ecosystem and settlements to the effects of climate change and other natural hazards.

Management

- “Repressive” measures to actively implement protection; management based on a consensus of stakeholders on the protection of resources; medium-level complexity but very active in the sense of protection.

6.3 Comparative overview of scenarios

An overview of the basic characteristics of the proposed scenarios is provided in table 6.1. The differences between them are apparent in virtually all dimensions. The existing situation is presented in the first scenario (risk). It is to be assumed that, barring systematic management measures, this scenario will continue as the dominant developmental formula in the County’s coastal zone. Here we are thinking, on the one hand, about the general condition of the broader surroundings which are still characterized by feeble economic growth and structural problems that are solved rather slowly and which considerably influence the situation in this county, while on the other hand, there is the fact that this county, in terms of its developmental status, is still below the national average, so that at this moment it is difficult to foresee endogenous factors serving as drivers to significant change.

Table 6.1: Comparative overview of scenarios

Dimensions	Scenario		
	Risk	Competition to cohesion	Protection to sustainability
	1	2	3
Drivers	Low-level tourism Real estate sales	Several forms of tourism and standard accommodations Polycentric growth of economic activities Higher GDP rates	Strict protection of environment and space Low to medium-level GDP growth
Natural resources	Perpetual exhaustion	Increased but controlled use	Lower use with strict controls
Socio-economic development	Possible short-term, long-term unsustainable growth	Enhanced growth Higher share of “blue” and “green” economies in the overall economic structure	Moderately stable growth “Blue” and “green” have a high share in the overall economic structure
Spatial cohesion	Weak	Very good	Good
Adaptation to climate change	Insufficient	Good Medium-level resilience to unexpected situations	Good High resilience to unexpected situations
Management	Undemanding	Very active approach Very complex	Strict enforcement of protection measures Moderate complexity

However, keeping in mind certain positive factors, such as intensive tourism development in the county, including the exceptionally high share in revenues from nautical tourism on the Croatian Adriatic, the appearance of small industrial clusters, successful innovative activities in the sphere of the “blue” economy, a high number of projects proposed and adopted for EU financing, the articulation of the city of Šibenik as a centre of cultural and learning which can have a positive impact on the development of human capital, activities to deal with critical ecological problems and, finally, the relatively high number of effective and motivated individuals among the leading personnel in various institutions, organizations and companies in the County, it may be concluded that there are good reasons to begin implementation of the second scenario, competition to cohesion, over the medium term. This is why the competition-to-cohesion scenario has been taken as the scenario for development of the draft Coastal Plan. This scenario, despite certain critical aspects, offers an opportunity to create the foundations for sustainable development over the long term in Šibenik-Knin County, which would be feasible by transition to the third scenario (protection to sustainability).

7 COASTAL PLAN

7.1 Introductory remarks

The Coastal Plan supplements – in those segments vital to coastal development – the Šibenik-Knin County Spatial Plan, the County’s regional development plan and other strategic plans and programs at the county level. A specific planning task is to identify conflicts among coastal activities and underscore broader issues that could be of interest to the relevant stakeholders. The process that leads from a situation analysis to definition of the vision, scenarios and the plan itself proceeds through the following steps:

- The key problems and issues pertaining to coastal development were diagnosed in the situation analysis. The planning proposals set forth from this situation, as the plan’s objective is, among other things, to work toward a solution to the problems observed in coastal zone development, and these are, in the briefest possible terms, the following:
- spatial development characterized by irrational use of coastal lands and the unsatisfactory quality of the developed environment;
- considerable exposure of individual parts of the coastal zone to the negative effects of climate variability and change, which results in a high degree of vulnerability of the coastal zone, including increased wildfire risks;
- a general decline in the total population in the county, which is most extreme in the hinterland and on the islands, and somewhat less in the “internal” section of the PCA, and much less notable in the coastal settlements;
- the general abundance of water, although there are notable shortages during the periods when demand is highest (July-August);
- diminishing quality of the natural landscape which is most apparent in the most visible parts of that landscape, particularly in construction zones;
- the low level of the coastal zone management system.
- Based on diagnosed problems and desired futures, generally expressed by a larger number of stakeholders at the *Climagine* workshops, the vision was defined, which sets forth from the desire to minimize and/or eliminate the key problems and to develop the coastal zone in the direction of an “idealized” picture of the future. The vision, to some extent, constitutes something that seems unattainable, but is sufficiently clear that it serves as the driver of the initiative. The vision also encompasses all of those principles that should be incorporated as a consequence of commitments assumed by the Republic of Croatia from the EU and under other international conventions (such as the Protocol).
- The scenarios are models of certain future realities. On the one hand, they are dependent upon the vision as an objective to which aspirations for the future are attached, but on the other they take into account the conditions under which individual models must be carried forward. A scenario is not a plan, so it is taken as a means to monitor development and not as something that must be brought about in every case.
- And finally, the Coastal Plan is a set of policies and specific measures which, in this case, constitute the first step forward toward the achievement of the vision for the County’s coastal zone. Its ultimate achievement will entail the incorporation and further articulation of policies and measures in other developmental and enabling plans and programs.

7.2 Structure of the Plan

The key elements of the coastal plan are thematic policies and the corresponding measures:

- Definition of **thematic policies** pertaining to the entire County's coastal zone: even though the Coastal Plan is primarily oriented toward defining the County's coastal zone management system, this system largely depends upon the potentialities and limitations of coastal development. This is why guidelines will be provided for coastal development via policies at the general level, because they must be formulated in greater detail through the application of proposed measures in the corresponding development and spatial plans. When defining policies, the proposed development scenarios were considered first and foremost. As already noted, the "competition-to-cohesion" scenario is the desirable one in this developmental phase of the County's coastal zone. In a later phase, when coastal zone development reaches a certain stage, it can transition to the "protection-to-sustainability" scenario. Of course, one should not lose sight of the risk scenario, which can result if everything remains as it is now in the management sense. Recommendations are presented in the form of a certain number of policies dealing with individual specific issues ensuing from the priority themes identified in the preliminary phase: sustainable spatial development, adaptation to climate change and management of water resources. This plan should provide only the frameworks for those areas defined as priorities in the in the Scoping Report and Situation Analysis. Wherever possible, each policy is presented through the following components: policy objectives, policy description, justification for the necessity of a given policy, political framework defining the point of origin of a policy, e.g. municipal/city, county, national or EU document (strategy, law, directive, plan guideline), links to other policies in the plan, description of the manner in which a specific policy improves the situation in the coastal zone and/or increases its resilience to climate change, limitations and risks or factors that threaten implementation, responsibility for implementation, i.e., the institutions, organizations or administrations deemed most suitable to implement a given policy.
- Defining specific **measures** for selected coastal spatial units: keeping in mind legal provisions, coastal settlements were chosen as the most suitable coastal spatial units. A set of specific measures within selected thematic areas will be proposed for each coastal settlement. These measures will be proposed taking into account natural, socio-economic, developmental, spatial and other features of individual settlements. The proposed measures will represent something of a "catalogue" that will serve the developers of physical and other plans in the definition of their proposals. Detailed explanations of individual measures will not be provided, as this would surpass the framework of this document. A map has been drafted for each thematic area which integrates a series of available, relevant criteria. Based on this analysis, the force of the problems in coastal settlements and also within individual thematic areas was identified and, consequently, suitable measures were proposed.

The coastal plan has been structured as follows:

1. Setting forth from the scoping phase, four thematic areas were defined and a certain number of **policies** have been determined for each of them. A policy is an agreed set of principles that direct activities with the objective of decision-making with the framework of specific themes, issues, problems, etc. Each policy is more precisely defined through a certain number of dimensions. The policies are presented in chapter 7.4.
2. By using available relevant indicators, **prioritization** of settlements or coastal local governmental units is done for each policy with the aim of highlighting the character of the problem which the plan should resolve in a given settlement. Prioritization shows, for example, where a certain activity should be situated in physical space, or where it could be given the set of indicators used in the analysis, which defines the character of the measures that will be proposed for each coastal settlement by thematic

areas. This analysis was conducted with the use of the GIS database. The overlapping of relevant indicators shows which areas are priorities for the implementation of individual thematic measures. To be sure, this analysis must be seen as only indicative, i.e., as a guideline for how to proceed in detailed planning. The prioritization of coastal settlements by individual thematic areas has been presented as part of chapter 7.4. Wherever possible, prioritization was done for individual proposed policies, in cartographic form.

3. For the territory of Šibenik-Knin County as a whole, a certain number of **general measures** has been proposed. These measures largely pertain to the most important economic sectors and their implementation should contribute to the enhanced resilience of economic sectors confronted by future challenges, particularly where these emerge as a result of climate change and climate variability.
4. Based on prioritization, **measures per thematic areas** have been determined for each settlement. Only necessary measures, those that serve planning objectives, have been proposed for each settlement. A summary overview of all management measures by coastal settlements is provided in chapter 7.5.5., while an overview of measures by thematic areas for each settlement is provided in Appendix 1.
5. And finally, a proposal is provided for a **coastal zone management system**, which is aimed at the implementation of a desirable development scenario (chapter 7.6.).

A schematic of the plan's structure is depicted in figure 7.1. This structure clearly shows the hierarchy established in the process of developing the Coastal Plan.

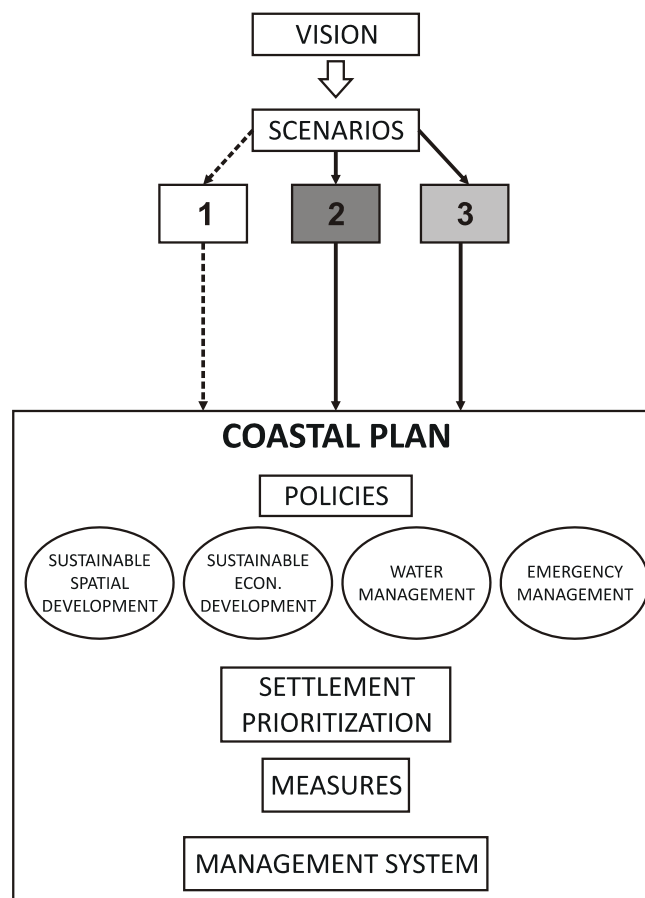


Figure 7.1: Schematic overview of the plan's structure

7.3 Coastal spatial units

The areas of coastal settlements shall be taken as the basic spatial units for which specific measures will be determined by thematic units. The reasons are the following:

- The ICZM Protocol (Art. 3) defines the coastal zone in the landward section as the territory of a coastal administrative unit, i.e., a unit which bounds the sea;
- The Spatial Planning Act (Art. 45(2)) defines local governmental units, i.e., coastal municipalities and towns, as spatial units which constitute the landward part of the PCA (see figure 3.2); certain coastal municipalities extend deep into the mainland territory that have very few of the features typical of a coastal zone, which is why the coastal settlement was taken as the basic spatial unit for planning proposals;
- The EEA's practice in monitoring coastal zone processes takes as its area of observation the 1-km wide belt from the coastline toward the interior; and
- The Spatial planning Act (Art. 45(3)) treats the 1,000 m wide mainland and island belt as a "buffer zone"; this belt is almost entirely encompassed by the coastal local governmental units.

The list of settlements based on local governmental units is provided in table 7.1. Besides specific measures for coastal settlements, general measures will also be provided which are being proposed for the County's entire territory.

Table 7.1: List of settlements according to local governmental units

No.	Municipality	Coastal settlement	Land area in km ²	Belt
1	Bilice	Bilice	21.24	Estuary
2	Murter	Kornati	69.28	Sea
3	Murter	Murter	9.26	Sea
4	Pirovac	Kašić	9.66	Sea
5	Pirovac	Pirovac	25.27	Sea
6	Primošten	Primošten	11.62	Sea
7	Primošten	Primošten Burnji	27.49	Sea
8	Rogoznica	Dvornica	8.22	Sea
9	Rogoznica	Kanica	4.02	Sea
10	Rogoznica	Oglavci	6.13	Sea
11	Rogoznica	Podglavica	3.59	Sea
12	Rogoznica	Ražanj	2.58	Sea
13	Rogoznica	Rogoznica	2.51	Sea
14	Rogoznica	Stivašnica	1.66	Sea
15	Rogoznica	Zatoglav	2.61	Sea
16	Rogoznica	Zečevo Rogozničko	4.30	Sea
17	Skradin	Bićine	7.76	Estuary
18	Skradin	Dubravice	27.23	Estuary
19	Skradin	Gračac	8.31	Estuary
20	Skradin	Skradin	1.32	Estuary
21	Skradin	Sonković	20.78	Estuary
22	Šibenik	Brodarica	6.28	Sea
23	Šibenik	Donje Polje	9.40	Sea
24	Šibenik	Grebaštica	15.41	Sea
25	Šibenik	Jadrtovac	9.23	Sea
26	Šibenik	Kaprije	11.82	Sea
27	Šibenik	Krapanj	7.41	Sea
28	Šibenik	Lozovac	18.64	Estuary
29	Šibenik	Raslina	8.90	Estuary
30	Šibenik	Šibenik	43.92	Estuary and sea
31	Šibenik	Zaton	20.75	Estuary

No.	Municipality	Coastal settlement	Land area in km ²	Belt
32	Šibenik	Zlarin	9.68	Sea
33	Šibenik	Žabarić	8.80	Sea
34	Šibenik	Žirje	15.91	Sea
35	Tisno	Betina	18.07	Sea
36	Tisno	Jezera	8.66	Sea
37	Tisno	Tisno	19.44	Sea
38	Tribunj	Tribunj	15.37	Sea
39	Vodice	Prvić Luka	4.89	Sea
40	Vodice	Prvić Šepurine	3.96	Sea
41	Vodice	Srima	10.79	Sea
42	Vodice	Vodice	34.50	Sea

7.4 Policies for the County's coastal zone management

Defining sectorial policies is an integral component of the planning process – at the very highest level of the hierarchy that characterizes this process. The fundamental definition of a policy is that it is a set of objectives and selected mechanisms that help to achieve these objectives. A policy is also a means for planning, so the dynamic nature of the planning and management process also means that in the formulation and implementation of individual policies, certain issues may be redefined during that process. The definition of “policy” is often also confused with the definition of “plan.” Since, as noted above, a policy is defined as certain guideline to achieve specified objectives, a plan is then defined as a set of concrete actions to achieve these objectives.

In line with the above, the balance between policy and measure is also struck in the Coastal Plan. A policy in the Coastal Plan actually sets forth guidelines for the achievement of the priority themes specified in the preliminary report: sustainability of spatial development, climate change impact, and management of the water system as one of the County's most valuable resources. However, for the needs of the plan these themes were partially redefined and four groups of policies were proposed for:

- Sustainable spatial development;
- Sustainable economic development;
- Water resource management; and
- Building resilience of the coastal area.

A certain number of policies (2-4) will be designated for each group, with which an attempt will be made to cover the key issues of future development of the County's coastal zone to the greatest possible degree, but with a particular focus on the question of adaptation to the impact of climate change. Policies provide guidelines to define measures that should be planned for each settlement.

7.4.1 Sustainable special development policies

The draft sustainable spatial development policies are rooted in the existence of an institutionally relatively well-developed spatial planning system and the instruments for managing spatial development. The proposed policies therefore focus on only a few priority and strategic themes that have been assessed as having the greatest impact on ensuring that coastal zone spatial development in the county is sustainable over the long term.

The following sustainable spatial development policies have been proposed:

1. Preservation of the coastal zone's integral landscape value (table 7.2 and figure 7.1);
2. Improvement of the quality of the developed environment (table 7.3);
3. Ensuring rational use of coastal lands (table 7.4);
4. Enhancing the capacity of the spatial planning system to manage spatial development at the regional level (table 7.5).

Table 7.2: Policy of preservation of the coastal zone's integral landscape value

Dimensions	Description
Policy objective	<ul style="list-style-type: none"> ▪ preservation of inherited natural, cultural, historical, aesthetic and other value in the County's territory as the foundation for its identity and specific character ▪ preservation of the landscape heritage as a crucial developmental resource and driver of current and future development, particularly tourism ▪ raising awareness of the importance of landscape value and landscape diversity, particularly in economic sectors
Policy description	<ul style="list-style-type: none"> ▪ through the Šibenik-Knin County Spatial Plan, preliminarily assess all components of the landscape, analyse vulnerabilities and strengths, conduct preventive protection and promote conferral of legal protection ▪ through the County Spatial Plan and further articulated in the Municipal/City Spatial Plans, refine the following criteria: opening of new construction zones outside of settlements exclusively for projects of overriding public interest and interventions outside of construction zones, but in both cases exclusively in areas of lesser vulnerability ▪ strictly control the spread of construction zones inside the buffer zone, and particularly the spread of shoreline construction in the narrowest coastal belt ▪ at the spatial planning system level, promote the legal regulation of landscape protection, planning and management, directly and through tax and land policy measures that will disincentivize the expansion of construction zones ▪ conceptualize and implement the associated green infrastructure in coastal towns and municipalities ▪ include landscape protection in operative protection (wildfires, safety and rescue, environmental) plans (devise the necessary methodology) or incorporate landscape protection in existing documents/plans dealing with this problem in the same manner as this is done in documents dealing with safety and rescue, wildfire protection, etc.
Justification	<ul style="list-style-type: none"> ▪ in a situation of deep social and economic crisis, when there are heightened pressures for and practices of uncontrolled use of land, particularly through construction zones set aside by planning and works outside of regulated construction zones, this will ensure that use of land and the resources on it align with the fundamental principle of sustainable growth such that it allows future generations to become familiar with and sustainably utilize the value and resources that today's generations inherited from their forebears
Broader policy framework	<ul style="list-style-type: none"> ▪ European Landscape Convention ▪ ICZM Protocol, particularly the commitments stipulated in Articles 5, 8 and 11 ▪ Spatial planning strategy, i.e., the new Spatial Development Strategy of the Republic of Croatia
Links to other policies in the plan	<ul style="list-style-type: none"> ▪ this policy is spatially complementary with the policy to improve the quality of the developed environment, wherein both policies overlap in peri-urban zones and peripheral areas of settlements
Impact on climate change	<ul style="list-style-type: none"> ▪ care for landscape value in the coastal zone generally means preserving large surfaces in their natural state and the green infrastructure on these surfaces, which also means preservation of natural processes, i.e., less exposure to climate change risks ▪ preservation and enlargement of green surfaces increase the capability of absorbing carbon dioxide from the atmosphere

Dimensions	Description
Limitations/risks	<ul style="list-style-type: none"> ▪ pressures for repurposing land, particularly in case of the persistence or deepening of the economic recession in the Republic of Croatia and increased demand for coastal real estate ▪ absence of understanding and political will for legalization and enforcement of measures to protect valuable landscapes at the national level ▪ absence of understanding and political will for enforcement of measures to protect valuable landscapes which are a component of this policy at the regional level ▪ uncoordinated activity of the primary actors in the implementation of this policy (portfolios of spatial planning, culture, nature and the environment, agriculture, tourism, forestry...)
Charged with implementation	<ul style="list-style-type: none"> ▪ The County in cooperation with local governmental units and state-level bodies with effective jurisdiction ▪ Ministry of Construction and Spatial Planning, Environmental Protection Ministry, Ministry of Culture, ICZM national coordinating body

Priority tasks for the first three policies were proposed to the bodies and institutions charged with spatial development at the regional level. These three policies are a reference for concrete spatial units in the county's coastal zone and as such they have concrete objectives to be implemented in these units. The fourth policy is specific and pertains to the strengthening of the capacity of the spatial planning system to manage spatial development, above all at the regional level, for the purpose of implementing previous policies.

Prioritization of coastal settlements for the policy of preserving integral landscape value was done with the use of two groups of relevant indicators:

- Existing and planned development: These indicators have been averaged on the coastline for each coastal settlement or local governmental unit. Coastal development pertains to the belt 1 km from the coastline, meaning the area in which the highest level of construction is concentrated. The data from the spatial plans of local governmental units were used.
- Valuation of landscapes: Three value categories have been defined. The data were derived from sectorial landscape studies prepared for the needs of this plan.

The results of prioritization are shown in figure 7.2. The analysis shows that, in general, in the environs of a settlements with higher construction development, the landscape has a lower class of value, which may also be the result of irrational spread of construction zones, i.e., "haphazard" construction, wherein the value of the landscape was not given notable consideration. The fact that the highest-category landscapes are generally located somewhat farther from settlements points to the need for careful planning of new construction zones.

Table 7.3: Policy of improving the quality of the developed environment

Dimensions	Description
Policy objective	<ul style="list-style-type: none"> ▪ ensure a higher quality for the developed environment in those parts of construction zones which have yet to be developed ▪ improve the quality of already developed construction zones ▪ raise social awareness of the significance of high quality developed areas
Policy description	<ul style="list-style-type: none"> ▪ secure quality urban and architectural formation, particularly through feasible, more detailed planning documents ▪ conceptualize and implement urban rehabilitation and transformation projects in poorly urbanized areas, particularly in areas with considerable illegal (unlicensed) construction ▪ at the spatial planning system level, regulate and implement urban consolidation, particularly in settlements inside the buffer zone ▪ initiate the re-examination of the utilities system in the sense of enabling the realistic reproduction of settlements and ensure socially just use of land in the coastal zone ▪ secure the participation of beneficiaries and interested members of the public in the planning and organization of the settlement's physical space ▪ introduce mandatory reviews of planning documents through the relevant bodies for works in the buffer zone and at particularly sensitive sites
Justification	<ul style="list-style-type: none"> ▪ a higher quality and standard of living will be ensured for residents in coastal settlements, ▪ a higher quality developed area will contribute to the development of higher quality tourism integrated into the local community ▪ the quality of life and attractiveness of the developed coastal zone will be improved as developmental resources and a future factor for higher quality immigration processes ▪ public and private benefits will be generated through the increased value of real estate in coastal settlements
Broader policy framework	<ul style="list-style-type: none"> ▪ Spatial planning strategy, i.e., the new Spatial Development Strategy of the Republic of Croatia ▪ Spatial Planning Act, which introduces the concept of excellence in developed areas but, unfortunately, removes urban consolidation ▪ national architectural policy (<i>Apolitika</i> – Architectural Policies of the Republic of Croatia)
Links to other policies in the plan	<ul style="list-style-type: none"> ▪ this policy is spatially complementary with the policy of preservation of the coastal zone's integral landscape value, wherein both policies overlap in peri-urban zones and peripheral areas of settlements
Impact on climate change	<ul style="list-style-type: none"> ▪ a higher quality developed environment includes, among other things, a comprehensive utility infrastructure in settlement as well as respect for the planning principle which is friendly to the settlement's environment (e.g. green and accumulation surfaces in settlements) ▪ also includes enlargement of green surfaces in developed parts of settlements
Limitations/risks	<ul style="list-style-type: none"> ▪ neglect of enabling instruments for detailed plans, particularly urban consolidation ▪ tolerance/inadequate and untimely sanctioning of illegal construction ▪ management of spatial development at the county level without clear assignment of responsibility for results in improving the quality of the developed environment
Charged with implementation	<ul style="list-style-type: none"> ▪ The County in cooperation with local governmental units and state-level bodies with effective jurisdiction ▪ Ministry of Construction and Spatial Planning, Environmental Protection Ministry, Ministry of Culture, ICZM national coordinating body

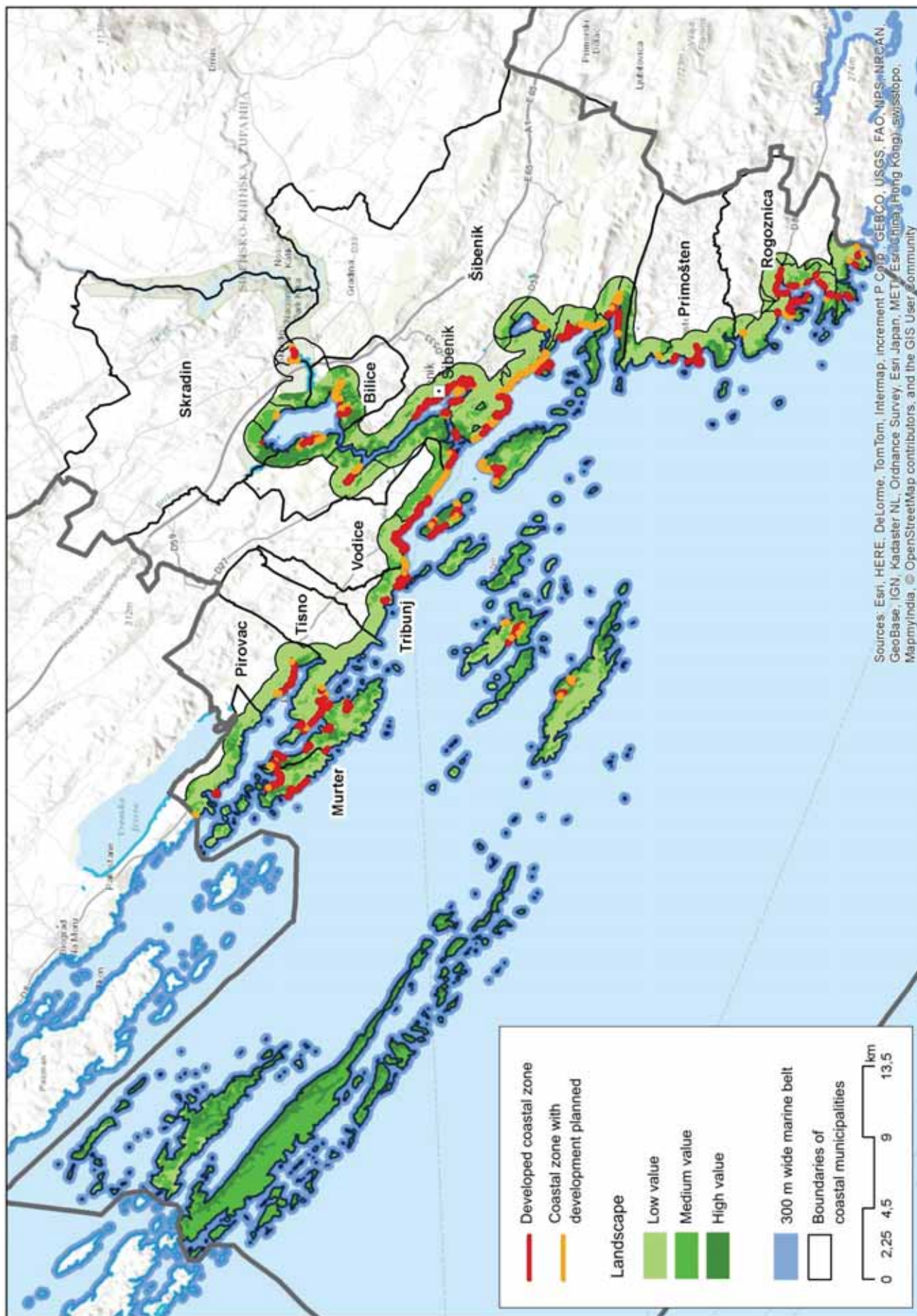


Figure 7.2: Prioritization of areas with regard to landscape value

Table 7.4: Policy of ensuring rational use of coastal lands

Dimensions	Description
Policy objective	<ul style="list-style-type: none"> ▪ rationally plan construction zones in settlements and especially construction zones lying outside of settlements in the buffer zone ▪ better coordinate spatial and regional development with the aim of encouraging balanced spatial development of all parts of counties as well as settlements in the protected coastal zone outside of the buffer zone ▪ ensure protection for agricultural lands ▪ establish measurable, quantifiable indicators for strict monitoring of consumption of coastal lands and the shoreline
Policy description	<ul style="list-style-type: none"> ▪ establish a system to monitor consumption of coastal lands at the county level with the use of the GIS database and indicators to evaluate the rationality of spatial development by counties/towns and settlements ▪ spur development of the hinterland, including complementary tourist programs (agrotourism, adventure tourism, rural heritage...) through the developmental measures contained in the county development strategy and through use of EU funds (Rural Development Program for 2014-2020) ▪ establish criteria for allowing use of coastal lands and the coastline only for projects of considerable public and strategic (long-term) interest ▪ proceed against all forms of illegal works in the narrow coastal belt (on land and sea) and in the buffer zone promptly and without exception
Justification	<ul style="list-style-type: none"> ▪ relief of pressure to repurpose lands and all manner of works concentrated on the narrow coastal belt, as shown by the manifold growth in the share of the urbanized coast over the past 50 years ▪ lessening of the vulnerability of the narrow coastal belt and coastline, which are the most vulnerable sites in the County in the sense of biological and ecological processes, and the risks related to climate change ▪ preservation of the natural character of the coast as a fundamental feature that attracts tourists
Broader policy framework	<ul style="list-style-type: none"> ▪ Spatial planning strategy, i.e., the new Spatial Development Strategy of the Republic of Croatia ▪ Spatial Planning Act (planning criteria in the PCA which must be supplemented with strict indicators for monitoring observance of established conditions) ▪ National list of indicators ▪ EU Rural Development Program, 2014-2020
Links to other policies in the plan	<ul style="list-style-type: none"> ▪ Coastal towns resistant to climate variability and change ▪ sustainable economic development policy ▪ EU Rural Development Program, 2014-2020
Impact on climate change	<ul style="list-style-type: none"> ▪ preservation of larger surfaces in their natural condition and the green infrastructure on these surfaces also means preservation of natural processes, i.e., less exposure to the risks of climate change
Limitations/risks	<ul style="list-style-type: none"> ▪ pressure to repurpose land and short-term economic growth interests ▪ insufficient coordination of developmental and spatial planning in the sense of creating a stimulative framework for balanced spatial development in the county ▪ political will and technical capacity at the county level for strict monitoring and direction of spatial development in the narrow coastal belt and area
Charged with implementation	<ul style="list-style-type: none"> ▪ The County in cooperation with local governmental units and state-level bodies with jurisdiction

Table 7.5: Policy of enhancing the capacity of the spatial planning system to manage spatial development at the regional level

Dimensions	Description
Policy objective	<ul style="list-style-type: none"> ▪ create the conditions for more effective enforcement of the spatial development policy at the county level, with special emphasis on more objective monitoring and assessment of situation in the field and the success of spatial planning measures ▪ secure higher quality strategic and long-term integrated spatial development planning on land and at sea ▪ enhance sectorial coordination, including enhanced integrated physical and development planning ▪ more successfully use EU funding through projects tied to improving sustainability of spatial development and building resilience of the coastal zones
Policy description	<ul style="list-style-type: none"> ▪ enhance monitoring and assessment of the situation and processes in the field and implementation of planning documents (use of indicators, stronger IT support, IT systems, especially GIS) ▪ enhance competition and capacity of staff in local and regional civil service who participate in the preparation, development and adoption of plans (vocational training programs) ▪ improve the quality of planning documents at the regional level (ensuring sectorial input and an expertise-based platform, development of expertise-based platforms for evaluation of landscapes and analysis of vulnerabilities for the County's Spatial Plan, with a priority for the PCA, detailed articulation of use of marine zones through the County Spatial Plan, creation of measures to adjust to climate change) ▪ articulate additional instruments to improve the quality of planning documents at the local level, including Strategic Environmental Impact Assessment (SEIA) procedures, marine spatial planning and assessments of the success of architectural and landscape formation of all elements of works in the buffer zone, particularly for all outlying construction zones, all works outside of construction zones and works along the coastline ▪ bolster competition to prepare and implement EU projects ▪ create conditions for higher quality participation and raising the awareness of all interested stakeholders
Justification	<ul style="list-style-type: none"> ▪ improvement of professional expertise, creativity and efficiency in managing spatial development in the future ▪ professional staffing of bodies entrusted with spatial planning and managing spatial development, which is currently inadequate due to the fragmentation of local governments ▪ achieve a higher degree of efficiency, organization and utilization of innovations
Broader policy framework	<ul style="list-style-type: none"> ▪ Public Administration Development Strategy of the Republic of Croatia (in preparation) ▪ Spatial Development Strategy of the Republic of Croatia (in preparation)
Links to other policies in the plan	<ul style="list-style-type: none"> ▪ this policy facilitates the creation of conditions for successful implementation of all other spatial development policies ▪ building resilience of the coastal zone
Impact on climate change	<ul style="list-style-type: none"> ▪ indirectly, through increased awareness and competence to deal with the problems of climate change and its impact on spatial development
Limitations/risks	<ul style="list-style-type: none"> ▪ domination of politically-motivated staffing as opposed to an objective system of evaluation and assessment of work, rewards and promotions ▪ deepening of the crisis and a lack of resources to hire or retain qualified experts, particularly at the local governmental level ▪ excessive growth of the system and bureaucratic procedures in the spatial planning system which additionally expends limited resources
Charged with implementation	<ul style="list-style-type: none"> ▪ The County, particularly the Administrative Department for Environmental Protection and Municipal Affairs, the Institute for Spatial Development, the Spatial Planning and Construction Department, in cooperation with local governmental units and the national bodies with jurisdiction

7.4.2 Sustainable economic development policy

The sustainable economic development policy is a basic prerequisite for general coastal zone development, and it particularly comes to the fore in the “competition-to-cohesion” scenario and the “protection-to-sustainability” scenario. Even though the first scenario can be considered more economically robust where it is essential to achieve relatively high growth rates in order to create a solid basis for the second scenario, when greater attention is accorded to protection of the resource base and securing long-term sustainable development, in both cases economic restructuring is essential, particularly in the coastal zone, so that it can be capable of contributing to the implementation of the objectives promoted through these two scenarios.

The following sustainable economic development policies are being proposed:

1. Policy of enhancing the resilience of the local economy (table 7.6)
2. Policy of balancing the green and blue economies (table 7.7)
3. Policy of preserving marine biodiversity as the platform for sustainable development (table 7.8 and figure 7.3)
4. Policy of sustainable mariculture as the basis for blue growth and economic development (table 7.9 and figure 7.4)

Table 7.6: Policy of enhancing the resilience of the local economy

Dimensions	Description
Objective	Enhance the resilience of the local economy in the face of climate variability and change and conditions of increased uncertainty.
Description	<p>Looming climate variability and change are raising the level of uncertainty in which we live, plan, manage and make decisions. Hot and dry summers will be reflected in the diminished attractiveness of our area in the hottest months, which could have repercussions for tourism. The models have shown that after 2030, the number of visitors in the high season could decline, while the climate in the pre- and post-seasons could become more attractive. This would mean better occupancy of tourism facilities, while employment could also be prolonged. From both the environmental and economic perspectives such changes could be positive. Any plans on the tourism product should take such climate change into account. A proactive approach in the sense of enriching the product in the pre- and post-seasons should become a primary objective. Moreover, planning of amenities in the shade during the hottest parts of the day, planning natural cooling outdoors (beaches, squares, streets...), green infrastructure all down the coastal towns and municipalities, cooling devices in tourist accommodation units, but also planning amenities during poorer weather (as a result of greater variability), should become an established practice. It is also worth recalling that hot and dry summers will create increased demand for water and electricity for the tourism sector.</p> <p>Reduced precipitation and riverine flows, increased temperatures and solar irradiance and the resulting increased evapotranspiration will threaten agriculture, particularly crops requiring higher quantities of water for cultivation and growth. Changes in the temperature regime will also influence changes in the growth cycles and ripening of crops, and on existing species, thereby also essentially altering the quality of the landscape, and this will in turn have an impact on tourism. This will furthermore result increased demand for irrigation, which is why conflicts over the use of limited water resources could arise.</p> <p>The energy sector in the county is greatly exposed to the risk of climate variability and change due to its structure. The high share of hydroelectric energy depends on waterways, and the announced changes will lead to lower availability of water in the summers. If tourism imposes itself as the main economic branch, then the most electricity, but also water, will be needed in the summer. Agriculture will simultaneously need water during the summer, and water is also needed by firefighting services. All of these needs will peak at the height of the summer season. Solutions must be sought from such perspectives.</p> <p>Climate variability, i.e. extreme weather, can have consequences for ports, marinas,</p>

Dimensions	Description
	<p>maritime traffic, nautical tourism and other maritime activities. Maritime activities are a relatively recent, but exceptionally promising sector of the County's coastal economy. The resilience of the economy is enhanced even with smaller revenues. One of the effective ways to achieve this aim is implementation of the circular economy principle. Reduction of the quantity of waste we generate, re-use, recycling and other procedures that allow for more responsible and efficient use of resources are the main principles of the circular economy which must be introduced in the everyday activities of all actors in the County.</p>
Justification	<p>The degree of adaptation to climate variability and change largely depends on the resilience of the local economy. The pending changes will be reflected in numerous economic branches. If we bear in mind long term changes, plan timely responses, proceed proactively, and keep in mind the global need for reducing harmful emissions, the local economy will then better deal with these new conditions.</p>
Policy framework	<ul style="list-style-type: none"> ▪ EU Climate Change Adaptation Strategy ▪ Protocol on Integrated Coastal Zone Management in the Mediterranean ▪ European structural and investment funds (Cohesion Fund, European Regional Development Fund, European Agricultural Fund for Regional Development, European Fisheries Fund, European Social Fund)
Links to other policies in the plan	<ul style="list-style-type: none"> ▪ policy of efficient distribution and use of waters ▪ policy of rational coastal land consumption ▪ policy of balanced blue and green economies ▪ policy of protecting public health and environmental security
Value added	<p>Implementation of these guidelines will enable more secure and resilient economic development in the county based on the blue and green economies.</p>
Limitations/risks	<p>Insufficient coordination and failure to generate regional solidarity could threaten the resilience of the regional economy as well as the possibility of achieving sustainable development.</p>
Area encompassed	<p>Towns and municipalities in Šibenik-Knin County</p>
Charged with implementation	<ul style="list-style-type: none"> ▪ Šibenik-Knin County, particularly the economic affairs section ▪ Regional Development Agency ▪ Šibenik-Knin County Tourism Board ▪ Chamber of Commerce ▪ Spatial Planning Institute

Table 7.7: Policy of balancing the blue and green economies

Dimensions	Description
Objective	Develop economic sectors that have high potential for sustainable growth of employment, such as mariculture and aquaculture, coastal and nautical tourism, shipbuilding, marine biotechnology, blue and green energy, use of marine mineral resources, etc.
Description	<p>A green economy, according to the UN Environment Programme's definition, is an economy that results in improved welfare and better social equality while simultaneously significantly reducing risks to the environment and degradation and irrational use of natural resources. The green economy includes sustainable coastal and maritime tourism, environmentally-sound mariculture and aquaculture, and organic farming, which are interconnected.</p> <p>The blue economy must primarily be viewed in the context of the green economy, because both share the same fundamental principles and aims. Since over 70% of the planet's surface is covered by oceans and seas, the UN Environment Programme, like the EU, have recognized the importance of these areas in solving the long-term challenges we face. Besides their role in dealing with climate change, the EU also sees the potential of these areas in enhancing its competitiveness at the global level, and its job-creation potential. A vital feature of the blue economy is that it rests on a long-term strategy for sustainable growth in the coastal and marine sectors of the economy. Blue economy activities must therefore have high protection criteria, keeping in mind the ecological sensitivity of the coastal and marine environments. The blue economy takes into account the actual value of natural capital (the value of the sea and coast as well as marine and coastal ecosystem services) and incorporates this value into all aspects of economic activity. Physical and marine planning and integrated coastal zone management, as well as enhancement of maritime skills, are among the activities vital to the blue economy.</p>
Justification	<p>Growth of earnings and greater revenue stability are a result of higher added value in production, thereby contributing to a reduction of the unemployment problem and an increase in living standards. Revenue growth via eco-friendly mariculture, aquaculture and organic farming maintains the population in rural areas, for besides organic food production, agro-tourism also develops on farm lands, encouraging the restoration of traditional rural lifestyles, preservation and renovation of specific architectural forms, reaffirmation of traditional crafts and customs, etc., through private and public investments made possible through the Republic of Croatia Rural Development Program for 2014-2020, the Operative Maritime and Fisheries Development Program for 2014-2020, and through a series of territorial cooperation programs (MED, Adriatic-Ionian Initiative, CBC Croatia-Italy, INRRERREG). This type of private and public investment contributes to reduced emissions of greenhouse gases and pollution, enhances energy and resource efficiency and halts the loss of biodiversity, and contributes to the preservation of soil fertility and the reduction of ecosystem service charges.</p> <p>The measures aimed at spurring the development of the organic farming sector can be classified into three categories:</p> <ul style="list-style-type: none"> ▪ supply push measures (SPM) to increase supply, i.e., the number of organic farmers; ▪ distribution measures (DM); ▪ demand pull measures (DPM) to enhance demand for organic products. <p>Due to the heterogeneity of the production sector, different measures must be applied in line with the size of the farms of target producer groups. Implementation of certain measures at the national level (such as the awareness-raising campaign, the strategic national organic farming orientation, branding and promotion of Croatia as a preserved country that produces high-quality organic good, enactment of laws on a mandatory share of organic food in the diets of kindergarten and primary school children...), while the majority of measures are suited for implementation at the local and regional level (continued support for organic farmers to prepare and implement projects financed by the public sector from the Republic of Croatia Rural Development Program, formation of specialized education curricula, specialization of regions, financing of applied research and linking of research institutions with producers/farmers, encouraging farmers to form associations and institutional purchasing of locally-produced food, international</p>

Dimensions	Description
	<p>networking with regions that implement sound practices...).</p> <p>The civic sector, i.e., associations and alliances of organic farmers, is a very important stakeholder in the formation of projects and implementation of measures, and it will be vital to encourage the formation of the National Association of Organic Farmers, as a prerequisite for the system's functioning and to serve as a representative of Croatia's organic farmers at the national and international levels, promoting the needs of farmers, suggesting amendments to legislative framework and responding to draft legislation.</p> <p>Educational institutions, institutions of higher learning and institutions offering informal education are also exceptional important stakeholders, since organic farming is characterized by a low level of input in the sense of use of agricultural chemicals, but also by a high level of input in the sense of the required knowledge and skills. The creation and implementation of adequate educational programs are key factors in the sector's development, particularly if one considers the fact that most activities in the educational system tied to agriculture are oriented toward theoretical knowledge rather than practical experience, which certainly does not correspond to the needs of (potential) farmers.</p>
Policy framework	EU Integrated Maritime Policy, EU Common Agricultural Policy
Links to other policies in the plan	<ul style="list-style-type: none"> ▪ Ensuring rational land use ▪ Preservation of marine biodiversity as the basis for sustainable development ▪ Sustainable mariculture as the basis for blue growth and economic development
Value added	<ul style="list-style-type: none"> ▪ Higher GDP ▪ Increased employment ▪ Improved protection of the coastal and marine environment ▪ Improved economic competitiveness and productivity ▪ Preservation of soil fertility ▪ Maintenance of population in rural areas
Limitations/risks	<ul style="list-style-type: none"> ▪ Insufficient investment ▪ Insufficient awareness of the value of the blue and green economies ▪ Dissatisfaction with achieved rates of growth and employment ▪ Shortage of human resources ▪ Lack of adequate knowledge
Charged with implementation	<ul style="list-style-type: none"> ▪ The County, particularly the Economic Affairs Department and the Maritime Affairs, Transportation, Insular and Regional Development Department ▪ Regional Development Agency ▪ Local governmental units ▪ Local action groups (LAGs) ▪ Educational institutions ▪ Civic sector (NGOs)

Table 7.8: Policy of preservation of marine biodiversity as the basis for sustainable development

Dimensions	Description
Objective	Establish measures necessary to preserve undersea biodiversity in the County's coastal zone as a condition for sustainable development of activities tied to the sea, particularly tourism and mariculture.
Description	<p>The policy of preserving undersea biodiversity as the basis for sustainable economic development includes the establishment of protective measures and the corresponding normative regulations that will prevent any negative impact on individual oases of biodiversity, such as areas in which diving tourism proceeds, areas in which of mariculture zones have been planned, and areas of major infrastructure interventions at sea. The growth and improvement of the tourism product in the summer months, which also encompasses diving and other forms of tourism that may potentially impact marine biodiversity, are expected in the County's future development, as is the development of mariculture as a one of the economic branches of the future.</p> <p>Protective measures should first and foremost include continuous monitoring of the quantitative and qualitative properties of biodiversity in areas of notable biodiversity, and in areas characterized by specific, threatened endemic species as indicators for the evaluation of the success of implementation of the proposed guidelines. The recommendation is for each major intervention into the marine space that may potentially threaten biodiversity to be accompanied by continual investment in biodiversity monitoring in the area of activity.</p>
Justification	Loss of biodiversity is often an irreversible process which has a negative impact on the marine ecosystem, and consequently on economic branches such as tourism, fisheries and mariculture.
Policy framework	<ul style="list-style-type: none"> ▪ EU Water Framework Directive ▪ EU Marine Strategy Framework Directive ▪ EU Habitats Directive ▪ Protocol on Integrated Coastal Zone Management in the Mediterranean ▪ UN Convention on Biological Diversity ▪ Republic of Croatia Biological and Landscape Diversity Strategy and Action Plan ▪ Republic of Croatia Sustainable Development Strategy ▪ Water Management Strategy ▪ National Environmental Action Plan ▪ Nature Protection Act (NN80/13) ▪ Republic of Croatia Ecological Network Directive (NN 124/13) ▪ Ecological Network Acceptability Assessment Rules (NN 146/14) ▪ Environmental Protection Act (NN80/13, 153/13, 78/15) ▪ Rules on the Conduct of Underwater Activities ▪ Šibenik-Knin County Development Strategy ▪ Šibenik-Knin County Spatial Plan
Links to other policies in the plan	<ul style="list-style-type: none"> ▪ Policy of reinforcing the capacity of the spatial planning system to manage spatial development at the regional level ▪ Policy of balancing the blue and green economies ▪ Policy of sustainable mariculture as the basis for blue growth and economic development
Value added	Implementation of these guidelines in county and coastal zone municipal development plans will increase the resilience of biodiversity to the effects of climate change, which generally has a negative impact on biodiversity in and of itself due to the sensitivity of individual species and ecosystems to changes in average temperatures and salinity.

Dimensions	Description
Limitations/risks	<ul style="list-style-type: none"> ▪ Uncontrolled growth of tourism, that component of tourism that exerts the greatest impact on marine biodiversity (e.g. diving tourism) ▪ Uncontrolled interventions which may potentially pollute individual areas (e.g. over-capacitated mariculture in enclosed sea zones, absence of adequate wastewater treatment) may threaten biodiversity, particularly in narrower coastal zones and in enclosed sea zones that lack significant exchanges of water with the open seas
Area encompassed	Transitional and coastal water zones in Šibenik-Knin County
Charged with implementation	<ul style="list-style-type: none"> ▪ Šibenik-Knin County inspection services ▪ Šibenik-Knin County's PRIRODA (NATURE) public institution ▪ Maritime Affairs, Transportation, Insular and Regional Development Department ▪ Local governmental services

Prioritization of the coastal zone for the policy of preserving marine biodiversity as the basis for sustainable development has been done through use of two groups of relevant indicators:

- Existing and planned construction development: These indicators have been averaged for the coastline for each coastal settlement, i.e., local governmental unit. Coastal development pertains to the belt 1 km from the coastline, meaning the area where the highest development is concentrated. It has been assessed that the degree of existing and future construction development may largely influence the state of biodiversity. The data from local governmental spatial plans were used.
- Threats to the ecological network: Three categories of value have been defined. The threat level was assessed on the basis of the impact of urbanization and economic activities linked to the degree of protection.

The results of prioritization are shown in figure 7.3. Analysis has shown that, in general, biodiversity is threatened in the surroundings of settlements where there is considerable development. By the same token, the threat level is greater in the vicinity of Kornati National Park, which is a result of more intense nautical tourism.

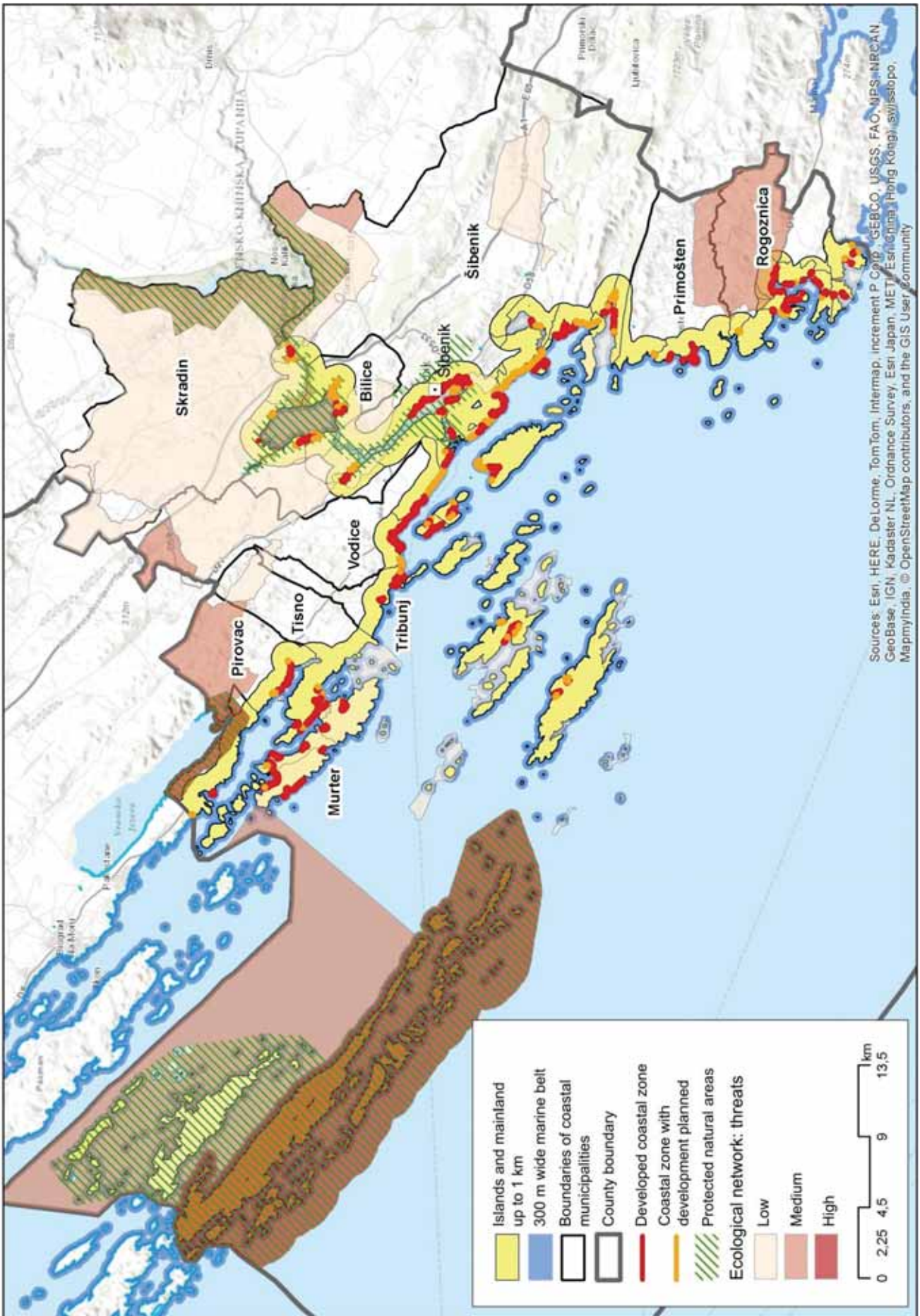


Figure 7.3: Prioritization of areas with regard to coastal and marine biodiversity

Table 7.9: Policy of sustainable mariculture as the basis for blue growth and economic development

Dimensions	Description
Objective	Establish a framework for sustainable development of shellfish and fish mariculture in the County's territory as an economic branch essential to the development of the blue economy and dependent economic branches (tourism).
Description	<p>Mariculture in the County's territory is a major economic branch, particularly present in the Krka River estuary, where there are even now a number of shellfish beds. Mariculture additionally constitutes a rapidly-developing economic branch in the global, EU and Croatian framework, which can foster economic growth and serve as a foundation for other strategic economic activities, such as tourism. It is therefore vital to plan the further development of mariculture which will be based on (i) minimization of environmental impacts of cultivation zones, (ii) development of cultivation in suitable areas in the coastal waters, and use of semi-offshore technology, and (iii) ensuring that the capacity of the cultivation zones complies with the needs of the market in the County's territory, and sustainable markets (Croatia, EU, world).</p> <p>It is necessary to ensure that the shellfish beds do not expand outside of estuary without an all-encompassing environmental impact study, since this area is more sensitive than the rest of the County's marine territory. The shellfish beds in the estuary are additionally under great anthropogenic pressure from nautical tourism, so the number of vessels coated with copper-based anti-fouling paint upstream from Šibenik must be reduced.</p> <p>The development of fish cultivation pens should only include those species adaptable to higher temperatures, meaning those that would be suitable for farming in line with climate change.</p> <p>Planned cultivation zones should not conflict with other activities in the county's territory, such as tourism, marine traffic, etc.</p>
Justification	Proper development of mariculture capacity is a prerequisite for the development of sustainable tourism based on the development own resources, which is in turn the foundation for comprehensive and well-rounded development of the blue economy in the County's territory. Insufficient capacity on the part of shellfish and fish farms in the face of increased global demand will necessitate the import of fish from other parts of Croatia and the EU.
Policy framework	<ul style="list-style-type: none"> ▪ EU Common Fisheries Policy ▪ EU Maritime Spatial Planning Framework Directive ▪ EU Habitats Directive ▪ Protocol on Integrated Coastal Zone Management in the Mediterranean ▪ Republic of Croatia Sustainable Development Strategy ▪ Water Management Strategy ▪ Spatial Planning Act ▪ Marine Fisheries Act ▪ Nature Protection Act ▪ Ecological Framework Directive ▪ National Fisheries Development Strategic Plan ▪ Šibenik-Knin County Development Strategy ▪ Šibenik-Knin County Spatial Plan
Links to other policies in the plan	<ul style="list-style-type: none"> ▪ Policy of reinforcing the capacity of the spatial planning system to manage spatial development at the regional level ▪ Policy of balancing the blue and green economies ▪ Policy of preservation of marine biodiversity as the basis for sustainable development ▪ Policy of protecting public health and environmental security
Value added	Implementation of this guideline will enable more rapid economic growth in the County based on the blue economy.

Dimensions	Description
Limitations/risks	Unplanned growth and development of mariculture cultivation that could threaten the sound condition of the environment and the related development of high-quality tourism and marine biodiversity.
Area encompassed	Coastal towns and municipalities in Šibenik-Knin County
Charged with implementation	<ul style="list-style-type: none"> ▪ The County, Maritime Affairs, Transportation, Insular and Regional Development Department, Economic Affairs Department ▪ Regional Development Agency

Prioritization of the coastal zone for the policy of sustainable mariculture as the basis for blue growth and economic development has been done through use of two groups of relevant indicators:

- Existing and planned construction development: These indicators have been averaged for the coastline for each coastal settlement, i.e., local governmental unit. Coastal development pertains to the belt 1 km from the coastline, meaning the area where the highest development is concentrated. It has been assessed that the degree of existing and future construction development may largely influence the state of biodiversity. The data from local governmental spatial plans were used.
- Existing mariculture locations and maritime transit routes that do not encompass the nautical tourism zone.

The results of prioritization are shown in figure 7.4. Analysis has shown that the potential for the development of mariculture exists, but that it must be very carefully planned, particularly due to the significant existing and planned construction development in the belt 1 km from the coastline. To be sure, this does not pertain as much to off-shore sites, but those are considerably more demanding in terms of both investment and use. A certain potential still exists in the transitional waters of the Krka River's estuary, downstream from Krka National Park, but it should also be carefully planned due to possible conflicts with other activities.

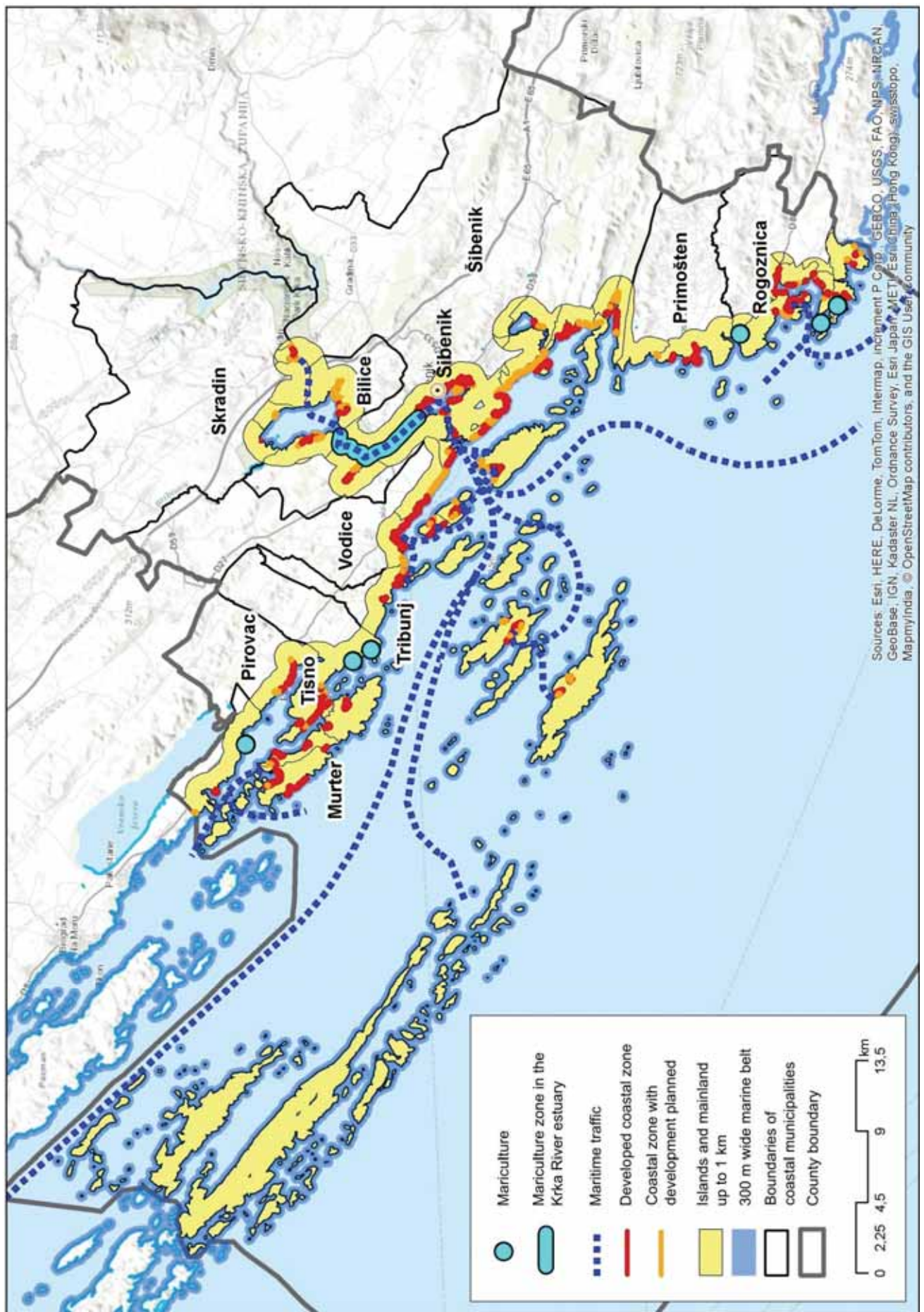


Figure 7.4: Prioritization of areas for sustainable mariculture

7.4.3 Water resource management policies

The objective of managing waters is to establish a system to manage and use surface waters and the water table in order to foster the greatest economic, social and environmental effects. These policies constitute an attempt to optimize economic, social and environmental impacts tied to securing a satisfactory state of affairs for water and water services within the context of climate change in the County's territory. It is important to stress that the existing policies and tools tied to water management, as well as their objectives, also apply to the future.

The following water resource management policies are proposed:

1. Policy of efficient allocation and use of water (table 7.10);
2. Planning investments and funding for investments in water supply and drainage systems (tables 7.11 and 7.12 and figure 7.5).

Table 7.10: Policy of efficient allocation and use of water

Dimensions	Description
Objective	<ul style="list-style-type: none"> ▪ water must be taken at a sustainable level to preserve biological diversity ▪ water intended for use outside of water resources (water supply, irrigation, industry) must be efficiently allocated
Description	<p><u>Planning</u>: Places exposed to risk need to be specified and ascertained via implementation of a comprehensive analysis of expected hydrological states generated by climate change. Simulations and projections of hydrological states should be conducted at river basin level. Since it is rather difficult to quantify changes between low and high waters, all current as well as future water users should count on high risks in meeting their needs. To ensure the most efficient solutions to the problem and to monitor change, it will be necessary to improve the existing monitoring of waters, particularly water use, and adjust it to future hydrological states and changes.</p> <p><u>Availability of water</u>: Since climate change will in turn lead to rapid and cumulative changes in the availability of water, i.e., the quantity of water for various purposes on the one hand and increased demand for water on the other, it will be necessary to allocate water among users to achieve the maximum positive effects for the County. This is why it will be necessary to analyse those sectors that have priority importance to the County's development, and then to adopt plans for future water use. The water supply for the population always takes priority over other uses.</p> <p><u>Water for the environment</u>: The environment's need for water in the expected future water regimes must be ascertained, particularly in Krka National Park, but also at other ecologically vital sites. The necessary quantities and states of water, and the value of the environments being protected, as well as the ensuing benefits derived by society, will all have to be determined. Environmental protection must be measured and should not significantly threaten water use, and particularly not for the needs of the water supply for the general population and tourists. This is why the services charged with the management of protected areas will have to develop tools to effectively respond to expected climate change and the consequent changes in the water regime of the Krka River's watershed.</p>
Justification	<p>Climate change may quite likely exacerbate water supply problems due to the overall decline in precipitation, particularly during the summers, and increase the variability of available water capacity (minimum quantity) with the simultaneous increase in the need for water due to increased temperatures. This may lead to sharpened conflicts of interest over limited quantities of water, and the question of securing sufficient quantities and/or surfaces for water use will be crucial for the future.</p> <p>Adaptation measures in agriculture and other sectors may lead to greater changes with regard to uses and the sites for use of the water table and surface waters.</p> <p>Measures to alleviate these consequences could result in a reduction in demand by some economic sectors and an increase by others.</p>
Policy framework	<ul style="list-style-type: none"> ▪ EU Water Framework Directive ▪ Waters Act ▪ Water Management Plan for the Adriatic Watershed
Links to other policies in the plan	<ul style="list-style-type: none"> ▪ Reinforcing the capacity of the spatial planning system to manage spatial development at the regional level ▪ Protecting public health and environmental security
Value added	Limited water resources are allocated/distributed for external and internal use (including the environment) such that the social value of water is maximized.
Limitations/risks	<ul style="list-style-type: none"> ▪ Unreadiness of local communities ▪ Absence of the necessary local plans and projects ▪ Absence of suitable services and organizations to implement plans
Area encompassed	Šibenik-Knin County, Krka River watershed
Charged with implementation	The County, but it would be helpful if the Krka River's waters were managed locally, at the Krka River basin level, rather than at the level of the Adriatic water zone.

Table 7.11: Policy of planning investments and funding for investments in water supply and drainage systems

Dimensions	Description
Objective	Securing a sound level of quality services for users at the lowest possible price
Description	<p>The activities that should be implemented include:</p> <ul style="list-style-type: none"> ▪ Integrated planning of “supply needs” in urban areas, including planning of the necessary investments; ▪ planning investments in sparsely populated rural areas and on the islands; ▪ planning investments tied to risk management with regard to the urban water infrastructure; ▪ planning investments tied to risk management with regard to flood and drought protection, and protection of coastal zones; ▪ enhancing the water sector’s role in regional, coastal, urban and rural planning; ▪ defining rate policies.
Justification	<p>Climate change and implementation of protection and adaptation measures will lead to a considerable increase in:</p> <ul style="list-style-type: none"> ▪ direct and indirect costs tied to increased power rates; ▪ the need for investments in order to strike a balance between available resources and the demand for water due to climate change; ▪ the costs generated by the necessary consequences of climate change, changes in the water cycle and the rising sea level to risk management with regard to: the urban water infrastructure (water supply, drainage of wastewater and precipitation, protection from runoff and torrents), defence from increasingly more frequent and intense flooding in the future, protection from droughts and protection of coastal zones.
Policy framework	<ul style="list-style-type: none"> ▪ EU Water Framework Directive ▪ Waters Act ▪ Water Management Plan for the Adriatic Watershed
Links to other policies in the plan	<ul style="list-style-type: none"> ▪ Efficient allocation and use of water ▪ Sustainable mariculture as the basis for blue growth and economic development ▪ Preservation of marine biodiversity as the basis for sustainable development ▪ Securing rational use of coastal lands ▪ Enhancing the capacity of the spatial planning system to manage spatial development at the regional level
Value added	The positive impact on the County’s economic development, particularly on tourism.
Limitations/risks	<ul style="list-style-type: none"> ▪ Unreadiness of local communities ▪ Absence of the necessary local plans and projects ▪ Absence of suitable services and organizations to implement plans
Area encompassed	Šibenik-Knin County, Krka River watershed
Charged with implementation	Šibenik-Knin County

Table 7.12 shows the ranking of water-related problems in the coastal settlements which indicates the character and extent of necessary investments. All settlements are divided into 4 categories, or grades of problems, as follows:

- A – greatest problems and costs for construction and rehabilitation;
- B – moderate problems and costs for construction and rehabilitation;
- C – minor problems and costs for construction and rehabilitation;
- D – very minor problems and costs for construction and rehabilitation.

Settlements were further sub-divided into 6 categories based on the type of investment needed, as follows:

- I – Coastal water infrastructure in the 10-30 m wide coastal belt (water supply, wastewater drainage, precipitation drainage);
- II – Water supply of settlement;
- III – Wastewater drainage and treatment;
- IV – Precipitation waters inside the settlement;
- V – Precipitation/surface waters from the hinterland, local coastal watershed;
- VI – Water table in the settlement.

Based on these divisions, the defined measures defined in chapter 7 are shown. Prioritization of settlements with regard to intensity of the water resource management problems is shown in figure 7.5.

Table 7.12: Ranking of water-related problems by settlements

SETTLEMENT (municipality)	I	II	III	IV	V	VI
Betina (Tisno)	C	B	A	C		
Bilice (Bilice)	D	B	A	C		
Brodarica (Šibenik)	D	A	B	A		
DonjePolje (Šibenik)	-	C	A	C		
Grebaštica (Šibenik)	-	C	A	C	A	
Jadrtovac (Šibenik)	B	C	A	C		
Jezera (Tisno)	-	B	A	C		
Kanica (Rogoznica)	-	C	A	C		
Kaprije (Šibenik)	-	C	A	C		
Krapanj (Šibenik)	-	C	A	C		
Murter (Murter)	D	B	A	B		
Šibenik (Šibenik)	C	A	D	B	A	
Pirovac (Pirovac)	-	C	A	B	A	
Podglavica (Rogoznica)	-	C	A	C		
Primošten (Primošten)	-	B	C	B		
Primošten Burnji	-	C	A	C		
Prvić Luka (Vodice)	-	C	A	B		
Prvić Šepurine (Vodice)	-	C	A	B		
Ražanj (Rogoznica)	-	C	A	C		
Raslina (Šibenik)	C	C	B	C		
Rogoznica (Rogoznica)	-	A	C	A		
Skradin (Skradin)	-	A	B	B	A	
Sonković (Skradin)	A	C	A	C		
Srima (Vodice)	-	C	A	B		
Stivašnica (Rogoznica)	-	C	A	C	A	
Tisno (Tisno)	-	B	A	C		
Tribunj (Tribunj)	B	C	A	B		
Vodice (Vodice)	C	B	B	A	A	
Zatoglav (Rogoznica)	-	C	B	A		
Zaton (Šibenik)	-	C	B	C		
Zečevo Rogozničko	-	C	A	C		
Zlarin (Šibenik)	-	C	A	C		
Žaborić (Šibenik)	-	C	A	C		
Žirje (Šibenik)	-	C	A	B		



Figure 7.5: Prioritization of settlements with regard to intensity of the water resource management problems

7.4.4 Policy of building resilience of the coastal zone

Adaptation to climate change is a process of adjustment to change that should proceed over a longer period. Decisions on adaptation to climate change are not made easily because climate change transpires over the long term, but action is necessary right now. However, implementation of these decisions must commence long before the impact of climate change manifests itself. This “discrepancy” may negatively influence decision-making, particularly at the local level, at which the public is often divided in belief in the justification for making these decisions. The proposed policies encompass all of the major aspects of adaptation with the recommendation that their application must begin as soon as possible so that their effects can become visible in due time.

Besides climate change, as already explained earlier, climate change variability is an increasingly present phenomenon, which results in an increase in the occurrence and intensity of extreme weather, for which the readiness to respond through suitable policies must also be enhanced.

These policies and the ensuing measures must reinforce the resilience of coastal settlements and towns both to expected climate change effects and unexpected weather and other hazards (floods, wildfires, storm surges), which have caused considerable damage to the County’s territory in the past several years. Increasing the resilience of coastal settlements and towns also implies enhancing the “elasticity” of these settlements and coastal and marine ecosystems, meaning their ability to rapidly restore the pre-hazard status

quo. It should be stressed that this county is among those Adriatic counties which can expect the severest consequences of climate variability and change.

The following policies to build the resilience of the coastal zone are being proposed:

1. The policy of protecting public health and environmental security (table 7.13 and figure 7.6);
2. The policy of building resilience of the coastal towns to extreme weather and climate-induced disasters (table 7.14 and figure 7.7);
3. Policy of adapting the coastal zone to the rising sea level (table 7.15 and figure 7.8);
4. Policy of building resilience to the wildfires (table 7.16).

Table 7.13: Policy of protecting public health and environmental security

Dimensions	Description
Objective	Manage water resources to secure protection of the population's health, effective control and management of the negative effects of water (such as floods), protection of water from contamination, and achieve a satisfactory level of protection of water ecosystems and those dependent on water.
Description	<p>The problems surrounding protection of the health of humans and the environment is well regulated in Croatia thanks to EU directives. However, the expected climate change will create new conditions, so that certain current regulations and guidelines in the water sector will have to be adjusted to new conditions in the environment, in waters and in the physical surroundings. This primarily pertains to:</p> <ul style="list-style-type: none"> ▪ redefinition of effluent standards and standards of water intended for specific purposes; ▪ redefinition of environmental monitoring and defining standards for sediment and soil quality; ▪ standards for the management of spillover from combined sewers, particularly in the city of Šibenik; ▪ standards for potable water, and particularly waters from individual systems; ▪ standards and guidelines for the use of treated wastewater and precipitation waters; ▪ standards and norms for the construction of flood defence structures, and structures to protect against torrents and surface runoff in settlements; ▪ standards and norms for the construction of coastal structures to defend against flooding from the sea, protection against groundwater seepage in the coastal belt, protection of coastal buildings and infrastructure inside and outside of settlements; ▪ standards and norms for the construction of undersea structures in the coastal belt (underwater discharge, underwater collectors), undersea pipelines and installations, anchorages, fish pens and shellfish beds. <p>Additionally, at the County level the following will be upgraded:</p> <ul style="list-style-type: none"> ▪ standards for the construction of water infrastructure in the Krka River basin; ▪ standards for the construction of water and utility infrastructure in the coastal belt and on the islands. <p>Some of these standards and norms will be defined by the EU as part of a common policy, but some pertaining to local conditions and specificities must be locally defined as a supplement to EU standards or as new standards and norms adapted to local features and needs in the County's coastal zone.</p>
Justification	Failure to implement this policy will reduce the quality of environmental standards.
Policy framework	<ul style="list-style-type: none"> ▪ EU Water Framework Directive ▪ Waters Act ▪ Water Management Plan for the Adriatic Watershed ▪ EU Floods Directive
Links to other policies in the plan	<ul style="list-style-type: none"> ▪ Sustainable mariculture as the basis for blue growth and economic development ▪ Preserving marine biodiversity as the basis for sustainable development ▪ Ensuring rational use of coastal lands ▪ Coastal towns resistant to extreme weather and climate-induced disasters
Value added	The positive impact on the County's economic development, particularly on tourism.

Dimensions	Description
Limitations/risks	<ul style="list-style-type: none"> ▪ Unreadiness of local communities ▪ Absence of the necessary local plans and projects ▪ Absence of suitable services and organizations to implement plans
Area encompassed	Šibenik-Knin County, Krka River watershed
Charged with implementation	Šibenik-Knin County

Prioritization of the coastal zone for the policy of protecting public health and environmental security has been done with the use of two groups of relevant indicators:

- Existing construction zones in the belt 1 km from the coastline: A higher percentage of construction zones indicates a higher level of development, which may lead to greater pressure on the coastal ecosystem and a greater peril of pollution in the near-coastal waters.
- Population per settlement: A higher concentration of inhabitants creates greater pressure on coastal ecosystems.

Both indicators are actually compatible and their synergetic effect constitutes a consolidated indicator of the threat to coastal waters. It is obvious that larger urban agglomerations generally situated in the belt 1 km from the coastline are deemed the greatest potential causal factors of pollution. The results of prioritization are shown in figure 7.6.

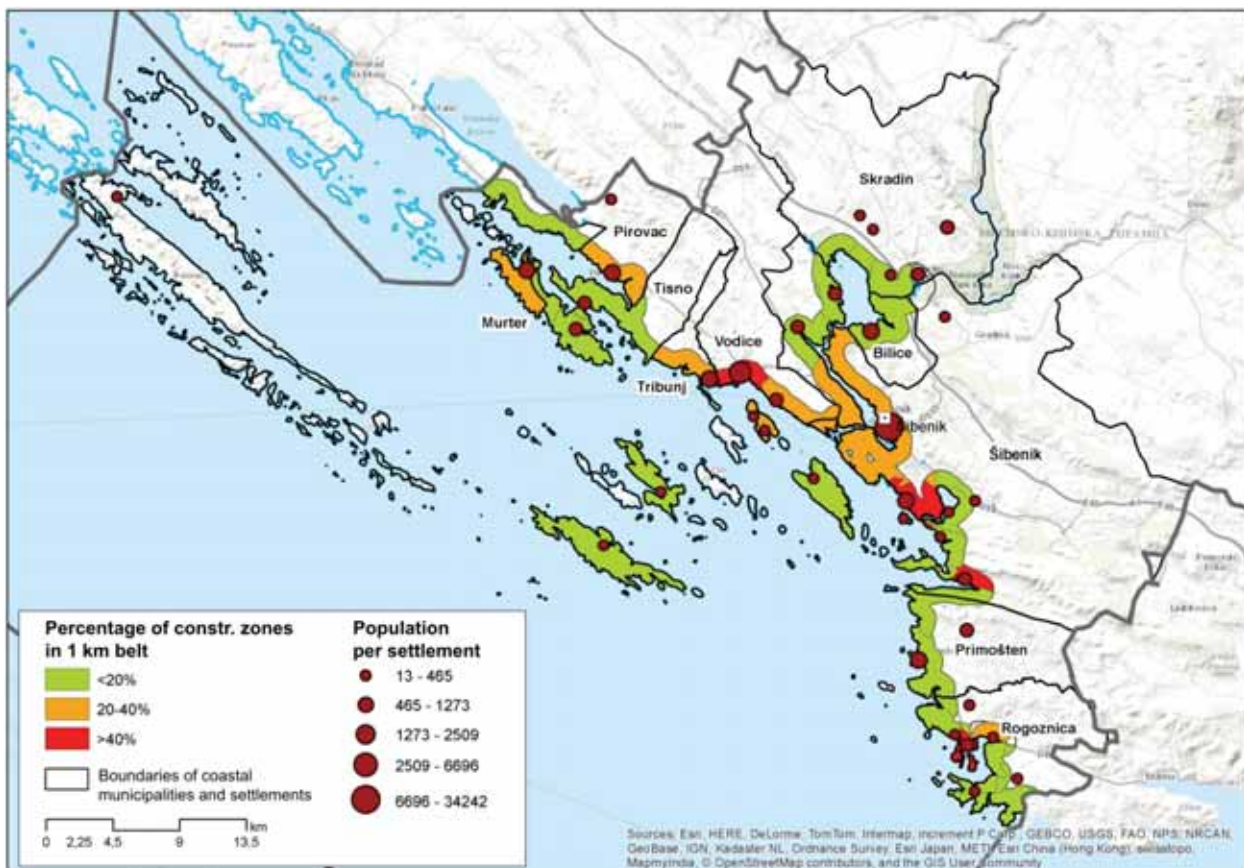


Figure 7.6: Coastal sea threat level from mainland pollution

Table 7.14: The policy of building resilience of the coastal towns to extreme weather and climate-induced disasters

Dimensions	Description
Objective	<ul style="list-style-type: none"> ▪ Adopt a normative framework and monitoring system for extreme weather, which will become more frequent and intense in the future due to climate change, ▪ Enhance resilience of settlements vis-à-vis extreme weather and climate-induced disasters.
Description	<p>The phenomenon of extreme weather and climate-induced disasters, which have a significant impact on humans, infrastructure and the environment climate will increase in the future. Climate-induced disasters include sea-level rise (which because of its all-encompassing nature will be covered in a separate guideline), as well as torrential floods, coastal flooding, droughts and heatwaves; forecasts indicate that these hazards will be more frequent in the future climate. The overall impact of these hazards must therefore be incorporated into existing physical and developmental plans, while the capacity for timely intervention and alleviation of damages must be adjusted. Above all, this means an adaptation of intervention plans and the equipping of intervention units (firefighters, emergency medical services...) which are tasked with responding to individual hazards. Furthermore, it will be necessary to bolster the capacity of emergency medical services during the summer months, when long periods of exceptional heat are expected that can have a significantly negative impact on human health, and tourism activities may be more intense than is the case now. Possible water shortages may also arise during such periods, so it will be necessary to secure a sufficient supply for urgent needs (firefighting, water tanker ships) and also plan for retention ponds and reservoirs in the County's interior which would solve this problem over the long term. Intervention by firefighters during torrential floods will be more common, so it will be necessary to enhance their overall capabilities (just as in periods of droughts and active wildfires).</p> <p>Developmental plans should foresee the reconstruction of coastal infrastructure and surface runoff drainage in urbanized areas threatened by torrential floods and coastal flooding, such that adaptations are made to deal with increased volumes in the future.</p>
Justification	<p>The damages that may be caused by the aforementioned climate-induced hazards could be inestimable and occur over a longer period. For example, shortages of potable water during the August tourist peak could lead to an instantaneous collapse of tourism activity, as well as the long-term avoidance of the area by tourists due to possible repetition of the same scenario. More frequent health-related problems, even the loss of lives during heatwaves, could also have a direct impact on tourism. This is why investments in adaptation to these hazards will yield multiple benefits. The damages that can be incurred by coastal buildings and other real estate should also be added to the above.</p>
Policy framework	<ul style="list-style-type: none"> ▪ EU Maritime Spatial Planning Framework Directive ▪ EU Adaptation Strategy ▪ Protocol on Integrated Coastal Zone Management in the Mediterranean ▪ Republic of Croatia Sustainable Development Strategy ▪ Spatial Planning Act ▪ Safety and Rescue Act ▪ Šibenik-Knin County Development Strategy ▪ Šibenik-Knin County Spatial Plan
Links to other policies in the plan	<ul style="list-style-type: none"> ▪ Policy of enhancing the capacity of the spatial planning system to manage spatial development at the regional level ▪ Policy of efficient water allocation and use.
Value added	<p>Implementation of these measures will lead to an alleviation of the repercussions of climate-induced hazards in the sense of maintaining a high level of healthcare services even with the additional pressure of tourism, maintaining a satisfactory level of basic tourist needs and prerequisites for sustainable tourism, such as availability of water in the coastal zone and a reduction in the increasing cost of recovery from extreme events.</p>
Limitations/risks	<p>Insufficient investment in the aforementioned measures and systems essential to adaptation to climate-induced hazards by the counties and coastal towns/settlements, which may lead to a decline in the prospects for high-quality tourism and threaten the sustainability of the County's coastal zone development.</p>
Area encompassed	<p>Coastal towns and settlements in Šibenik-Knin County</p>
Charged with implementation	<ul style="list-style-type: none"> ▪ Public services of Šibenik-Knin County and its towns/municipalities, ▪ National and local intervention services (firefighters, emergency medical response) and infrastructure (water supply).

Prioritization of the coastal zone for the policy of building resilience of the coastal towns to extreme weather and climate-induced disasters has been done with the use of indicators of population density and sites of tourism capacity. Extreme weather mostly threatens the coastal populations and their assets, and tourism facilities which are among the most important economic sectors in Šibenik-Knin County and which are mostly situated on the coastline. It has already been shown that the absence of the appropriate protective measures, particularly the shortcomings in the planning for coastal settlements, which did not foresee the repercussions of such phenomena, has led to considerable damage. The results of prioritization are shown in figure 7.7.

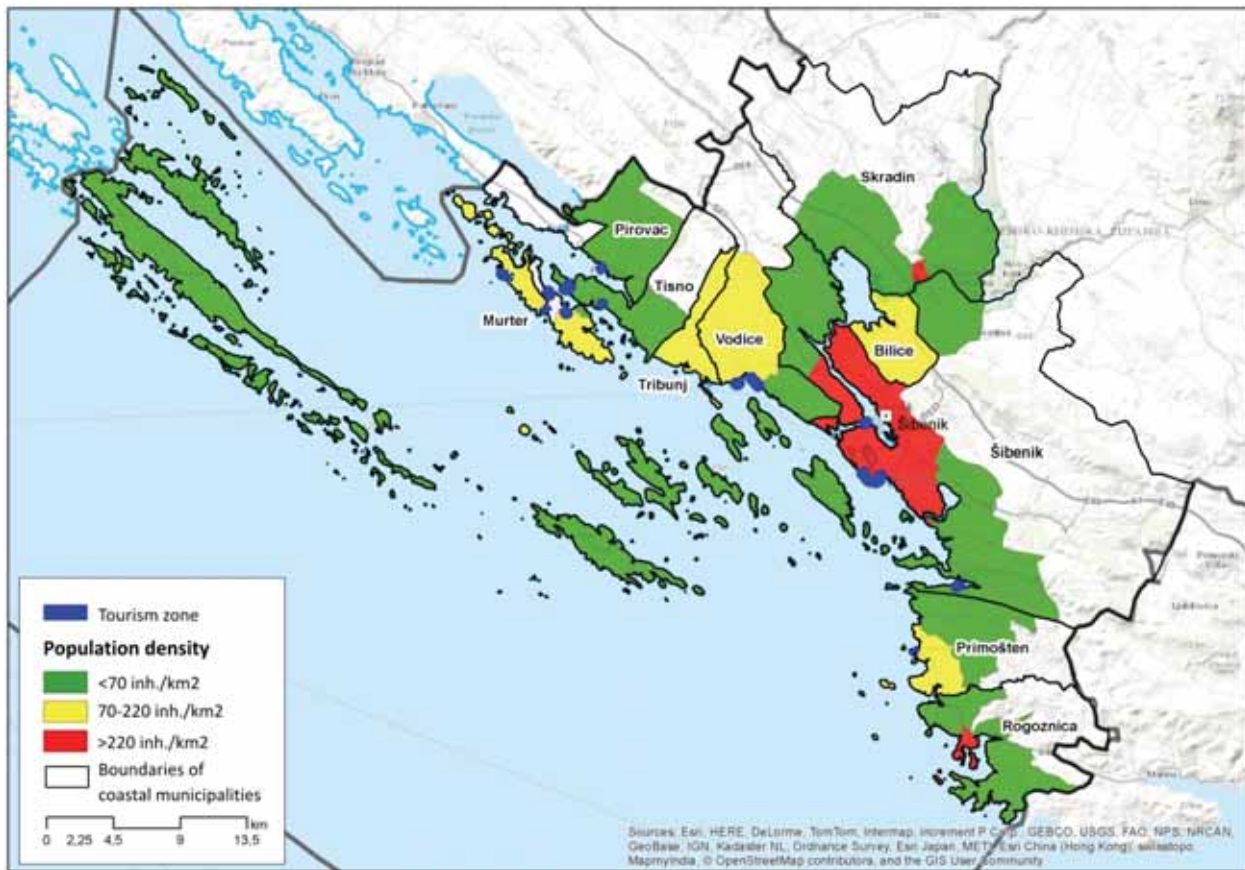


Figure 7.7: Prioritization of the coastal zone pertaining to extreme weather and climate-induced disasters with regard to population density and physical assets

Table 7.15: Policy of adapting the coastal zone to the rising sea level

Dimensions	Description
Objective	Adaptation of the coastal zone to the expected sea level rise for the purposes of management and enhanced resilience of the coastal infrastructure and the overall coastal zone, as well as protection of cultural assets and the historical cores of towns and other settlements.
Description	Sea level rise is a process which is already influencing coastal zones and causing flooding of coastal towns and damage to the coastal infrastructure. In the future, the frequency of flooding due to a rising sea level will be far greater, so it will be necessary to define measures aimed at adapting the coastal zone to this climate-induced threat. Above all, this will mean factoring in sea-level rise when planning the construction and adaptation of long-term coastal structures, such as waterfronts, constructed shores, breakwaters, harbours, marinas, sewage systems, etc. It will be equally essential to factor in sea level rise when planning the construction of coastal settlements, infrastructure facilities and tourism complexes, which will have to be situated at sufficient distances and elevations, i.e., at sites not vulnerable to the projected rise in the sea level. Furthermore, the adoption and implementation of measures to protect cultural assets and sites situated on the actual shoreline and at low elevations (e.g. the near-shore section of Dolac in Šibenik) will be necessary in order to preserve the historical heritage, which has a vital impact on tourism in the County's territory. Finally, sea level rise also effects potable water sources in the coastal zone, which may become saline and unsuitable for drinking, so it will be necessary to plan alternative methods, i.e., enhance capacity in the areas and springs farther from the coast.
Justification	A failure to adapt coastal zones to sea-level rise will necessarily lead to a far stronger impact of the sea on coastal structures and a multiplication of damages (collapsing shorelines, waterfronts and promenades...). The construction of coastal facilities and residential buildings in the immediate vicinity of the seashore will, once the sea level rises, lead to a disappearance of beaches and the coastal landscape and reduce their attractiveness to tourists and the quality of tourism amenities.
Policy framework	<ul style="list-style-type: none"> ▪ EU Maritime Spatial Planning Framework Directive ▪ EU Adaptation Strategy ▪ Protocol on Integrated Coastal Zone Management in the Mediterranean ▪ Convention Concerning the Protection of the World Cultural and Natural Heritage ▪ Republic of Croatia Sustainable Development Strategy ▪ National Action Plan for the Environment ▪ Spatial Planning Act ▪ Environmental Planning Act ▪ Šibenik-Knin County Development Strategy ▪ Šibenik-Knin County Spatial Plan
Links to other policies in the plan	<ul style="list-style-type: none"> ▪ Policy of enhancing the capacity of the spatial planning system to manage spatial development at the regional level ▪ The policy of building resilience of the coastal towns to extreme weather and climate-induced disasters
Value added	Enhancing adaptation of the coastal zone to sea-level rise is essential to the sustainable development of the coastal zone in the sense of spatial planning, management, tourism and the landscape.
Limitations/risks	Failure to recognize this climate-induced threat and failure to incorporate it into the spatial and developmental plans of the County and coastal towns/settlements may lead to a significant increase in the vulnerability of the coastal zone to climate change.
Area encompassed	Coastal towns and settlements in Šibenik-Knin County
Charged with implementation	Šibenik-Knin County, coastal towns and settlements

Prioritization of the coastal zone for the policy of adapting the coastal zone to the rising sea level has been done with the use of the following groups of indicators:

- Observed instances of coastal zone flooding: In recent years, the notably greater frequency and intensity of flooding due to climate variability and a rising sea level has been recorded. This phenomenon is being very precisely monitored.
- Presence of buildings on the coastline: These are the most threatened buildings, and they include general construction development and cultural assets, which are particularly threatened.
- Elevation of the coastal zone.

A considerable portion of the coastal zone up to 500 m from the coastline is lower than one meter above sea level, and this area is deemed particularly threatened, because according to some scenarios the sea level in the County may rise even more than 1 meter by 2100. The results of prioritization are shown in figure 7.8.

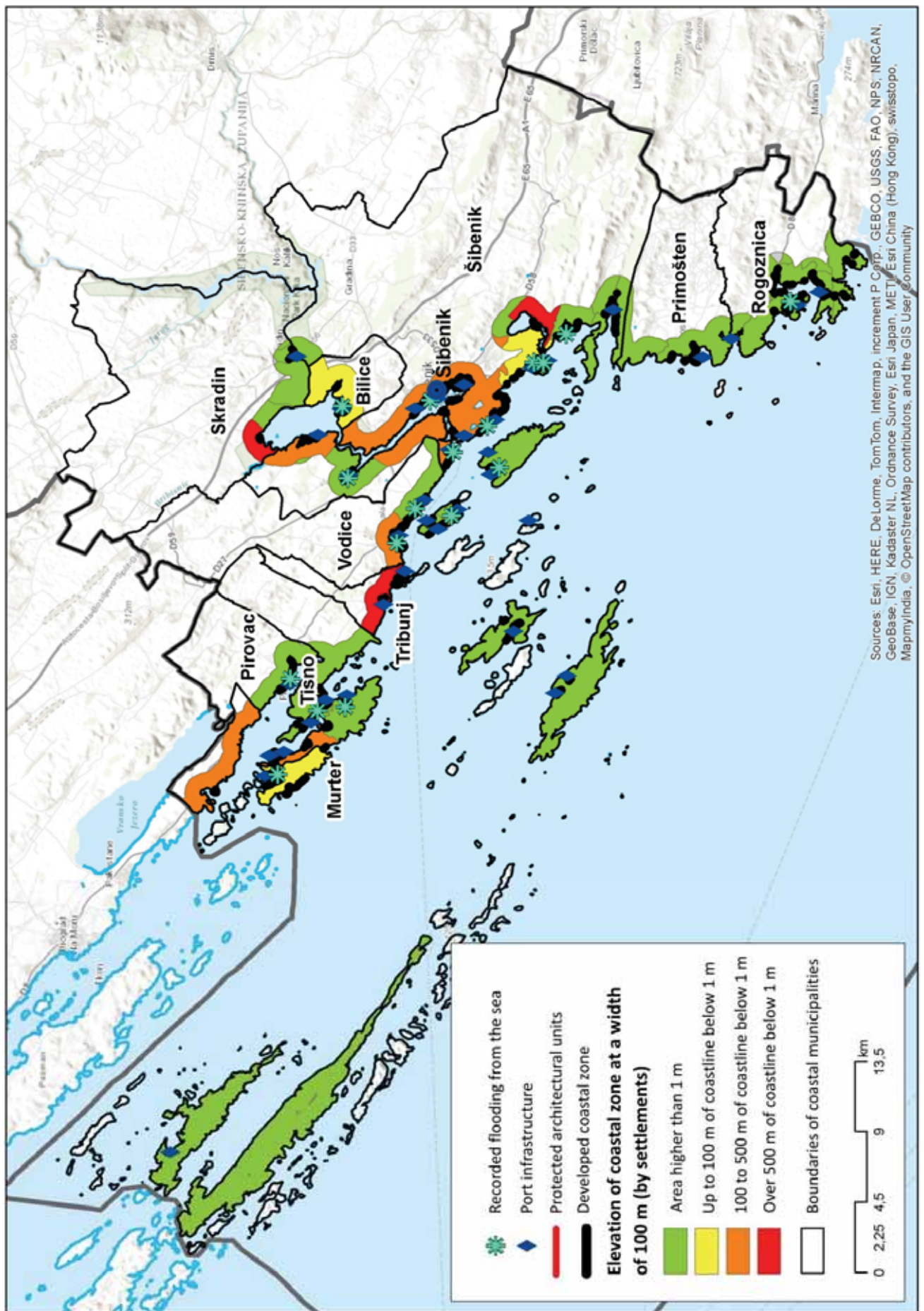


Figure 7.8: Prioritization of the coastal zone with regard to the effects of sea-level rise

Table 7.16: Policy of bolstering wildfire resilience

Dimensions	Description
Objective	Horizontally and vertically establish a system that will provide the necessary response to all threats confronted by this region with particular attention accorded to wildfires that threaten human lives, property and the landscape.
Description	<p>The fire protection policy is thoroughly governed by the Wildfire Protection Act. Since these are complex protection systems, this problem is additionally governed by the Firefighting Act and the Civil Safety System Act (Safety and Rescue Act until July 2015). These laws and a series of subordinate regulations, as well as documents under the jurisdiction of local and regional governments, such as the annual civil safety system development plan or the annual wildfire protection improvement enabling plans for their territories and other enabling ordinances under their jurisdiction, form the foundation for this policy. Operative action in emergency situations accounts for the bulk of the content of the aforementioned regulations, while prevention is present to a lesser extent. Wildfire protection and civil safety as broader concepts in spatial planning are present only in a smaller portion of these regulations. The reason is the absence of newer enabling regulations that would commit the responsible authorities to become involved in this aspect of spatial planning and commit those who compile spatial planning documents to take a higher-quality approach to this problem.</p> <p>Existing or expected climate change is not addressed in spatial planning documents, with the exception of the “Risk Assessment for Disasters in the Republic of Croatia” as the fundamental state-level document which is still being prepared; in it, climate change is seriously considered in the development of future scenarios and risk management measures.</p> <p>The wildfire protection policy should be divided into two components: preventive and operative. The preventive level should encompass:</p> <ul style="list-style-type: none"> ▪ incorporation of measures in spatial planning primarily through potential legal solutions that will soon be instituted by the Rules on Civil Safety Measures in Spatial Planning, which should include heliports, aircraft runways, evacuation routes, firebreaks and anti-fire corridors, natural and artificial reservoirs and water sources, access roads to critical infrastructure and forest complexes, etc.; ▪ incorporation of preventive measures in spatial planning in the sense of landscape protection and the impact of wildfires on the landscape, which should be included in documents and serve to protect the landscape from wildfires (plant species, infrastructure and routes that influence wildfires and the progress of wildfires, forests and other outdoor tracts after wildfires and the landscape, standards on minimum surfaces of specified fire routes and firebreaks, which forests and outdoor tracts would have priority for firefighting efforts and which would not and why, and this in regard to the landscape); ▪ establishment of a system of surveillance (video surveillance and manned observation posts) and alarms; ▪ education of all of those involved in the protection system and raising awareness of climate change and wildfires, with particular attention accorded to rural populations and youths and training and qualification of command staff and local officials; ▪ timely preparation and updating of plans at all levels and operative documents governing the actions of operative units in line with operative needs; ▪ inspection and other services with authority (community wardens, firefighters...) which can propose solutions in the field must strictly supervise the work done under their jurisdiction (fire safety routes, cleaning of firebreak corridors, ensuring surveillance and patrols on days with high fire threat levels, hydrant inspections, prohibition of campfires, etc.); ▪ in compliance with legal commitments, establish and qualify operative forces necessary to respond to crisis situations in municipalities in which this has not been done thus far; ▪ establish a mode to finance a system necessary to each settlement, with the obligation

Dimensions	Description
	<p>of the tourism sector, like other sectors, to be more involved in financing wildfire protection at the local level;</p> <ul style="list-style-type: none"> ▪ exchange of experiences, skills and expertise with other, similar areas (and those confronting similar problems) in Croatia and the EU; ▪ improvement of the system of filing joint applications for EU projects aimed at raising preventive and operative quality. <p>The operative level should encompass the following:</p> <ul style="list-style-type: none"> ▪ based on the established surveillance and early warning system, establish and utilize an integrated management and command system in crisis situations; ▪ in all operative procedures, adhere to the principles of subsidiarity and solidarity; ▪ direct particular attention in operative procedures to the possible phenomenon of wildfires and major mishaps occurring over several days, extend self-reliance capability over longer periods; ▪ based on risk assessments, operative forces necessary for an effective response to all threats must be equipped and qualified in compliance with regulations.
Justification	Failure to implement this policy will jeopardize implementation of other policies; without wildfire protection there can be no quality development of tourism, water resources, landscapes, safety systems for tourists and local residents, agriculture, forestry, responses to climate change, etc.
Policy framework	<ul style="list-style-type: none"> ▪ National Wildfire Protection Strategy for 2013-2022 ▪ Risk Assessment for Disasters in the Republic of Croatia (document in preparation) ▪ Wildfire Protection Act ▪ Firefighting Act ▪ Civil Safety System Act ▪ Global Code of Ethics for Tourism ▪ European Landscape Convention
Links to other policies in the plan	<ul style="list-style-type: none"> ▪ Preserving integral landscape value of the coastal zone ▪ Coastal towns resistant to extreme weather and climate-induced disasters ▪ Policy of efficient water allocation and use
Value added	Positive effect on tourism, increased safety of tourists and the local population
Limitations/risks	<ul style="list-style-type: none"> ▪ Absence of qualified staff in the relevant systems ▪ Unreadiness of local communities ▪ Absence of the necessary local plans and projects ▪ Problems surrounding the horizontal and vertical operation of the system
Area encompassed	Šibenik-Knin County
Charged with implementation	Šibenik-Knin County

7.5 Management measures

Management measures will be provided at three levels: general measures proposed at the county level, management measures pertaining to the narrower coastal zone, i.e., measures in coastal settlements, and measures to establish a management system that will be provided in the subsequent chapter.

7.5.1 General management measures for Šibenik-Knin County

Management measures for the County's entire territory are directly aimed at achieving balanced, sustainable development throughout the County, and attaining resilience to climate variability and change. The measures are grouped into sectors, or themes, crucial to the County's sustainable development (Table 7.17).

Table 7.17: Management measures for the County's entire territory

Sector	Measures
Physical space	<p>Preservation of the integral landscape value of the coastal zone</p> <ul style="list-style-type: none"> ▪ Preservation of the landscape heritage and outdoor tracts as key developmental resources and drivers of current and future development, particularly in tourism, via the County Spatial plan ▪ Articulation of further spatial planning criteria and methods for more active control of coastal land use for urbanization, especially at sites with heightened vulnerability ▪ Engendering awareness of the importance of landscape value and landscape diversity, particularly for economic sectors <p>Improvement of the quality of the developed environment</p> <ul style="list-style-type: none"> ▪ Securing higher-quality urban and architectural development, particularly through feasible detailed planning documents (Spatial Planning Office) ▪ Securing the conditions for successful implementation of urban rehabilitation and transformation projects in areas with lower-quality development, particularly those characterized by unlicensed construction development ▪ Establishment of instruments to evaluate the success of architectural and landscape formation of all elements of works inside the buffer zone, particularly for all separated construction zones, all works outside of construction zones and works along the coastline ▪ Re-examination of the utility system in the sense of enabling the realistic reproduction of settlements and securing socially just use of land in the coastal zone ▪ Building social awareness of the significance of high-quality developed areas <p>Ensuring rational use of coastal lands</p> <ul style="list-style-type: none"> ▪ With due observance of the buffer zone,⁶ use the county spatial plans to ascertain low coastal zones at higher risk of flooding by the sea, and stipulate for them specific construction criteria and protective measures to deal with flooding by the sea and other threats tied to the rising sea level and extreme weather ▪ More active management of spatial development, particularly through strict control of the expansion of construction zones in the buffer zone (separated construction zones outside of settlements) and expansion of coastline construction in the narrowest coastal belt, ▪ Establishment of a system of measurable, quantifiable indicators to strictly monitor use of coastal lands and shorelines, applicable at various planning levels ▪ Improve coordination of spatial and developmental planning with the aim of promoting balanced spatial development in all parts of the County and settlements in the protected coastal zone outside of the buffer zone (rural development) <p>Enhancing the capacity of the spatial planning system to manage spatial development at the regional level</p> <ul style="list-style-type: none"> ▪ Establishment of a system to monitor and evaluate the status and processes in the field and implementation of planning documents, with a priority set on the County's coastal zone, with use of indicators and enhanced IT support and IT systems, particularly GIS ▪ Enhance the competence and capabilities of staff in bodies at the local and regional levels participating in the preparation, development and adoption of plans (professional qualification programs), ▪ Establishment of additional coordination in the spatial planning and regional development system at the county level by formulating common strategic development themes, objectives and solutions that follow from an integrated, multi-sector outlook, ▪ Further improvement of inter-sector coordination conducted through preparation of spatial planning documents (pursuant to the Spatial Planning Act) as support to the County's ICZM
Water infrastructure	<ul style="list-style-type: none"> ▪ Adaptation of existing coastal structures, waterfronts, breakwaters and marinas to the rising sea level and increased extreme weather, particularly in planned reconstruction works ▪ Adaptation of coastal urban infrastructure (roads, pipelines, cables, etc.) to the future rise of the sea level and extreme weather

⁶ The coastal restricted belt is defined in the Protocol on Integrated Coastal Zone Management in the Mediterranean, Art. 8(3), which is regulated through national legislation.

Sector	Measures
	<ul style="list-style-type: none"> ▪ Organization of a system of community wastewater drainage, treatment and release in line with anticipated rises in temperatures, precipitation and sea level, particularly coastal release ▪ Planning of the construction or reconstruction of urban water infrastructure in compliance with the cumulative impact of the sea, local precipitation and groundwater and waters from the immediate hinterland/watershed, in compliance with expected increases in extreme weather and the rising sea level ▪ Application of the integrated surface water drainage concept wherever this is possible (drainage without ditches and pipelines; increased share of green/evapotranspiration and blue/infiltration of water) ▪ Integrated resolution of the problem of surface and groundwater drainage together with neighbouring settlements, insofar as hydrogeological studies ascertain that the problem is common in nature due to watershed boundaries and impact ▪ Implementation of measures for rational consumption of water, particularly measures to reduce the loss of water from the water supply system ▪ Restoration and promotion of use of traditional water supply systems (use of precipitation waters) wherever economically, socially and environmentally acceptable ▪ Implement water sensitive design when planning the organization of settlements ▪ Promotion of the use of treated wastewater for irrigation, sprinkling, greenery, street washing and similar purposes ▪ Implementation of measures to protect the environment, coastal sea and people from pollution (gas emissions, solid and fluid waste) generated by coastal settlements and areas, particularly measures to deal with incidental situations such as floods and extreme marine conditions ▪ Ensuring that all waters which flow from the urban water system (surface and wastewater, as well as waters from the hinterland) do not threaten the quality of the coastal sea and ecosystem in the territory of settlements and beyond, with particular emphasis on the waters in the Krka River estuary and sheltered and semi-sheltered inlets ▪ Application of energy efficiency and saving measures, as well as other activities aimed at reducing greenhouse gas emissions generated by the urban water system and infrastructure ▪ Establishment of a local integrated system of forecasting, early warning, and assistance in protection from extreme weather, marine conditions or high water phenomena
Narrow coastal belt	<ul style="list-style-type: none"> ▪ With due observance of the buffer zone, allow construction on low-lying sections of the coast only exceptionally, exclusively on the basis of an analysis of the vulnerability of specific sites and with due respect for construction standards and application of protective measures against flooding by sea and other threats tied to the rising sea level and extreme weather ▪ Landscaping and adaptation of the coastline, beaches and promenades to future sea level rise and extreme weather and tides ▪ Implementation of measures (planning, operative, infrastructure) for sustainable use and protection of the coastal sea with the aim of reducing harmful effects on the quality of the sea and biological diversity (anchorage, berths, fishing, mariculture, recreation, navigation routes, etc.) ▪ Ensuring that all waters that flow from the mainland and from water use do not affect the quality of the coastal sea, the processes therein and coastal biological diversity ▪ Ensure an efficient system to collect and treat marine solid and other waste, and the assumption of waste from vessels ▪ Ensure an efficient system of collection and treatment of waste from beaches ▪ Ensuring sustainable use of coastal natural resources through sound planning of development, implementation of oversight and enforcement ▪ Implementation of measures that will protect coastal natural processes of erosion and conveyance of sediments and thereby maintain natural landscape features of the coast and beaches ▪ Prevention of construction and modification of the coastline that alters the hydrodynamic features of the coastal sea, processes on the coast and the features of coastal ecosystems, particularly expected changes in sea-levels and storm conditions at sea
Wildfires	<ul style="list-style-type: none"> ▪ Enhancement of wildfire risk management measures in spatial planning (heliports, aircraft

Sector	Measures
	<p>runways, evacuation routes, firebreaks and anti-fire routes, natural and artificial reservoirs and water sources, access roads to critical infrastructure and forest complexes, etc.)</p> <ul style="list-style-type: none"> ▪ Incorporation of preventive measures in spatial planning in the sense of landscape protection (plant species, infrastructure and routes that influence wildfires and the progress of wildfires, forests and other outdoor tracts after wildfires and the landscape, standards on minimum surfaces of specified fire routes and firebreaks, prioritization of areas with regard to landscape) ▪ Construction and maintenance of access roads for emergency vehicles leading to critical infrastructure and forested tracts and ensuring sufficient sources of water for firefighting ▪ Establishment of a system of surveillance (video surveillance and manned observation posts) and early warning ▪ Enhancement of inspection services with relevant jurisdiction and coordination with other services ▪ Exchange of experiences, skills and expertise with other, similar areas (and those confronting similar problems) in Croatia and the EU ▪ Improvement of the system of filing joint applications for EU projects aimed at raising preventive and operative quality ▪ Based on the established surveillance and early warning system, establish and utilize an integrated management and command system in crisis situations ▪ Direct particular attention in operative procedures to the possibility of wildfires and major mishaps persisting over several days; extend self-reliance capability over longer periods ▪ Education of those involved in the protection system and raising awareness of climate change and wildfires
Economy	<ul style="list-style-type: none"> ▪ Ensuring diversity of economic structure with the objective of bolstering its resilience to climate variability and change ▪ Systematic and continual planning, monitoring and management of key economic resources (people, energy, water, space) ▪ Development of a local production base to encourage creation of local jobs, thereby reducing the distance which mass consumption goods travel ▪ Promotion of the use of disaster insurance ▪ Promotion of reduced dependency on petroleum and its derivatives ▪ Promotion of the circular economy and business based on “good management”
Tourism	<ul style="list-style-type: none"> ▪ Enhancement of the off-season offer ▪ Enhancement of offer outside of the “sun & sea” segment ▪ Devising a tourism product for the hinterland ▪ Planning of the energy needs of tourism under conditions of higher temperatures and droughts ▪ Planning of demand for water in tourism under conditions of higher temperatures and droughts ▪ Devising specific products for the hottest periods of the day, such as, e.g., creating shade on beaches, squares and streets ▪ Encouraging energy efficiency measures in the construction of tourism facilities ▪ Development of non-invasive tourism, and organization of nature hiking trails ▪ Adaptation of stakeholders in tourism-related sectors⁷ ▪ Realistic assessment of the use of state services and resources, and attaining financial consolidation (including the higher cost of firefighting, possible evacuations, increased need for medical assistance, costs of energy system collapses as a result of increased pressure on the grid, and other burdens caused by multiple increases in the number of consumers in tourism costs)
Agriculture	<ul style="list-style-type: none"> ▪ Ensuring resources and infrastructure for irrigation of cultivated lands ▪ Systematic monitoring of changes in agriculture caused by climate change ▪ Networking of farmers and building of partnerships between farmers and scientists with the goal of continual and easily accessible professional and scientific support to farmers to enhance the

⁷ For more detailed adaptation measures for tourism-related sectors see:
<http://www.unep.fr/shared/publications/pdf/WEBx0142xPA-ClimateChangeandTourismGlobalChallenges.pdf>

Sector	Measures
	<ul style="list-style-type: none"> resilience of agriculture ▪ Promotion of associations of producers and institutional purchasing of locally produced food ▪ Ensuring an early warning system for farmers ▪ Preparation of plans for crop rotation necessitated by climate change ▪ Promotion of the use of farm insurance ▪ Protection of agricultural lands in the region and development of local food production with the aim of reducing emissions from traffic, as well as creating local food security ▪ Creation of an indigenous seed bank ▪ Securing continual support for organic farmers and implementation of projects financed from the Republic of Croatia Rural Development Program by the public sector ▪ Formation of specialized educational programs for organic farming ▪ International networking with regions that implement sound practices
Mariculture	<ul style="list-style-type: none"> ▪ Planning of use of the sea must more carefully determine sites for pens and beds, taking into account the circulation of the water mass, the existing ecosystem and pressure on it ▪ Encouragement of thermophilic species
Energy	<ul style="list-style-type: none"> ▪ Planning of the energy system through an assessment of increased demand, and adaptation of production with regard to oscillations caused by climate variability and change ▪ Continuous communication with the inter-sectorial coordinating body, and reporting on electricity consumption and production, particularly under extraordinary circumstances (heatwaves, storms, etc.) ▪ Promotion and development of local energy production using renewables, and energy efficiency and saving measures ▪ Verification of the energy transmission infrastructure and testing its resilience during natural disasters
Transportation	<ul style="list-style-type: none"> ▪ Promotion of environmentally acceptable concepts of mobility that will contribute to a reduction of harmful emissions (public transport, public bicycles, vehicle pooling, vessel pooling) ▪ Devising and implementing bicycling and walking paths, horticulturally landscaped, with the aim of reducing harmful emissions, promotion of healthy lifestyles and enriching the tourism product ▪ Taking into consideration the need to reduce CO₂ and other harmful emissions when building new thoroughfares ▪ Ensuring transportation infrastructure more resistant to extraordinary circumstances ▪ Avoidance of construction of low waterfronts in the development of new harbours and marinas, expanding existing structures and taking into account the increased frequency and intensity of extreme weather
Biodiversity	<ul style="list-style-type: none"> ▪ Establishment of systems to monitor the impact of climate change and variability on biodiversity on land and at sea, and formulation of measures for adaptation and enhancing resilience ▪ Promotion of non-invasive undersea tourism at sites of increased biodiversity ▪ Promotion of sustainable mariculture at sites sufficiently distant from the coast
Health	<ul style="list-style-type: none"> ▪ Implementation of warning measures in cases of extreme weather and recommendations for proper conduct ▪ Preparation of health-care institutions for periods of exceptional heat and weather-related hazards
Cultural heritage	<ul style="list-style-type: none"> ▪ Establishment of a cultural heritage database with spatial data, including elevation and distance from the sea ▪ Ensure monitoring of the impact of climate variability and change on the cultural heritage ▪ Preparation of measures for adaptation and reinforcement of resilience to climate variability and change in order to preserve the cultural heritage

7.5.2 Management measures in coastal settlements

Management measures are given for each coastal settlement, distributed according to thematic fields explained in greater detail earlier in the document as a part of chapter 7. Since each area has its specific features, this overview is not fully uniform. However, it can be followed without any problems since each settlement is identified, and it is possible to read clearly from the table the measures proposed within each thematic field. A total of 42 settlements border the sea in the coastal zone of the SKZ. However, measures are proposed only for those settlements for which it was deemed relevant within the given thematic field.

Table 7.18 gives an assembled overview of measures by settlements (“catalogue”). It has to be noted that the measures for water resources management are given in the form of “codes” which are explained in detail in the Annex 1. This annex presents an overview of measures in coastal settlements by topics.

Table 7.18: Overview of measures by coastal settlements⁸

ULS/settlement	Thematic field	Description
Bilice Bilice	Space	<ul style="list-style-type: none"> Without new expansion of building areas unless a higher degree of utilisation is achieved (80%) Additions and repairs within the existing BA Preservation of the specific valuable landscape features.
	Strengthening resilience	<ul style="list-style-type: none"> With the obligation to respect the setback zone regulations⁷, construction in low-lying parts of the coast, and especially those lower than 2m, should be allowed only exceptionally, and exclusively on the basis of vulnerability assessment of the given location and respecting the specific building conditions, and application of protection measures against sea flooding and other hazards relevant to sea-level rise and extreme weather phenomena. Arrangement of the coastline where road passes, construction of seaside promenades high enough, protected and adapted to the expected sea-level rise, extreme weather conditions and associated waves. Adaptation of the existing coastal structures to the future sea-level rise and extreme weather phenomena, especially when planning their reconstruction. Arrangement of the road network and water drainage system, as well as other infrastructure to make them resilient to future extreme weather conditions, especially extreme rainfall and storms from the sea. Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space. In accordance with the existing legal obligations establish necessary capacities (fire brigade, civil protection, ...) to respond to emergencies (fire, flood, drought, ...) and coordination with other services.
	Water infrastructure	IC; IIB; IIIA; IVC; VB
Murter Murter	Space	<ul style="list-style-type: none"> Protect the remaining natural coast against construction, focus on raising the quality of the built-up environment (rehabilitation and urban transformation). Desirable discouraging further growth of the number of apartments aimed at occasional use.
	Coastal sea and mariculture	<ul style="list-style-type: none"> Stimulate development of sustainable mariculture in the outer part of the Murter island using off-shore technologies. Stimulate non-invasive underwater tourism at locations with rich biodiversity.
	Strengthening resilience	<ul style="list-style-type: none"> With the obligation to respect the regulation regarding setback⁷, construction at low-lying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. Arrangement of the coastline in the peripheral part of the settlement where road passes, construction of new seaside promenades high enough, protected and adapted to the expected

⁸ For explanation of measures in the thematic field „water resources management“ and partly in the thematic field „strengthening coastal resilience“ see Annex 1, the part elaborating the water resources management measures.

ULS/settlement	Thematic field	Description
		<p>sea-level rise, extreme weather conditions and associated waves.</p> <ul style="list-style-type: none"> Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space. Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise and extreme weather phenomena, especially when planning their reconstruction. Arrangement of the road network and water drainage system, as well as other infrastructure to make them resilient to future extreme weather conditions, especially extreme rainfall and storms from the sea.
	Water infrastructure	IA; IIB; IIIA; IVB; VC
Kornati Murter	Coastal sea	<ul style="list-style-type: none"> Implementation of protection measures defined in the existing regulations, especially those aimed at biodiversity preservation. Stimulate non-invasive underwater tourism at locations with rich biodiversity.
	Strengthening resilience	<ul style="list-style-type: none"> Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise and extreme weather phenomena, especially when planning their reconstruction. Develop a system to control the behaviour of the visitors to the national park, according to the existing regulations and environmental protection. Define measures aimed at mitigating potential climate hazards such as fires and flood waters. Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space. Fire fighting procedures have to be harmonised with legal and programme guidelines for national parks. “Traditional” burning should be organised according to the needs of the local population and possible legislative solutions.
Pirovac Pirovac	Space	<ul style="list-style-type: none"> Rehabilitation within the existing construction area. Desirable discouraging further growth of the number of apartments aimed at occasional use
	Strengthening resilience	<ul style="list-style-type: none"> With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise and extreme weather phenomena, especially when planning reconstructions in the centre of the settlement. Arrangement of the coastline in the peripheral parts of the settlement, construction of new and adaptation of the existing seaside promenades high enough, protected and adapted to the expected sea-level rise, extreme weather conditions and associated waves. Continuous maintenance of the beaches and planned construction of beach defences to minimise erosion. Arrangement of the road network and water drainage system, as well as other infrastructure to make them resilient to future

ULS/settlement	Thematic field	Description
		<p>extreme weather conditions, especially extreme rainfall and storms from the sea.</p> <ul style="list-style-type: none"> Prohibition of new mariculture facilities within the bay due to insufficient exchange rate of water masses in the enclosed waters of the settlement. Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space.
	Water infrastructure	IB; IIC; IIIA; IVB; VA
Primošten Oglavci	Space	<ul style="list-style-type: none"> No particular limitations, desirable discouraging further growth of the number of apartments aimed at occasional use.
	Strengthening resilience	<ul style="list-style-type: none"> Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space.
Primošten Primošten	Space	<ul style="list-style-type: none"> Limit further urbanisation of the narrow coastal strip.
	Coastal sea and mariculture	<ul style="list-style-type: none"> Possible development of sustainable mariculture sufficiently far from the coast using off-shore technologies.
	Strengthening resilience	<ul style="list-style-type: none"> With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise and extreme weather phenomena, especially when planning reconstructions in the centre of the settlement. Continuous maintenance of the beaches and planned construction of beach defences to minimise erosion, especially since the coastal area is exposed to open sea waves. Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall and storms from the sea. Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space.
	Water infrastructure	IB; IIB; IIIC; IVB; VD
Primošten Primošten Burnji	Space	<ul style="list-style-type: none"> Stay within the limits of the current indicators.
	Strengthening resilience	<ul style="list-style-type: none"> Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space.
	Water infrastructure	IB; IIC; IIIA; IVC; VD
Rogoznica Dvornica	Space	<ul style="list-style-type: none"> No particular limitations.
	Coastal sea and mariculture	<ul style="list-style-type: none"> Possible development of sustainable mariculture sufficiently far from the coast using off-shore technologies. Stimulate non-invasive underwater tourism at locations with rich biodiversity.
	Strengthening resilience	<ul style="list-style-type: none"> With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and

ULS/settlement	Thematic field	Description
		<p>exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena.</p> <ul style="list-style-type: none"> ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall and storms from the sea. ▪ Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space.
Rogoznica Kanica	Space	<ul style="list-style-type: none"> ▪ Stay within the limits of the current indicators, limit further urbanisation of the narrow coastal strip. ▪ Desirable discouraging further growth of the number of apartments aimed at occasional use.
	Coastal sea and mariculture	<ul style="list-style-type: none"> ▪ Possible development of sustainable mariculture sufficiently far from the coast using off-shore technologies. ▪ Stimulate non-invasive underwater tourism at locations with rich biodiversity.
	Strengthening resilience	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall and storms from the sea. ▪ Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise and extreme weather phenomena, including the accompanying waves. ▪ Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space.
	Water infrastructure	IC; IIC; IIIA; IVC; VD
Rogoznica Podglavica	Space	<ul style="list-style-type: none"> ▪ Stay within the limits of the current indicators, limit further urbanisation of the narrow coastal strip. ▪ Desirable discouraging further growth of the number of apartments aimed at occasional use.
	Coastal sea and mariculture	<ul style="list-style-type: none"> ▪ Prohibition of new mariculture facilities within the bay due to insufficient exchange rate of water masses in the enclosed waters of the settlement and impact on the landscape. ▪ Prohibition of new mariculture facilities within the bay due to insufficient exchange rate of water masses in the enclosed waters of the settlement and impact on the landscape.
	Strengthening resilience	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions,

ULS/settlement	Thematic field	Description
		<p>especially extreme rainfall and storms from the sea.</p> <ul style="list-style-type: none"> Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise and extreme weather phenomena. Continuous maintenance of the beaches and planned construction of beach defences to minimise erosion. Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space.
	Water infrastructure	IC; IIC; IIIA; IVC; VA
Rogoznica Ražanj	Space	<ul style="list-style-type: none"> Stay within the limits of the current indicators, limit further urbanisation of the narrow coastal strip. Desirable discouraging further growth of the number of apartments aimed at occasional use, especially along the coastline.
	Coastal sea	<ul style="list-style-type: none"> Stimulate non-invasive underwater tourism at locations with rich biodiversity.
	Strengthening resilience	<ul style="list-style-type: none"> With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall and storms from the sea. Arrangement of the coastline and construction of seaside promenades high enough and adapted to the expected sea-level rise and extreme weather conditions. Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise and extreme weather phenomena, especially when planning their reconstructions. Continuous maintenance of the beaches and planned construction of beach defences to minimise erosion. Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space.
	Water infrastructure	IC; IIC; IIIA; IVC; VC
Rogoznica Rogoznica	Space	<ul style="list-style-type: none"> Stay within the limits of the current indicators of the total built-up ratio of the settlement, limit further urbanisation of the narrow coastal strip. Raising the quality of the built-up areas and especially preserving the green and undeveloped areas, urban rehabilitation and transformation.
	Coastal sea and mariculture	<ul style="list-style-type: none"> Prohibition of new mariculture facilities within the bay due to insufficient exchange rate of water masses in the enclosed waters of the settlement and impact on the landscape.
	Strengthening resilience	<ul style="list-style-type: none"> With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards

ULS/settlement	Thematic field	Description
		<p>relative to sea-level rise and extreme weather phenomena.</p> <ul style="list-style-type: none"> ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall and storms from the sea. ▪ Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise and extreme weather phenomena, especially when planning their reconstructions. ▪ Arrangement of the coastline and construction of seaside promenades high enough and adapted to the expected sea-level rise and extreme weather conditions. ▪ Arrangement of promenades around the Zmajevsko jezero lake in order to give that natural phenomenon touristic importance, while applying the highest standards for the protection of the area and its biodiversity. ▪ Continuous maintenance of the beaches and planned construction of beach defences to minimise erosion. ▪ Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space.
	Water infrastructure	IB; IIA; IIC; IVA; VC
Rogoznica Stivašnica	Space	<ul style="list-style-type: none"> ▪ Necessary to disable further linear urbanisation of the coast.
	Coastal sea and mariculture	<ul style="list-style-type: none"> ▪ Possible development of sustainable mariculture sufficiently far from the coast using off-shore technologies. ▪ Stimulate non-invasive underwater tourism at locations with rich biodiversity.
	Strengthening resilience	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall and storms from the sea. ▪ Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise and extreme weather phenomena. ▪ Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space.
	Water infrastructure	IC; IIC; IIIA; IVC; VC
Rogoznica Zatoglav	Space	<ul style="list-style-type: none"> ▪ Necessary to disable further linear urbanisation of the coast.
	Coastal sea and mariculture	<ul style="list-style-type: none"> ▪ Prohibition of new mariculture facilities within the bay due to insufficient exchange rate of water masses in the enclosed waters of the settlement and impact on the landscape.
	Strengthening resilience	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena.

Uls/settlement	Thematic field	Description
		<ul style="list-style-type: none"> Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall. Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise and extreme weather phenomena. Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space.
	Water infrastructure	IC; IIC; IIIB; IVA; VC
Rogoznica Zečevo	Space	<ul style="list-style-type: none"> Protect natural coast against linear urbanisation, especially for secondary homes.
	Coastal sea	<ul style="list-style-type: none"> Possible development of sustainable mariculture sufficiently far from the coast using off-shore technologies. Stimulate non-invasive underwater tourism at locations with rich biodiversity.
	Strengthening resilience	<ul style="list-style-type: none"> With the obligation to respect the regulation regarding setback⁷ construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall and storms from the sea. Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise and extreme weather phenomena. Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space.
	Water infrastructure	IC; IIC; IIIA; IVC; VC
Skradin Bićine	Space	<ul style="list-style-type: none"> Preserve the natural coast and the specific features of the protected (significant) landscape.
	Strengthening resilience	<ul style="list-style-type: none"> With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space.
Skradin Gračac	Space	<ul style="list-style-type: none"> Assess the environmental impact of the planned tourist project, and make a cost-benefit analysis, and on that basis take the final decision. Preserve the remaining natural coast.
	Coastal sea	<ul style="list-style-type: none"> Biodiversity preservation measures in this ecologically sensitive area.
	Strengthening resilience	<ul style="list-style-type: none"> With the obligation to respect the regulation regarding setback⁷⁶, construction at low-laying parts of the coast, and especially those

ULS/settlement	Thematic field	Description
		<p>lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena.</p> <ul style="list-style-type: none"> Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space.
Skradin Sonković	Space	<ul style="list-style-type: none"> Assess the environmental impact of the planned tourist project, and make a cost-benefit analysis, and on that basis take the final decision. Preserve the remaining natural coast.
	Coastal sea	<ul style="list-style-type: none"> Biodiversity preservation measures in the ecologically sensitive coastal area.
	Strengthening resilience	<ul style="list-style-type: none"> With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. Development of non-invasive tourism, especially in the area of Guduća river mouth, and arrangement of the existing roads and nature trails. Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space.
	Water infrastructure	ID; IIC; IIIA; IVC; VB
Skradin Skradin	Strengthening resilience	<ul style="list-style-type: none"> With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall and storms from the sea. Arrangement of the coastline in the part of the settlement where it hasn't been done yet, and protection of the Skradinsko field against future sea-level rise. Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise and extreme weather phenomena. Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space. Development of non-invasive tourism and arrangement of the existing roads and nature trails. Fire fighting procedures have to be harmonised with legal and programme guidelines for national parks.
	Water infrastructure	IC; IIA; IIIB; IVB; VA

ULS/settlement	Thematic field	Description
Šibenik Brodarica	Space	<ul style="list-style-type: none"> Prevent further spreading of construction areas of the settlement until the existing reserves have been used up. Preserve the remaining natural coast.
	Strengthening resilience	<ul style="list-style-type: none"> With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall and storms from the sea. Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise and extreme weather phenomena, especially when planning their reconstructions. Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space.
	Water infrastructure	IC; IIA; IIB; IVA; VB
Šibenik Donje Polje	Space	<ul style="list-style-type: none"> Due to its specific features, the limited-construction space should be preserved.
	Strengthening resilience	<ul style="list-style-type: none"> With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space.
	Water infrastructure	ID; IIC; IIIA; IVC; VD
Šibenik Grebaštica	Space	<ul style="list-style-type: none"> Preserve the remaining natural coast. Prevent further spreading of construction areas of the settlement until the existing reserves have been used up.
	Coastal sea and mariculture	<ul style="list-style-type: none"> Prohibition of new mariculture facilities within the bay due to insufficient exchange rate of water masses in the enclosed waters of the settlement and impact on the landscape. Development of non-invasive tourism in pristine parts of the settlement, and arrangement of the existing seaside promenades and nature paths, especially in the Grebaštica peninsula.
	Strengthening resilience	<ul style="list-style-type: none"> With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall and storms from the sea. Adaptation of the existing coastal structures to the expected sea-

ULS/settlement	Thematic field	Description
		<p>level rise and extreme weather phenomena, especially when planning their reconstruction.</p> <ul style="list-style-type: none"> ▪ Arrangement of the coastline and construction of seaside promenades high enough and adapted to the expected sea-level rise. ▪ Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space.
	Water infrastructure	IC; IIC; IIIA; IVC; VA
Šibenik Jadrtovac	Space	<ul style="list-style-type: none"> ▪ The construction area can spread according to real needs and demographic growth. ▪ Preserve the valuable parts of the coast and the compact shape of the settlement.
	Coastal sea and mariculture	<ul style="list-style-type: none"> ▪ Prohibition of new mariculture facilities within the bay due to insufficient exchange rate of water masses in the enclosed waters of the settlement and impact on the landscape.
	Strengthening resilience	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Arrangement of the coastline in the part of the settlement where the road passes, construction of seaside promenades high enough and adapted to the expected sea-level rise, extreme weather conditions and associated waves. ▪ Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise and extreme weather phenomena, especially when planning their reconstructions. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall and storms from the sea. ▪ Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space.
	Water infrastructure	IC; IIC; IIIA; IVC; VB
Šibenik Kaprije	Space	<ul style="list-style-type: none"> ▪ Prevent further consumption of the space, i.e. linear urbanisation.
	Coastal sea and mariculture	<ul style="list-style-type: none"> ▪ Stimulate non-invasive underwater tourism at locations with rich biodiversity. ▪ Possible development of sustainable mariculture sufficiently far from the coast using off-shore technologies.
	Strengthening resilience	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Arrangement of the coastline, a road and seaside promenades outside the settlement centre high enough and adapted to the expected sea-level rise, extreme weather conditions and associated waves. ▪ Adaptation of the existing coastal structures to the future sea-level

ULS/settlement	Thematic field	Description
		<p>rise and extreme weather phenomena, especially when planning their reconstructions.</p> <ul style="list-style-type: none"> ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall and storms from the sea. ▪ Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space.
	Water infrastructure	IB; IIC; IIIA; IVC; VD
Šibenik Krapanj	Space	<ul style="list-style-type: none"> ▪ Protect the area of significant landscape against construction. ▪ Prevent further linear urbanisation in the southern part of the settlement.
	Coastal sea	<ul style="list-style-type: none"> ▪ Stimulate non-invasive underwater tourism at locations with rich biodiversity, in the area with developed sponge fishing.
	Strengthening resilience	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Arrangement of the existing waterfront, streets and promenades, and adaptation of the existing coastal structures to the future sea-level rise and extreme weather phenomena, especially when planning their reconstructions. ▪ Arrangement of the water drainage system to make it resilient to future extreme weather conditions, especially extreme rainfall and storms from the sea. ▪ Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space.
	Water infrastructure	IB; IIC; IIIA; IVC; VD
Šibenik Lozovac	Coastal sea	<ul style="list-style-type: none"> ▪ Biodiversity preservation measures in this ecologically sensitive area.
	Strengthening resilience	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space. ▪ Fire fighting procedures have to be harmonised with legal and programme guidelines for national parks.
Šibenik Raslina	Space	<ul style="list-style-type: none"> ▪ The construction area can spread according to real needs and demographic growth. ▪ Preserve the valuable parts of the coast (significant landscape) and the compact shape of the settlement.
	Strengthening resilience	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those

ULS/settlement	Thematic field	Description
		<p>lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena.</p> <ul style="list-style-type: none"> ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall and storms from the sea. ▪ Arrangement of the existing waterfront, streets and promenades, and adaptation of the existing coastal structures to the future sea-level rise and extreme weather phenomena, especially when planning their reconstructions. ▪ Development of non-invasive tourism, and arrangement of the existing roads and nature trails, especially in the area of Guduća river mouth. ▪ Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space.
	Water infrastructure	IC; IIC; IIIB; IVC; VC
Šibenik Šibenik	Space	<ul style="list-style-type: none"> ▪ Protect the natural coast (significant landscape) against further urbanisation. ▪ Fill in the existing undeveloped parts of the construction area.
	Coastal sea and mariculture	<ul style="list-style-type: none"> ▪ Careful evaluation of requests for setting up new shellfish farms within the estuary, given the current load due to the existing farms, insufficient exchange of water masses and general load on the area.
	Strengthening resilience	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-lying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall and sea-level rise. ▪ Reconstruction and raising of the banking in the city centre, the Dolac area, and taking measures to protect coastal structures against the effects of the sea on their stability. ▪ Adaptation of the existing low-lying coastal structures to the future sea-level rise in the Zblaće and Solaris areas, especially when planning their reconstruction. ▪ Arrangement of the coastline and of seaside promenades where it hasn't been done yet, high enough and adapted to the expected sea-level rise and extreme weather conditions. ▪ Arrangement and rehabilitation of the Male and Velike Soline areas. ▪ Continuous maintenance of the beaches (Banj, Jadrija); arrangement of the coastal area to the north-west from the Banj beach. ▪ Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space.
	Water infrastructure	IA; IIA; IIID; IVB; VA

ULS/settlement	Thematic field	Description
Šibenik Zaton	Space	<ul style="list-style-type: none"> Protect the area of significant landscape against construction, especially linear urbanisation. The construction area can spread according to real needs and demographic growth.
	Coastal sea and mariculture	<ul style="list-style-type: none"> Careful evaluation of requests for setting up new shellfish farms within the estuary, given the current load due to the existing farms, insufficient exchange of water masses, environmental state and general load on the area.
	Strengthening resilience	<ul style="list-style-type: none"> With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall and storms from the sea. Arrangement of the existing waterfront, streets and promenades, and adaptation of the existing coastal structures to the future sea-level rise and extreme weather phenomena, especially when planning their reconstructions. Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space.
	Water infrastructure	IC; IIC; IIIB; IVC; VB
Šibenik Zlarin	Space	<ul style="list-style-type: none"> Prevent possible linear urbanisation along the coast and opening of new separate construction areas. The construction area can spread according to real needs and demographic growth.
	Coastal sea and mariculture	<ul style="list-style-type: none"> Possible development of sustainable mariculture in the off-shore parts of the island, sufficiently far from the coast using off-shore technologies.
	Strengthening resilience	<ul style="list-style-type: none"> With the obligation⁷⁶ to respect the regulation regarding setback⁷⁶, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall and storms from the sea. Arrangement of the existing waterfront, streets and promenades, and adaptation of the existing coastal structures to the future sea-level rise and extreme weather phenomena, especially when planning their reconstructions. Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space.
	Water infrastructure	IC; IIC; IIIA; IVC; VD
Šibenik Žabarić	Space	<ul style="list-style-type: none"> Prevent possible further urbanisation of the remaining natural coast.
	Strengthening resilience	<ul style="list-style-type: none"> With the obligation to respect the regulation regarding setback⁷,

ULS/settlement	Thematic field	Description
		<p>construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena.</p> <ul style="list-style-type: none"> ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall. ▪ Arrangement of the existing waterfront, streets and promenades, and adaptation of the existing coastal structures to the future sea-level rise and extreme weather phenomena, especially when planning their reconstructions. ▪ Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space.
	Water infrastructure	IB; IIC; IIIA; IVC; VB
Šibenik Žirje	Space	<ul style="list-style-type: none"> ▪ Prevent possible further urbanisation of the remaining natural coast in the function of secondary homes, as well as opening new separate construction sites.
	Coastal sea and mariculture	<ul style="list-style-type: none"> ▪ Stimulate non-invasive underwater tourism at locations with rich biodiversity. ▪ Possible development of sustainable mariculture on the near-shore side of the island, sufficiently far from the coast using off-shore technologies.
	Strengthening resilience	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷⁶, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall. ▪ Arrangement of the existing waterfront, streets and promenades, and adaptation of the existing coastal structures to the future sea-level rise and extreme weather phenomena, especially when planning their reconstructions. ▪ Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space.
	Water infrastructure	IC; IIC; IIIA; IVB; VD
Tisno Betina	Space	<ul style="list-style-type: none"> ▪ Prevent possible further urbanisation of the remaining natural coast.
	Coastal sea	<ul style="list-style-type: none"> ▪ Stimulate non-invasive underwater tourism at locations with rich biodiversity.
	Strengthening resilience	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena.

ULS/settlement	Thematic field	Description
		<ul style="list-style-type: none"> Arrangement of the coastline in the peripheral parts of the settlement, construction of new and adaptation of the existing seaside promenades high enough and adapted to the expected sea-level rise. Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise and extreme weather phenomena, especially when planning their reconstructions. Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall. Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space.
	Water infrastructure	IB; IIC; IIIA; IVC; VC
Tisno Jezera	Space	<ul style="list-style-type: none"> Prevent further linear urbanisation of the coast.
	Coastal sea	<ul style="list-style-type: none"> Stimulate non-invasive underwater tourism at locations with rich biodiversity.
	Strengthening resilience	<ul style="list-style-type: none"> With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. Arrangement of the coastline in the peripheral parts of the settlement where the road passes, construction of new and adaptation of the existing seaside promenades high enough, protected and adapted to the expected sea-level rise. Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise and extreme weather phenomena, especially when planning their reconstructions. Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall. Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space.
	Water infrastructure	IB; IIB; IIIA; IVC; VB
Tisno Tisno	Space	<ul style="list-style-type: none"> Prevent further linear urbanisation of the coast.
	Strengthening resilience	<ul style="list-style-type: none"> With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. Arrangement of the coastline in the peripheral parts of the settlement, construction of new and adaptation of the existing seaside promenades high enough, protected and adapted to the expected sea-level rise. Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise and extreme weather phenomena, especially when planning their reconstructions. Arrangement of the road network and water drainage system to

ULS/settlement	Thematic field	Description
		<p>make them resilient to future extreme weather conditions, especially extreme rainfall.</p> <ul style="list-style-type: none"> Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space. Provision of sufficient water for fire extinguishing appropriately distributed in the space. Integrated resolution of the problem of surface and groundwater drainage together with neighbouring settlements, insofar as hydrogeological studies ascertain that the problem is common in nature due to watershed boundaries and impact
	Water infrastructure	IB; IIC; IIIA; IVA; VB
Tribunj Tribunj	Space	<ul style="list-style-type: none"> Preserve the remaining natural coast.
	Coastal sea and mariculture	<ul style="list-style-type: none"> Stimulate non-invasive underwater tourism at locations with rich biodiversity. Possible development of sustainable mariculture in the of-shore part of the Logorun island, sufficiently far from the coast using semi-off-shore technologies.
	Strengthening resilience	<ul style="list-style-type: none"> With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. Arrangement of the coastline in the peripheral parts of the settlement where the road passes, construction of new and adaptation of the existing seaside promenades high enough, protected and adapted to the expected sea-level rise. Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise and extreme weather phenomena, especially when planning their reconstructions. Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall. Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space.
	Water infrastructure	IA; IIB; IIIA; IVA; VA
Vodice Prvić Luka	Space	<ul style="list-style-type: none"> No spreading of new construction areas along the coast. Building annexes and reconstruction within the existing construction area. Preservation of landscape values and stimulation of rehabilitation/maintenance of elements of the cultural landscape.
	Coastal sea	<ul style="list-style-type: none"> Stimulate non-invasive underwater tourism at locations with rich biodiversity.
	Strengthening resilience	<ul style="list-style-type: none"> With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena.

ULS/settlement	Thematic field	Description
		<ul style="list-style-type: none"> Arrangement and adaptation of seaside promenades to the expected sea-level rise. Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise and extreme weather phenomena, especially when planning their reconstructions. Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall. Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space.
	Water infrastructure	IC; IIC; IIIA; IVB; VC
Vodice Šepurine	Space	<ul style="list-style-type: none"> No spreading of new construction areas along the coast. Building annexes and reconstruction within the existing construction area. Preservation of landscape values and stimulation of rehabilitation/maintenance of elements of the cultural landscape.
	Coastal sea	<ul style="list-style-type: none"> Stimulate non-invasive underwater tourism at locations with rich biodiversity.
	Strengthening resilience	<ul style="list-style-type: none"> With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. Arrangement and adaptation of seaside promenades high enough and adapted to the expected sea-level rise. Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise and extreme weather phenomena, especially when planning their reconstructions. Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall. Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space.
	Water infrastructure	IB; IIC; IIIA; IVB; VC
Vodice Srima	Space	<ul style="list-style-type: none"> Protect the remaining natural coast against construction, focus on raising the quality of the built-up environment (rehabilitation and urban transformation).
	Strengthening resilience	<ul style="list-style-type: none"> With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. Arrangement of the coastline, construction of new and adaptation of the existing seaside promenades high enough, protected and adapted to the expected sea-level rise. Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise and extreme weather

ULS/settlement	Thematic field	Description
		<p>phenomena, especially when planning their reconstructions.</p> <ul style="list-style-type: none"> ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall. ▪ Continuous maintenance of the beaches and planned construction of beach defences to minimise erosion. ▪ Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space.
	Water infrastructure	IB; IIB; IIIA; IVB; VA
Vodice Vodice	Space	<ul style="list-style-type: none"> ▪ Since the coast has been almost totally urbanised, the future interventions have to focus on raising the quality of the built environment and particularly on preserving all sorts of green areas.
	Strengthening resilience	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁴, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Arrangement of the coastline and adaptation of seaside promenades to the expected sea-level rise. ▪ Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise and extreme weather phenomena, especially when planning their reconstructions. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall. ▪ Continuous maintenance of the beaches and planned construction of beach defences to minimise erosion. ▪ Construction and maintenance of access roads for emergency vehicles to crucial infrastructure and forests, and provision of sufficient water for fire extinguishing appropriately distributed in the space. ▪ Integrated resolution of the problem of surface and groundwater drainage together with neighbouring settlements, insofar as hydrogeological studies ascertain that the problem is common in nature due to watershed boundaries and impact
	Water infrastructure	IB; IIA; IIIA; IVA; VA

7.6 Proposal of a coastal zone management system

7.6.1 Introductory remarks

It is not usual that a proposal of a coastal zone management system, or any other “sectoral” management system, makes part of a plan since there is a presumption that, at the moment of preparing a plan such a system already exists and the plan becomes just a means of implementation of a “sectoral” or “inter-sectoral” policy, while it, if necessary, proposes improvements for the existing system. However, in the case of the Coastal Plan we have a somewhat different situation. First, this is the first plan of its kind in Croatia, and one of very few such plans being prepared in the Mediterranean, especially those stemming from the need to adapt to the climate change effects. It is, thus, understandable that it contains certain elements which are not always part of “standard” planning solutions. Second, in the Šibenik-Knin County or anywhere in Croatia or Mediterranean there is no corresponding example that would be in direct function of coastal zone management. There are, however, complementary systems such as management systems for space or protected areas management, or a water management system (at a higher administrative level, i.e. at the level of the Adriatic watershed), but those can by no means replace the ICZM system. Third, this plan is defined as an indicative plan and its objective is, among others, to deal with the issues that have been elaborated insufficiently or not at all in other plans, and to give a different perspective to certain development issues, such as adaptation to climate change effects. Fourth, although the Coastal Plan is not a regulatory plan, one of its objectives is to improve coordination among all the activities in the coastal zone, which points out the importance of establishing an efficient ICZM system. And finally, one of the defining features of this plan is that it is primarily a “management” plan and only to a lesser extent a “development” plan. This means that the Coastal Plan must, in the end, result in a proposal of a management system for the coastal zone or coastal resources. This does not mean that the sole contents of the management component is this management system proposal, sine policies and measures, explained in the previous chapter, also have to be considered as components of the management system.

This management system proposal is of a strategic importance since it does not go into all details of the functioning of various elements of the system. The proposal will present the basic structure of the system, possible stakeholders in the ICZM process in the Šibenik-Knin County, and basic prerequisites for the system functioning.

7.6.2 Starting points for defining the management system

The starting points for defining the ICZM system in the Šibenik-Knin County, as a tool for raising the resilience of the coastal zone to future challenges, and especially those resulting from the already certain, sudden and very intense weather phenomena, as well as other hazards, are the basis on which its structure is built. These contain the elements noted in the state analysis, and which are considered to make a good basis either by their very existence or by the need to introduce changes that will make them a good basis, as well as some new principles essential for an efficient ICZM system. The following starting points have been defined for the ICZM system of the Šibenik-Knin County:

1. **State of the institutional arrangement for ICZM at the Šibenik-Knin County:** The state analysis has shown the absence of a systematic approach to this issue. However, through “Climagine” workshops and interviews made during the Plan preparation, it appeared that in the County there was a considerable number of institutional actors and other stakeholders that could make a good basis for the establishment of an efficient system. Such a system would serve the purpose of improving resilience and sustainable development of the Šibenik-Knin County.
2. **Timely action:** Consequences of climate changes in coastal zones are a typical problem that we need to start resolving today although it is expected at a long term. A high degree of consciousness of the climate change consequences is necessary to make timely decisions, that will significantly improve the

resilience of the coastal systems. In today's hectic life and complex management, the challenge of timely action is ever growing. What may be timely to one „sector“ (such as physical planning) often fails to be considered as such by those who have to give their opinions in a short term. It is necessary to secure harmonisation of those various dynamics of the actors involved with coastal zone management. For all of the above, Integrated Coastal Zone Management requires a continuously available management and decision-making system

3. **Plans:** A sufficient number of development and management plans have been prepared in the Šibenik-Knin County, but those are largely of a „sectoral“ nature with comparatively low levels of time, space and content integration. This plan aims at improving the integration of sectoral plans.
4. **Policies implementation:** This is prerequisite for an ICZM system. If the proposed policies are adopted, whether those proposed by the Coastal Plan or any other complementary planning document, it is necessary to secure the implementation of those policies, as well as their integration. The essence of the process of policies definition and implementation is a continuous effort aimed at reducing conflicts and gaps between the existing and future desired states, The ICZM system has to provide the procedure of decision making relevant to individual policies and enable their implementation.
5. **Governance:** This makes the basis of environmental and development management (definition is given in section 4.6). According to that definition, the governance is more than just planning and/or management, since it includes the widest possible circle of stakeholders in all phases of the procedure of taking and implementing decisions regarding costal ecosystems with the objective of achieving sustainability of natural systems, assuming that human activities will stay within the limitations posed by the characteristics of those natural systems.
6. **Coastal ecosystem management:** Ecosystem approach is in the very foundations of ICZM. It presumes that ecosystems have to be dealt with in their entirety, within their natural borders, even if those borders are different from and/or go beyond the borders of administrative units. The ecosystem approach is harmonised to a large degree with the governance principles. However, it also includes sectoral, regional and physical planning and management. The figure 7.9 gives a scheme of territorial and management division of the Šibenik-Knin County based on ecosystem approach.
7. **Integration:** Strengthening integration and coordination is the basic prerequisite of coastal zone management. It includes *vertical* integration (between county and national, and county and local levels), *horizontal* integration (among various sectors at the county and local levels), *planning* (vertical among the same sectoral plans at various levels – physical plans at the county and municipal/town levels; horizontal among the sectors at the same level – physical and development plans at the county level), integration between the *land and sea parts of the coastal zone*, and integration of *natural and social systems*.
8. **Borders:** At the moment in Croatia there is no adequate legal basis for ecosystem approach. However, the harmonisation of the institutional elements of a management system and ecosystems borders has to be done first at the contents level. This means that we need a gradual growth of awareness of the need to understand the ecosystem within its natural and functional borders, rather than within administrative borders. After that we can discuss methods of harmonising the borders.
9. **Professional capacities:** There is a permanent lack of knowledge on the basic concepts of ICZM. Additional efforts are needed to train professional staff of the relevant institutions on the topics of priority interest for ICZM, as well as complementary topics, such as spatial marine spatial planning, information systems, systems for monitoring and state assessment.
10. **Awareness of the need for coastal and marine area management:** Apart from failing to understand the basic concepts of ICZM (meaning of integration, definition of the coastal zone, importance of the sea for the coastal space, ecosystem sensitivity), there is a general lack of awareness of the need for careful planning and management of coastal zone development. “Climagine” workshops have shown that there still existed a “critical mass” at many stakeholders in the Šibenik-Knin County that could be the driving force in raising awareness of the need to use ICZM as a key instrument for the protection and development of the coastal zone of the Šibenik-Knin County.

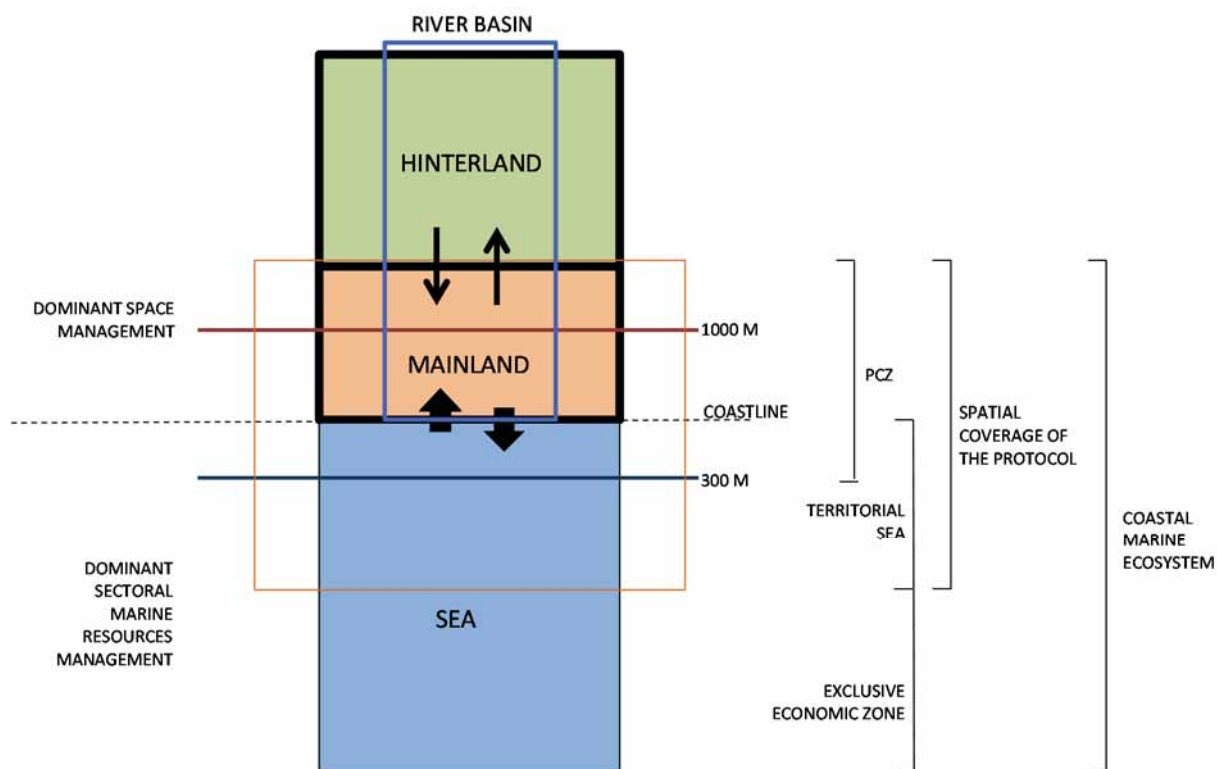


Figure 7.9: Scheme of the borders of the coastal ecosystem management

11. **“Top-down” and “bottom-up” approaches:** The use of both approaches is recommended. The advantage of the “top-down” approach is timely and exact implementation of decisions, while inclusion of experts guarantees preparation of good quality decisions. The advantage of the “bottom-up” approach, especially through active involvement of the local community, is in the guarantee that the decisions taken will be implemented because the consensus of all interested parties is presumed, even if it takes more time to implement. With regard to the uncertainty immanent to climate changes, as well as the extent of this challenge, education and awareness raising are key factors of the needed changes. The workshops organised within the complementary project “Climagine” are an example of the “bottom-up” approach.
12. **Cooperation:** Achieving coastal zone resilience and sustainable development is easier, or perhaps even only possible through cooperation, within the County, among the Adriatic counties, Mediterranean regions and wider. Cooperation is achieved through trust, and trust is built by transparency, communication and considerable engagement of the management sector, as well as all others involved in the governance process. Cooperation makes the trip following the above starting points easier, faster and safer.

7.6.3 Management system proposal

Bearing in mind the natural and socio-economic complexity of coastal zones, the ICZM system looks for a special arrangement that will be capable of encompassing the said complexity in its entirety. The Šibenik-Knin County has a coastline of some 1,000 km, which accounts for 1/6 of the total coastline of the Republic of Croatia. A large number of naturally sensitive areas, two national parks located in the coastal zone, more than 40 coastal settlements and a comparatively large percentage of the coast vulnerable to climate change effects makes the establishment of an efficient ICZM system a necessity and not a matter of choice.

The basic principles of the ICZM system in the Šibenik-Knin County are:

1. New institutions should not be set up for ICZM but the existing professional capacities and competences should be used of the existing institutions and organisations that have been deemed suitable for the needs of ICZM.
2. The decision-making system within the competence of the proposed organisational framework for ICZM will be made simple, but respecting the importance and jurisdiction of all the stakeholders.
3. Vertical and horizontal links will be secured among the elements of the ICZM system.
4. The competences of all key stakeholders will be clearly defined.
5. A common database will be set up to offer support to planning and management and to unify data and information from the monitoring system.
6. A capacity building system will be established for ICZM, spatial marine spatial planning and other modern challenges such as adaptation to climate variability and change.
7. It will be necessary to secure a minimum of financing for the functioning of the system.
8. At the very beginning of the system operation it will be necessary to define clearly the way in which ICZM priorities will be defined.
9. It is necessary to clearly define the monitoring and evaluation system for ICZM activities that will not only regard the expenses but identify with outcomes and/or results of the activities.
10. It is necessary to strengthen the practice and develop mechanisms of participation and cooperation among the public, private and civil sectors and the interested public in early phases of the public political process starting with the definition of the problem, consideration of options and formulation of optimum solutions.
11. It is necessary to continuously inform and educate the general public, raise awareness of the changes and the necessary answers, and stimulate active involvement in all phases of the process.

The ICZM system in the Šibenik-Knin County is fairly simple as it proposes the establishment of a permanent **inter-sectoral coordination body** for the coastal zone with necessary authority, that should overcome fragmentation and tightness of individual sectors. This means that establishment of a new institution is not envisaged. It is estimated that within the existing institutions such as management organisations, public institutions, university, as well as the private and civil sectors, the County has sufficient professional capacities for the functioning of the coordination body. Its exact title is not of particular importance at this moment, but it is good to remind that for the preparation of the Coastal Plan a Management Board has been established, that there is a National Committee at the national level, while at the international level we often talk of coastal forums, partner councils and alike.

Decision-making system in such a body is based on the existence of certain „competences“. This does not imply competencies as in the case of taking management decisions, but competencies, i.e. authority for coordinated action of one sector with the other, and which the representatives of individual sectors in the coordination body must have. This matter can be arranged with an appropriate act that would oblige the institutions in charge of ICZM to implement the guidelines and measures defined by the Coastal Plan, as well as other plans relevant to the coastal zone. In many case the coordination body showed to be a useful tool for exchange of information and coordination of activities implementation. Optimisation of the decision system assumes securing information support, such as GIS tools that can facilitate integration of various contents and data. It is a matter of priority to gather the existing databases owned by the institutions and organisations of the Republic of Croatia, followed by securing human resources, and financial means for the preparation of a precise and contemporary decision support for which several coastal institutions and organisations should provide data.

The matter of **vertical and horizontal integration** is very important. If we presume that ICZM is, in a way, implemented mostly at the regional, i.e. county level, we still have to bear in mind that in legislative sense it

greatly depends on what happens at the national level. There are numerous laws, strategies and regulations, and now EU directives and other international commitments that the Republic of Croatia is obliged to implement, such as the ICZM Protocol, and which have to be implemented at the local level. Assessment of the regulatory effects of a legal act or the process itself of regulation preparation should presume more active forms of consultation among the national, regional and local self-government with regard to applicability and feasibility of the legal solutions relevant to financial and operational capacities, as well as needs at lower levels. As regards horizontal integration at the county level, it is necessary to secure solid coordination in the preparation of strategic documents in the field of marine environment and coastal zone, physical planning and regional development.

Easily accessible and good-quality data and information are a basis for good planning and decision-making. It is necessary to prepare a **unified database** on the county, improve and complement the contents of the existing databases, and include data obtained through monitoring. It is primarily necessary to prepare a **geo-data-base for the county area**. The preparation of such a base could be linked to the preparation of a multi-hazard platform for risk management.

Bearing in mind the insufficient level of education of ICZM stakeholders, it is necessary to establish a **capacity-building system**. If we want to secure good coordination of public policies with the policy of coastal zone protection and preservation, as well as active involvement of various stakeholders, a necessary prerequisite is good information of all stakeholders on the ICZM concept, its mechanisms and legal basis, and practical implications of the adopted regulations. It is necessary to implement a systematic informational-educational campaign to promote the ICZM concept, as well as institutional and non-institutional roles in management, and promote models of good coastal zone management in Croatia and abroad. Capacity building understands, among others, improving professional capabilities of institutions to implement ICZM at the county and local levels, marine spatial planning, environmental impact assessment of the decisions, monitoring and evaluation of environmental state, etc. Finally, it is necessary to build capacities for creating resilience of the coastal zone to climate variability and change. These challenges need the decision makers to work under new conditions characterised by a considerably higher level of uncertainty than before. When taking decisions it will be increasingly more important to think at a long term and a proactive approach.

Since the coordination body is not a new institution, it is estimated that the **financing** of its activities will be minimal. This financing has to be secured, primarily, by the County and ULS, and to a lesser degree the national level and, possibly EU. The first two sources secure the funds for the basic functioning of the body, while the financing for the other two levels would be requested at an *ad hoc* basis for the implementation of special programmes of education, concrete protection and improvement of coastal resources, i.e. increase of their resilience. Immediately after the adoption of the Plan, it is necessary to prepare short- and medium-term action plans for the implementation of ICZM, prioritize activities and make a preliminary assessment of the funds needed for a five-year period.

Defining **priorities** of ICZM in the Šibenik-Knin County is a task that the coordination body should perform immediately after establishment. At that, discussion should be organised among all the relevant stakeholders as well as use the results of the *Climagine* workshops (see Annex 1). The priorities include, by all means, the preparation of a plan for awareness raising aimed at sensitising the general public of the need to at towards diminishing negative impacts of climate change and raising the degree of resilience of coastal agglomerations to emergencies.

Monitoring and evaluation of the progress of coastal zone management presumes defining a set of indicators. Through *Climagine* activities indicators have been selected aimed at monitoring the movement of development in the Šibenik-Knin County towards sustainability and resilience. The list of indicators, their current and past values, the zone in which those values can be considered sustainable, and objectives for

2030 as agreed during the *Climagine* workshops, are described in the *Climagine* study, and are contained in the Annex 1 of this Plan.

Participatory mechanisms for public, private and civil sectors should be more than passive opening of public debates. All potentially interested stakeholders should be informed on the possibility of consultation, and as many channels as possible should be opened in as many points as possible in the process of gathering proposals and comments by the interested public. The ICZM implementation strategy of the County should envisage additional modalities for mobilisation and involvement of the representatives of economy, civil society and academic community in coastal zone management planning, as well as in the management itself.

When planning implementation at the county and local levels it is necessary to envisage a pro-active approach to **informing** all the stakeholders on the context of plan preparation and the notion of integrated coastal zone management, as well as on their role in the entire process, to mobilisation of the stakeholders to participate in the preparation of planning documents, and their active involvement in it, which is a prerequisite of such involvement, later, in the management process. Involvement of various stakeholders should be adapted to their interests, capacities and ways of organisation, and should not be reduced to just insight and providing comments on draft documents.

The coordination body would be composed of three groups of actors: operational bodies, coastal administrative units and civil society (this proposal comes from the Analysis of social actors prepared within the *Climagine* activity, presented in section 4.6; naturally, the composition of the body is flexible and can be changed according to the needs). To secure efficiency of the coordinating body action, selective participation in the work of the body has been envisaged. The following organisational levels are proposed:

- **First level** (could be called operational level). This level includes a comparatively narrow circle of institutions which are already today, in both operational and strategic sense, most involved in some of the activities relevant to ICZM (such as Steering Committee of this Plan), but an appropriate degree of coordination is missing. "Institutionalisation" of their position in ICZM would lead to the obligation of increased coordination in the future. These are:
 - **Department of Environment and Municipal Affairs of the Šibenik-Knin County;**
 - Department of Maritime Affairs, Transport and Insular Development **of the Šibenik-Knin County;**
 - Department of Economy **of the Šibenik-Knin County;**
 - Public Institution Institute for Physical Planning of the Šibenik-Knin County
 - Public institution Regional Development Agency of the Šibenik-Knin County;
 - Port Authority of the Šibenik-Knin County;
 - Public institution PRIRODA of the Šibenik-Knin County;
 - State Directorate for Protection and Rescue – Regional office Šibenik
 - Institute of Public Health of the Šibenik-Knin County;
 - Relevant services of the towns and municipalities of the County;
 - (option) representatives of ministries depending on the topic.
- **Second level** (could be called administrative level). This level includes coastal administrative units, i.e. coastal towns and municipalities which, according to the Law on land-use planning, belong to the protected coastal zone. Today, these are included only to a lesser extent in the activities relevant to ICZM, but a lack of coordination among them is noted regarding the „coastal“ issues. Their inclusion in the coordination body does not mean their participation in every aspect of its work, but then when the need appears to coordinate activities in the coastal zone which include two or more coastal administrative units. However, their involvement will be necessary when taking decisions of strategic importance for the entire Šibenik-Knin County.
- **Third level** (could be called advisory level). This level includes all other stakeholders of the civil society (private sector, NGOs, professional associations and communities, academic institutions, etc.) that

participate in the matters of coastal development. If needed, representatives of relevant ministries can be included here. The possibility should be considered of including at this level the Steering Committee for the preparation of the Plan which could be expanded to include interested participants in the *Climagine* workshops, as well as representative of the tourism community. Their inclusion in the coordinating body is of strategic importance, but their more direct participation is possible in the matters relevant to their competence and/or interest.

A scheme of relations within the coordinating body is given in figure 7.10.

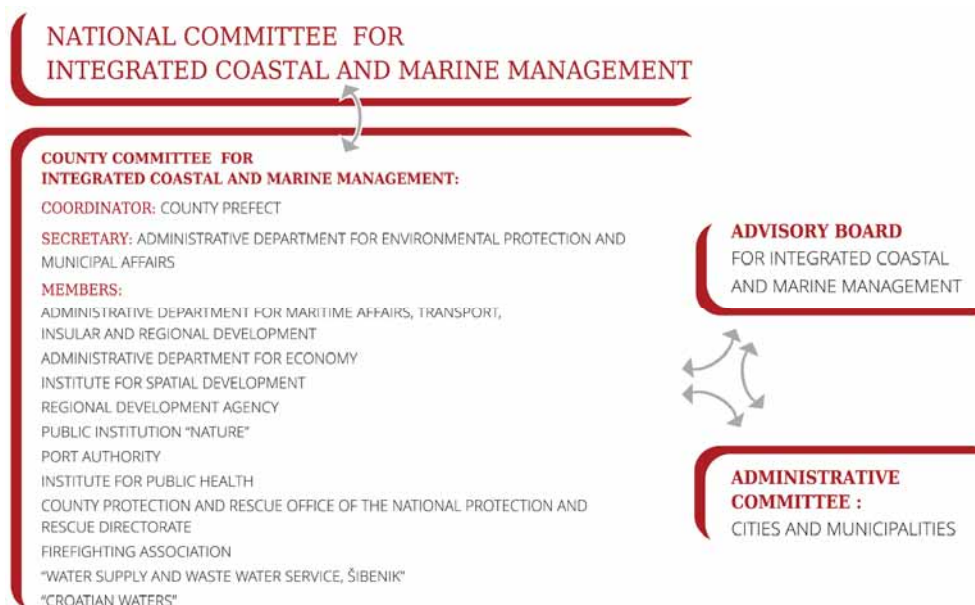


Figure 7.10: Scheme of relations in the coordination body

7.6.4 Measures for the establishment of the management system

Along with the general management measures for the Šibenik-Knin County, and measures for the coastal settlements, measures are proposed for establishing a management system for the coastal zone of the County. These measures make the backbone of the Coastal Zone Management Plan of the Šibenik-Knin County, since their successful implementation greatly facilitates monitoring and application of measures proposed in the previous chapters of the Plan.

Table 7.19: Measures for the establishment of the Šibenik-Knin County coastal zone management

Sector	Measures
Coordination mechanism Advisory body Databases Monitoring system Capacity building Marine planning Coordination Cooperation Implementation Public participation Awareness raising	<ul style="list-style-type: none"> ▪ Establish a permanent coordination mechanism for the management of the coastal and marine zone of the Šibenik-Knin County ▪ Nominate members, define competences, tasks and the process of vertical and horizontal integration ▪ Organise the programme of work of the members of the coordination mechanism ▪ Establish mechanisms of cooperation with water management services of the Krka river basin and the Adriatic watershed ▪ Set up an advisory body for the management of the coastal and marine zones of the Šibenik-Knin County ▪ Nominate members, define competences, tasks and programme of work of the advisory body ▪ Prepare a data and information base needed for planning and management in the ICZM process, including a database on maritime domain, and define competences and obligations for its management and updating ▪ Prepare a multi-hazard platform for risk management in the County ▪ Establish a harmonised monitoring system for the state of coastal and marine ecosystems and processes, and secure evaluation of the progress ▪ Secure capacity building for the management of the coastal and marine zone of the Šibenik-Knin County, and for adaptation to climate change ▪ Strengthen and update marine spatial planning, and prepare a marine spatial plan ▪ Improve coordination in the preparation of strategic and planning documents of the County ▪ Strengthen cooperation with services in charge of preparation of water resources strategic and planning documents ▪ Improve coordination with the services in charge of acting in case of emergencies due to weather conditions ▪ Participate in ICZM related activities of coastal counties of the Republic of Croatia, and international cooperation in projects dealing with coastal and marine area management ▪ Improve implementation of ICZM documents through the use of new and improvement of existing tools, methods, systems, technologies, and especially strengthening and coordination of inspections ▪ Secure prerequisites for good and timely inclusion of the interested public in the decision-taking process (transparency, use of Internet, permanent insight into strategic and planning documents of the County, and especially drafts of the new ones) ▪ Design and support activities aimed at awareness raising and better public participation, as well as making changes in behaviour necessary for achieving sustainable development of the Šibenik-Knin County coastal zone, and adaptation to climate change

ANNEX I:

Specific management measures by coastal settlements

Specific management measures by coastal settlements are given for each thematic field separately, in the form of tables. Bearing in mind that each field has its specific characteristics, this overview of measures is not fully uniform. However, it is possible to follow it without major problems since each settlement is identified, and it is easy to read from each table which measures are proposed within each thematic field. There are 42 coastal settlements in the Šibenik-Knin County. However, measures are proposed just for those settlements for which it was deemed relevant within the given thematic field. It is also important to bear in mind that sometimes it is difficult to identify the administrative borders since the settlements are linked to each other. Therefore, the measures for one settlement sometime flow over into/include the bordering settlements. The same applies to natural processes.

1. Specific measures for sustainable spatial development

1.1 Basic guidelines for defining measures for sustainable spatial development by settlements

Within the diagnostic analysis, i.e. quick assessment of the state in the space, the following indicators of spatial development sustainability have been calculated for the coastal zone of the Šibenik-Knin County:

1. share of construction zones in the total surface of the settlement;
2. degree of use (built up) of the construction zones;
3. share of temporary residents;
4. share of construction zones in the 1 km belt;
5. degree of use (built up) of the construction zones in the 1 km belt;
6. use of coastline by 1 ha of construction zones.

The said indicators of spatial development sustainability can point at the following states, processes and problems in the space of coastal settlements:

1. a high share of construction zones surface in the total surface area of a settlement indicates a high rate of use of the land, potentially high degree of anthropogenization and loss of appeal due to smaller share of natural surfaces and preserved original landscape;
2. the degree of use (built up) of the construction zones, especially if combined with the indicator 1, speaks of the rationality of planning, at the same time in close correlation with sparse, scattered construction which has multiple negative effects on the environment, landscape, use of energy and costs of municipal infrastructure;
3. a high share of units of temporary residence can point at the rentier development model, low-income tourism development, unreasonable use of valuable coastal land and possible infrastructure and socio-cultural problems;
4. the share of construction zones in the 1 km belt speaks of urbanisation pressures on the most vulnerable belt (coastal development restriction area) from the biological, ecological and landscape point of view, and in combination with the indicator 3 it points at economically sub-optimal use of the most valuable coastal resources;
5. degree of use (built up) of the construction zones in the 1 km belt clearly points at the rationality of physical planning, the rest as indicator 2;
6. the use of coastline by 1 ha of construction zones speaks of the use of the coast, i.e. the degree of linear urbanisation of the coast.

All of the above indicators have been quantified, making them measurable and comparable. If each of them is categorised in 3 groups by the degree of problems they cause, and attributed suitable points (the scale of negative points from 1 to 3), adding up the values of all 6 indicators gives an overall indicator or spatial development sustainability index. In theory, the value of this index for coastal settlements can be within the range 6-18, and in practice it is in the range 8-15, which shows that there are no settlements with distinctly favourable or extremely unfavourable situation in the space. Thus obtained overall numeric spatial development sustainability index can, in the same way, be categorised in 3 groups which give synthetic evaluation of the spatial development sustainability (table D1-1 and figure D1-1).

Table D1-1: Synthesis of spatial development sustainability assessment by settlements

ULS / settlement	Settlement						1,000 m				Coast		Index	
	CZtotal/surface%		CZuset%		Residences perman/total		CZ total/surfac%		CZuset%		Coast/ha CZ (m)			
Bilice / Bilice	18.6	2	44.5	3	64.9	2	14.8	1	50.0	2	9.0	1	11	
Murter / Murter	26.1	3	86.4	1	33.8	3	26.3	2	86.5	1	26.0	2	12	
Pirovac / Pirovac	7.9	1	57.9	2	20.9	3	22.7	2	67.0	2	17.0	1	11	
Primošten / Primošten	13.0	2	59.5	2	32.6	3	18.5	1	59.3	2	37.0	2	12	
Primošten / Primošten Burnji	5.2	1	56.1	2	39.5	3	9.2	1	58.7	2	9.0	1	10	
Rogoznica / Dvornica	4.2	1	50.7	2	70.0	1	3.0	1	37.2	3		1	9	
Rogoznica / Kanica	11.2	2	67.1	2	16.5	3	11.2	1	67.1	2	32.0	2	12	
Rogoznica / Oglavci	4.1	1	65.2	2	16.7	3	6.8	1	85.1	1		1	9	
Rogoznica / Podglavica	15.2	2	79.6	2	22.5	3	20.9	2	83.7	1	33.0	2	12	
Rogoznica / Ražanj	16.9	2	78.8	2	12.5	3	16.9	1	78.8	2	55.0	3	13	
Rogoznica / Rogoznica	51.6	3	79.9	2	38.8	3	51.4	3	79.9	2	26.0	2	15	
Rogoznica / Stivašnica	10.2	2	78.2	2	16.0	3	10.2	1	78.2	2	67.0	3	13	
Rogoznica / Zatoglav	15.3	2	42.2	3	15.6	3	15.9	1	42.2	3	46.0	2	14	
Rogoznica / Zečevo	15.7	2	85.3	1	17.9	3	16.0	1	85.3	1	24.0	2	10	
Skradin / Bićine	5.5	1	48.8	3	81.5	1		1		1		1	8	
Skradin / Gračac	11.4	2	35.7	3	69.8	2	19.5	1	0.0	1	9.0	1	10	
Skradin / Sonković	6.1	1	32.6	3	72.2	1	1.6	1	1.8	1	5.0	1	8	
Šibenik / Brodarica	37.2	3	48.9	3	55.1	2	40.6	3	48.9	3	17.0	1	15	
Šibenik / Donje Polje	6.5	1	31.0	3	74.3	1	0.3	1	77.1	2		1	9	
Šibenik / Grebaštica	8.6	1	51.8	2	42.5	2	42.8	3	49.5	3	16.0	1	12	
Šibenik / Jadrtovac	2.2	1	70.3	2	52.8	2	5.4	1	70.8	2	37.0	2	10	
Šibenik / Kaprije	7.0	1	40.4	3	52.1	2	7.0	1	40.4	3	52.0	3	13	
Šibenik / Krapanj	8.1	1	38.8	3	32.7	3	8.2	1	38.8	3	63.0	3	14	
Šibenik / Raslina	6.9	1	60.0	2	79.4	1	11.9	1	60.0	2	41.0	2	9	
Šibenik / Šibenik	31.8	3	57.5	2	92.3	1	37.4	2	59.8	2	12.0	1	11	
Šibenik / Zaton	4.7	1	43.7	3	61.5	2	9.1	1	53.5	2	17.0	1	10	
Šibenik / Zlarin	18.4	2	30.3	3	46.3	2	18.4	1	30.3	3	20.0	1	12	
Šibenik / Žaborić	8.5	1	58.3	2	26.3	3	8.5	1	58.3	2	59.0	3	12	
Šibenik / Žirje	2.9	1	51.5	2	68.7	2	2.9	1	51.5	2	39.0	2	10	
Tisno / Betina	3.5	1	71.9	2	38.8	3	4.9	1	71.9	2	70.0	3	12	
Tisno / Jezera	8.9	1	62.7	2	38.7	3	10.0	1	62.7	2	29.0	2	11	
Tisno / Tisno	5.3	1	60.9	2	36.3	3	8.2	1	60.9	2	53.0	3	12	
Tribunj / Tribunj	9.8	1	63.3	2	31.2	3	28.8	2	66.3	2	17.0	1	11	
Vodice / Prvić Luka	24.5	3	69.3	2	25.3	3	24.5	2	69.3	2	58.0	3	15	
Vodice / Šepurine	34.2	3	75.8	2	26.9	3	34.2	2	75.8	2	54.0	3	15	
Vodice / Srima	14.6	2	36.0	3	17.8	3	32.9	2	36.0	3	24.0	2	15	
Vodice / Vodice	16.2	2	63.5	2	38.8	3	89.9	3	83.1	1	6.0	1	12	

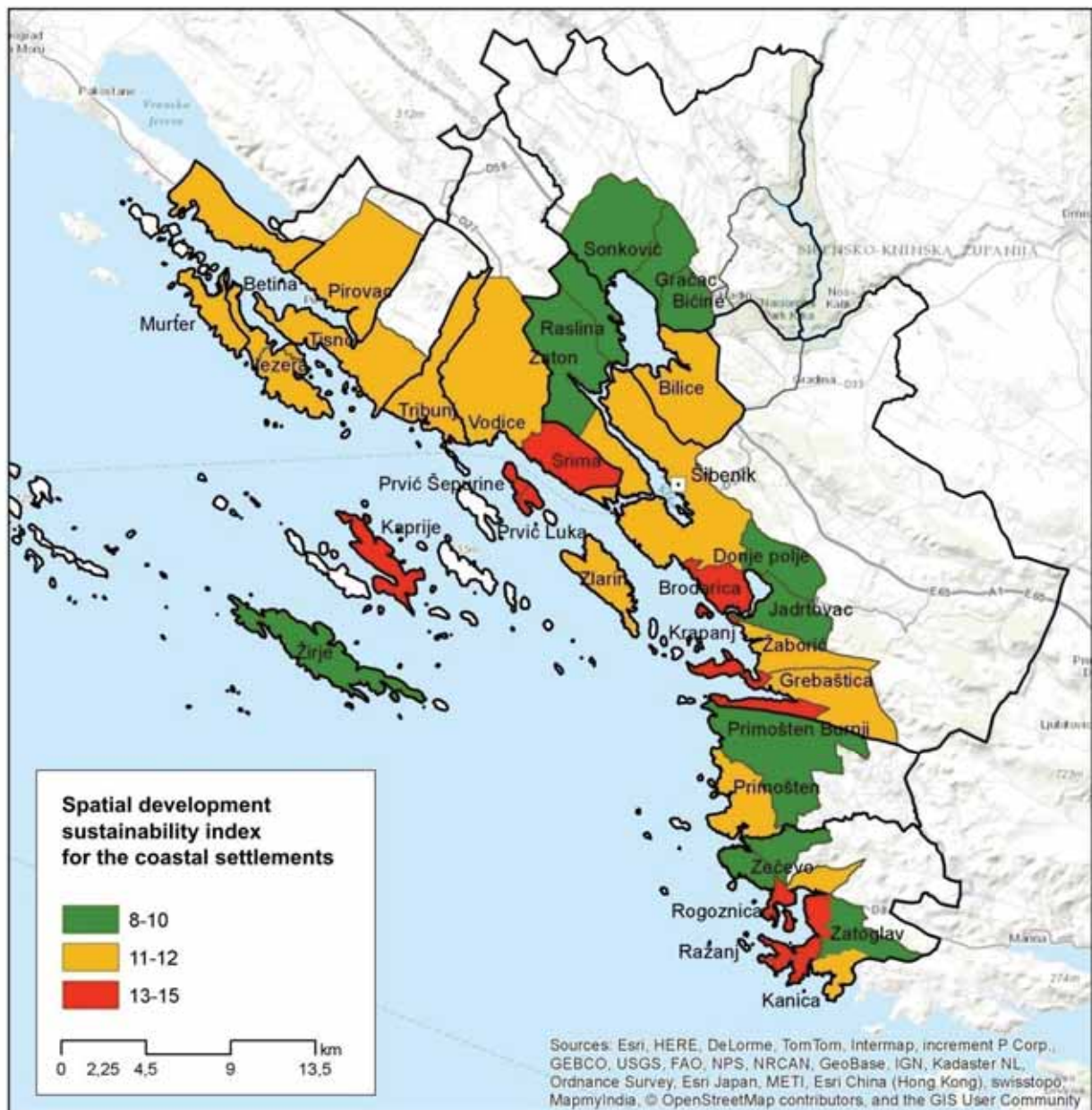


Figure D1-1: Summary spatial development sustainability index for the 6 selected quantitative indicators of the use of space in the coastal settlements of the Šibenik-Knin County

It has to be pointed out that in this way only the selected, directly measurable quantitative indicators of the way of use of the coastal settlements space are elaborated. Accordingly, the quality of the built environment is not taken into consideration which can sometimes significantly affect the total evaluation, either for better or for worse. Good examples of problematic situations are Rogoznica, Srma and Pirovac where, regardless of evaluation of the quantitative analysis, priority is on improving the quality of the built environment of the settlement through procedures of urban recovery and urban transformation. Unfortunately, for the time being, there are no detailed guidelines or models for these important instruments, nor real tools for their implementation. It is also important to point out that the analysed individual indicators are a result, or consequence of several spatial development factors. Those are, primarily, geographic, i.e. natural factor and regard first of all the shape and relief of the settlement as well as the share of coastline in the total surface of the settlement. Other factors are anthropogeneous, and the most important of those is the population distribution, i.e. density. Another important physical anthropogeneous factor is traffic infrastructure which is

crucial for accessibility of a part of the coast for urbanisation processes. A special group of anthropogeneous factors regards the quality of spatial development management which, over a longer time period, can lead to a more or less sustainable state of spatial development. It is obvious that it is more difficult to quantify some of these factors objectively, and that it is more appropriate to analyse and evaluate them qualitatively. Therefore, the table with the proposal of guidelines for spatial development management includes, as a possible corrective for the numeric presentation of the state in the space, a brief comment on specific geographic features of the settlements that can sometimes significantly influence the interpretation of certain sustainability

Table D1-2: Specific measures for sustainable spatial development by settlements in the coastal zone

ULS / settlement	Settlement						1.000 m				Coast		Index	
	CZtotal/surface%		CZuset%		Residences perman/total		CZ total/surface%		CZuset%		Coast/ha CZ (m)		TOTAL	
Bilice / Bilice	18.6	2	44.5	3	64.9	2	14.8	1	50.0	2	9.0	1	11	
State	The settlement, i.e. municipality, especially outside the limitations space, functions as a peri-urban area of the town of Šibenik (indicator of low use of the coast is influenced by this fact). The low degree of use of construction zones of the settlement pints at unrealistic, i.e. unreasonable planning.													
Guidelines	<ul style="list-style-type: none"> Without new expansion of building areas unless a higher degree of utilisation is achieved (80%) Additions and repairs within the existing CZ Preservation of the specific valuable landscape features. 													
Murter / Murter	26.1	3	86.4	1	33.8	3	26.3	2	86.5	1	26.0	2	12	
State	A large share of construction zones in the total surface of the settlement (the situation is somewhat mitigated by the near-by small islands which make part of the settlement), but with a high degree of use, which still indicates a rational planning. A large share of temporary residences.													
Guidelines	<ul style="list-style-type: none"> No particular limitations, desirable discouraging further growth of the number of apartments aimed at occasional use. 													
Pirovac / Pirovac	7.9	1	57.9	2	20.9	3	22.7	2	67.0	2	17.0	1	11	
State	A very high share of temporary residences, especially apartment buildings. A considerable number of construction zones within the coastal development restriction area. A compact and rationally planned construction zone where the construction zone of the settlement shows a very high degree of use.													
Guidelines	<ul style="list-style-type: none"> Rehabilitation within the existing construction zone. Desirable discouraging further growth of the number of apartments aimed at occasional use. 													
Primošten / Primošten	13.0	2	59.5	2	32.6	3	18.5	1	59.3	2	37.0	2	12	
State	Moderate sustainability indicator with a large share of temporary residences and borderline high share of repurposed coast.													
Guidelines	<ul style="list-style-type: none"> Limit further urbanisation of the narrow coastal strip. 													

ULS / settlement	Settlement						1.000 m				Coast		Index	
	CZtotal/surface%		CZuset%		Residences perman/total		CZ total/surface%		CZuset%		Coast/ha CZ (m)		TOTAL	
Primošten / Primošten Burnji	5.2	1	56.1	2	39.5	3	9.2	1	58.7	2	9.0	1	10	
State	Settlement specific for a large share of construction zones (traditional) outside the coastal development restriction area. Favourable sustainability indicators with somewhat larger share of temporary residences.													
Guidelines	<ul style="list-style-type: none"> Stay within the limits of the current indicators. 													
Rogoznica / Dvornica	4.2	1	50.7	2	70.0	1	3.0	1	37.2	3		1	9	
State	The settlement does not reach the coast, except for a small part within the coastal development restriction area. Low degree of use of the space.													
Guidelines	<ul style="list-style-type: none"> No particular limitations. 													
Rogoznica / Kanica	11.2	2	67.1	2	16.5	3	11.2	1	67.1	2	32.0	2	12	
State	Practically the entire settlement within the coastal development restriction area. Moderate sustainability indicators with very large share of temporary residences.													
Guidelines	<ul style="list-style-type: none"> Stay within the limits of the current indicators, limit further urbanisation of the narrow coastal strip. Desirable discouraging further growth of the number of apartments aimed at occasional use. 													
Rogoznica / Oglavci	4.1	1	65.2	2	16.7	3	6.8	1	85.1	1		1	9	
State	Settlement specific for a large share of construction zones (traditional) outside the coastal development restriction area. Favourable sustainability indicators with very large share of temporary residences.													
Guidelines	<ul style="list-style-type: none"> No particular limitations with desirable discouraging of further growth of the number of apartments aimed at occasional use. 													
Rogoznica / Podglavica	15.2	2	79.6	2	22.5	3	20.9	2	83.7	1	33.0	2	12	
State	Moderate rate of construction with a high degree of use of the construction zone. Large share of temporary residences. Very high rate of construction on the coastline.													
Guidelines	<ul style="list-style-type: none"> Stay within the limits of the current indicators, limit further urbanisation of the narrow coastal strip. Desirable discouraging further growth of the number of apartments aimed at occasional use. 													
Rogoznica / Ražanj	16.9	2	78.8	2	12.5	3	16.9	1	78.8	2	55.0	3	13	
State	The entire settlement within the coastal development restriction area. Very large share of temporary residences. High rate of construction on the coastline and very high specific use of the coastline.													
Guidelines	<ul style="list-style-type: none"> Stay within the limits of the current indicators, limit further urbanisation of the narrow coastal strip. Desirable discouraging further growth of the number of apartments aimed at occasional use, especially along the coastline. 													

ULS / settlement	Settlement						1.000 m				Coast		Index	
	CZtotal/surface%		CZuset%		Residences perman/total		CZ total/surface%		CZuset%		Coast/ha CZ (m)		TOTAL	
Rogoznica / Rogoznica	51.6	3	79.9	2	38.8	3	51.4	3	79.9	2	26.0	2	15	
State	Unfavourable spatial development sustainability index (mitigated somewhat by the fact that it is the central settlement of the municipality). The entire settlement within the coastal development restriction area. Very high rate of construction with high degree of use of the construction zones of the settlement.													
Guidelines	<ul style="list-style-type: none"> Stay within the limits of the current indicators of the total built-up ratio of the settlement, limit further urbanisation of the narrow coastal strip. Raising the quality of the built-up areas and especially preserving the green and undeveloped areas, urban rehabilitation and transformation. 													
Rogoznica / Stivašnica	10.2	2	78.2	2	16.0	3	10.2	1	78.2	2	67.0	3	13	
State	The entire settlement within the coastal development restriction area. Very large portion of temporary residences. Moderate overall built-up ratio but very high specific use of the coastline.													
Guidelines	<ul style="list-style-type: none"> Necessary to disable further linear urbanisation of the coast. 													
Rogoznica / Zatoglav	15.3	2	42.2	3	15.6	3	15.9	1	42.2	3	46.0	2	14	
State	Practically the entire settlement within the coastal development restriction area. Low built-up ratio of the construction zones is a consequence of the failed construction of a large tourist establishment. Very large share of temporary residences. Fairly large specific use of the coastline (if the undeveloped construction zone for tourism purpose is excluded).													
Guidelines	<ul style="list-style-type: none"> Necessary to disable further linear urbanisation of the coast. 													
Rogoznica / Zečevo	15.7	2	85.3	1	17.9	3	16.0	1	85.3	1	24.0	2	10	
State	Practically the entire settlement within the coastal development restriction area. Acceptable spatial development sustainability indicators, especially built-up ratio (use) of the construction zones of the settlement. Very large share of temporary residences.													
Guidelines	<ul style="list-style-type: none"> Protect natural coast against linear urbanisation, especially for secondary homes. 													
Skradin / Bićine	5.5	1	48.8	3	81.5	1		1		1		1	8	
State	Settlement on the coast but without construction zones within the coastal development restriction area.													
Guidelines	<ul style="list-style-type: none"> Preserve the natural coast and the specific features of the protected (significant) landscape. 													
Skradin / Gračac	11.4	2	35.7	3	69.8	2	19.5	1	0.0	1	9.0	1	10	
State	Settlement on the coast but without construction zones within the coastal development restriction area. A large separate construction zone for tourism purposes is planned within the coastal development restriction area and the area of significant landscape.													
Guidelines	<ul style="list-style-type: none"> Assess the environmental impact of the planned tourist project, and make a cost-benefit analysis, and on that basis take the final decision. Preserve the remaining natural coast. 													

ULS / settlement	Settlement						1.000 m				Coast		Index	
	CZtotal/surface%		CZuset%		Residences perman/total		CZ total/surface%		CZuset%		Coast/ha CZ (m)		TOTAL	
Škradin / Sonković	6.1	1	32.6	3	72.2	1	1.6	1	1.8	1	5.0	1	8	
State	Settlement on the coast but almost without construction zones within the coastal development restriction area. A large separate construction zone for tourism purposes is planned within the coastal development restriction area and the area of significant landscape.													
Guidelines	<ul style="list-style-type: none"> Assess the environmental impact of the planned tourist project, and make a cost-benefit analysis, and on that basis take the final decision. Preserve the remaining natural coast. 													
Šibenik / Brodarica	37.2	3	48.9	3	55.1	2	40.6	3	48.9	3	17.0	1	15	
State	Almost the entire settlement within the coastal development restriction area. The settlement is a part of the urban area of the town of Šibenik which can justify the planned high built-up ratio, although the low degree of use of the construction zones points at unreasonable planning.													
Guidelines	<ul style="list-style-type: none"> Prevent further spreading of construction areas of the settlement until the existing reserves have been used up. Preserve the remaining natural coast. 													
Šibenik / Donje Polje	6.5	1	31.0	3	74.3	1	0.3	1	77.1	2		1	9	
State	Settlement with a very small part on the coast and practically without construction zones within the coastal development restriction area. Low degree of use of the construction zones is a consequence of failure to develop a part of the zone intended for work.													
Guidelines	<ul style="list-style-type: none"> Due to its specific features, the limited-construction space should be preserved. 													
Šibenik / Grebaštica	8.6	1	51.8	2	42.5	2	42.8	3	49.5	3	16.0	1	12	
State	Settlement with a small part on the coast but which is almost completely urbanised or planned for construction which makes the sustainability indicators for the coastal development restriction area unfavourable.													
Guidelines	<ul style="list-style-type: none"> Preserve the remaining natural coast. Prevent further spreading of construction areas of the settlement until the existing reserves have been used up. 													
Šibenik / Jadrtovac	2.2	1	70.3	2	52.8	2	5.4	1	70.8	2	37.0	2	10	
State	Settlement with a small compact construction zone on the coast and comparatively favourable spatial development sustainability indicators. Moderate share of temporary residences.													
Guidelines	<ul style="list-style-type: none"> The construction area can spread according to real needs and demographic growth. Preserve the valuable parts of the coast and the compact shape of the settlement. 													
Šibenik / Kaprije	7.0	1	40.4	3	52.1	2	7.0	1	40.4	3	52.0	3	13	
State	A fairly small island (with several small uninhabited islands), with its entire surface within the coastal development restriction area. Moderate planned built-up ratio with low degree of use and high use of the coastline points at unreasonable planning. High share of temporary residences.													
Guidelines	<ul style="list-style-type: none"> Prevent further consumption of the space, i.e. linear urbanisation. 													

ULS / settlement	Settlement						1.000 m				Coast		Index	
	CZtotal/surface%		CZuset%		Residences perman/total		CZ total/surface%		CZuset%		Coast/ha CZ (m)		TOTAL	
Šibenik / Krapanj	8.1	1	38.8	3	32.7	3	8.2	1	38.8	3	63.0	3	14	
State	A very specific settlement, a small island with a significant part of the settlement on the mainland, in 2 parts one of which is in the area of significant landscape. In the southern mainland part of the settlement there is linear coastal urbanisation, partly caused by the position of the existing main road.													
Guidelines	<ul style="list-style-type: none"> Protect the area of significant landscape against construction. Prevent further linear urbanisation in the southern part of the settlement. 													
Šibenik / Raslina	6.9	1	60.0	2	79.4	1	11.9	1	60.0	2	41.0	2	9	
State	Almost the entire settlement is within the coastal development restriction area. A settlement with small, compact construction zone on the coast and comparatively favourable spatial development sustainability indicators. Low share of temporary residences.													
Guidelines	<ul style="list-style-type: none"> The construction area can spread according to real needs and demographic growth. Preserve the valuable parts of the coast (significant landscape) and the compact shape of the settlement. 													
Šibenik / Šibenik	31.8	3	57.5	2	92.3	1	37.4	2	59.8	2	12.0	1	11	
State	The central settlement of the urban area of Šibenik which partly justifies the planned high built-up ratio, where degree of use is uneven and borderline acceptable, especially in the peripheral, southern parts of the settlement.													
Guidelines	<ul style="list-style-type: none"> Protect the natural coast (significant landscape) against further urbanisation. Fill in the existing undeveloped parts of the construction area. 													
Šibenik / Zaton	4.7	1	43.7	3	61.5	2	9.1	1	53.5	2	17.0	1	10	
State	Comparatively favourable sustainability indicators, compact construction zone of the settlement with somewhat lower degree of total use, while the degree of use of the construction zone of the settlement (without the separate allocations) more favourable.													
Guidelines	<ul style="list-style-type: none"> Protect the area of significant landscape against construction, especially linear urbanisation. The construction area can spread according to real needs and demographic growth. 													
Šibenik / Zlarin	18.4	2	30.3	3	46.3	2	18.4	1	30.3	3	20.0	1	12	
State	A fairly small island (with several small uninhabited islands), with its entire surface within the coastal development restriction area. Compact construction zone of the settlement with a low degree of use (partly due to the failure to build a tourist zone) and generally acceptable sustainability indicators (lower use of the coastline). Acceptable share of temporary residences.													
Guidelines	<ul style="list-style-type: none"> Prevent possible linear urbanisation along the coast and opening of new separate construction areas. The construction area can spread according to real needs and demographic growth. 													
Šibenik / Žaborić	8.5	1	58.3	2	26.3	3	8.5	1	58.3	2	59.0	3	12	
State	Settlement covering a small surface, entirely within the coastal development restriction area. A high share of temporary residences. Very high specific use of the coastline. Other indicators acceptable.													
Guidelines	<ul style="list-style-type: none"> Prevent possible further urbanisation of the remaining natural coast. 													

ULS / settlement	Settlement						1.000 m				Coast		Index	
	CZtotal/surface%		CZuset%		Residences perman/total		CZ total/surface%		CZuset%		Coast/ha CZ (m)		TOTAL	
Šibenik / Žirje	2.9	1	51.5	2	68.7	2	2.9	1	51.5	2	39.0	2	10	
State	An island with its entire surface entirely within the coastal development restriction area. Compact, built up construction zone of a traditional settlement and partly built up construction zone on the coast with considerable reserves. Other indicators acceptable.													
Guidelines	<ul style="list-style-type: none"> Prevent possible further urbanisation of the remaining natural coast in the function of secondary homes, as well as opening new separate construction sites. 													
Tisno / Betina	3.5	1	71.9	2	38.8	3	4.9	1	71.9	2	70.0	3	12	
State	A specific settlement with the inhabited part on the island and a larger, almost uninhabited part on the mainland which makes the indicators of the total built-up ratio more favourable than they actually are. The degree of use of the construction zones is acceptable, while the use of the coastline is high. High share of temporary residences.													
Guidelines	<ul style="list-style-type: none"> Prevent possible further urbanisation of the remaining natural coast. 													
Tisno / Jezera	8.9	1	62.7	2	38.7	3	10.0	1	62.7	2	29.0	2	11	
State	The settlement entirely within the coastal development restriction area. The construction zone of the settlement is comparatively compact with moderate degree of use. High share of temporary residences.													
Guidelines	<ul style="list-style-type: none"> Prevent further linear urbanisation of the coast. 													
Tisno / Tisno	5.3	1	60.9	2	36.3	3	8.2	1	60.9	2	53.0	3	12	
State	Settlement partly on the island and mostly on the mainland. All construction zones are within the coastal development restriction area. High specific use of the coastline with examples of typical linear coastal urbanisation. High share of temporary residences.													
Guidelines	<ul style="list-style-type: none"> Prevent further linear urbanisation of the coast. 													
Tribunj / Tribunj	9.8	1	63.3	2	31.2	3	28.8	2	66.3	2	17.0	1	11	
State	Settlement partly on the mainland with all construction zones within the coastal development restriction area. Construction zone of the settlement is comparatively compact with considerable reserves. Favourable use of the coastline. High share of temporary residences.													
Guidelines	<ul style="list-style-type: none"> Preserve the remaining natural coast. 													
Vodice / Prvić Luka	24.5	3	69.3	2	25.3	3	24.5	2	69.3	2	58.0	3	15	
State	Settlement on a part of a fairly small island, of high landscape value and protected. A large share of the construction zone is within the settlement area with acceptable degree of use, partly due to specific geographic situation. Large share of temporary residences. Very high specific use of the coastline is partly due to specific geographic features, and partly to unreasonable linear urbanisation.													
Guidelines	<ul style="list-style-type: none"> No spreading of new construction areas along the coast. Building annexes and reconstruction within the existing construction area. Preservation of landscape values and stimulation of rehabilitation/maintenance of elements of the cultural landscape. 													

ULS / settlement	Settlement						1.000 m				Coast		Index	
	CZtotal/surface%		CZuset%		Residences perman/total		CZ total/surface%		CZuset%		Coast/ha CZ (m)		TOTAL	
Vodice / Šepurine	34.2	3	75.8	2	26.9	3	34.2	2	75.8	2	54.0	3	15	
State	Settlement on a part of a fairly small island, of high landscape value and protected. A large share of the construction zone is within the settlement area with a good degree of use. Large share of temporary residences. Very high specific use of the coastline is partly due to specific geographic features.													
Guidelines	<ul style="list-style-type: none"> No spreading of new construction areas along the coast. Building annexes and reconstruction within the existing construction area. Preservation of landscape values and stimulation of rehabilitation/maintenance of elements of the cultural landscape. 													
Vodice / Srma	14.6	2	36.0	3	17.8	3	32.9	2	36.0	3	24.0	2	15	
State	Coastal settlement with all construction zones within the coastal development restriction area. The largest part of the coast has been built up or is planned for construction (tourist zone). Very high share of temporary residences, especially apartment buildings.													
Guidelines	<ul style="list-style-type: none"> Protect the remaining natural coast against construction, focus on raising the quality of the built-up environment (rehabilitation and urban transformation). 													
Vodice / Vodice	16.2	2	63.5	2	38.8	3	89.9	3	83.1	1	6.0	1	12	
State	A fairly large coastal settlement with a compact construction zone along the entire coastline. Accordingly high degree of urbanisation and use of the coastal development restriction area. Large share of temporary residences.													
Guidelines	<ul style="list-style-type: none"> Since the coast and the coastal development restriction area have been almost totally urbanised, the future interventions have to focus on raising the quality of the built environment and particularly on preserving all sorts of green areas. 													

2. Specific measures of adaptation to climate change

Table D1-3: Measures of adaptation to climate change

Uls/Settlement	Description
Bilice / Bilice	
State	The settlement includes coastal area bordering the Prokljan lake, built up, without a plan, with family houses reaching the sea itself. The height a.s.l. of most of the settlement is very low, narrow and undeveloped roads lie in the immediate vicinity of the sea, the coastline has been haphazardly filled and is largely undeveloped, apart from the marina, and interventions have degraded the coastline.
Guidelines	<ul style="list-style-type: none"> ▪ Coastal settlements resilient to extreme weather and climate hazards ▪ Adaptation of the coastline to sea-level rise
Measures	<ul style="list-style-type: none"> ▪ With the obligation to respect the setback zone regulations⁷, construction in low-lying parts of the coast, and especially those lower than 2m, should be allowed only exceptionally, and exclusively on the basis of vulnerability assessment of the given location and respecting the specific building conditions, and application of protection measures against sea flooding and other hazards relevant to sea-level rise and extreme weather phenomena. ▪ Seafront development where road passes, construction of seaside promenades high enough, protected and adapted to the expected sea-level rise, extreme weather conditions and associated waves. ▪ Adaptation of the existing coastal structures to the future sea-level rise and extreme weather phenomena, especially when planning their reconstruction. ▪ Arrangement of the road network and water drainage system, as well as other infrastructure to make them resilient to future extreme weather conditions, especially extreme rainfall.
Murter / Murter	
State	The settlement encompasses the north-western part of the Murter island, developed seafront in the centre of the settlement, partly developed and undeveloped seafront in the peripheral part of the settlement, height a.s.l. of most of the settlement very low, road infrastructure close to the coastline, a marina and several fishing ports in the settlement.
Guidelines	<ul style="list-style-type: none"> ▪ Coastal settlements resilient to extreme weather and climate hazards ▪ Adaptation of the coastline to sea-level rise ▪ Sustainable mariculture as the basis of blue growth and economic development. ▪ Preservation of marine biodiversity as the basis of sustainable development.
Measures	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Seafront development in the peripheral part of the settlement where road passes, construction of new seaside promenades high enough, protected and adapted to the expected sea-level rise. ▪ Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise and extreme weather phenomena, especially when planning their reconstruction. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall. ▪ Stimulate development of sustainable mariculture in the outer part of the Murter island using semi-off-shore technologies. ▪ Develop non-invasive coastal tourism and arrangement of existing walking paths in the nature. ▪ Stimulate non-invasive underwater tourism at locations with rich biodiversity.

ULS/settlement	Description
Kornati / Murter	
State	The settlement located in a bay on the south-western part of the Kornat island, within the “Kornati” national park. Just few inhabitants live in a small number of houses.
Guidelines	Coastal settlements resilient to extreme weather and climate hazards Adaptation of the coastline to sea-level rise Preservation of marine biodiversity as the basis of sustainable development.
Measures	<ul style="list-style-type: none"> ▪ Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise and extreme weather phenomena, especially when planning their reconstruction. ▪ Develop a system to control the behaviour of the visitors to the national park, according to the existing regulations and environmental protection. ▪ Define measures aimed at mitigating potential climate hazards such as fires and flood waters. ▪ Implementation of other protection measures as defined in the current legislation, especially those enabling biodiversity preservation. ▪ Stimulate non-invasive diving tourism at locations with rich biodiversity.
Pirovac / Pirovac	
State	The settlement is located in a shallow bay cut deeply into the mainland, Built up, mainly without any plan, with family houses and tourist apartments reaching all the way to the sea in most of the settlement. In the developed centre of the settlement there is an arranged seaside promenade and small piers which enable mooring of boats and yachts, while in the peripheral parts of the settlement there are partly developed artificial beaches.
Guidelines	<ul style="list-style-type: none"> ▪ Coastal settlements resilient to extreme weather and climate hazards ▪ Adaptation of the coastline to sea-level rise ▪ Sustainable mariculture as the basis of blue growth and economic development. ▪ Preservation of marine biodiversity as the basis of sustainable development.
Measures	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise and extreme weather phenomena, especially when planning reconstructions in the centre of the settlement. ▪ Arrangement of the coastline in the peripheral parts of the settlement, construction of new and adaptation of the existing seaside promenades in accordance with the expected sea-level rise. ▪ Continuous maintenance of the beaches and planned construction of beach defences to minimise erosion. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall. ▪ Prohibition of new mariculture facilities within the bay due to insufficient exchange rate of water masses in the enclosed waters of the settlement.

ULS/settlement	Description
Primošten / Primošten	
State	The settlement is located at a peninsula, the coast is steep and the buildings and infrastructure are beyond effects of the sea, except in the very centre of the settlement. Seaside promenades spread along most of the settlement, above the beaches.
Guidelines	<ul style="list-style-type: none"> ▪ Coastal settlements resilient to extreme weather and climate hazards ▪ Adaptation of the coastline to sea-level rise ▪ Sustainable mariculture as the basis of blue growth and economic development. ▪ Preservation of marine biodiversity as the basis of sustainable development.
Measures	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise, especially when planning reconstructions in the centre of the settlement. ▪ Continuous maintenance of the beaches and planned construction of beach defences to minimise erosion, especially since the coastal area is exposed to open sea waves. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall. ▪ Possible development of sustainable mariculture in an area far enough from the coast, using offshore technologies.
Rogoznica / Dvornica	
State	The settlement is scattered in the south-eastern part of the Rogoznica municipality and encompasses a minor part of the coastline. The coast is steep and rocky and partly developed with family houses and tourist establishments, with undeveloped municipal infrastructure.
Guidelines	<ul style="list-style-type: none"> ▪ Sustainable mariculture as the basis of blue growth and economic development. ▪ Preservation of marine biodiversity as the basis of sustainable development.
Measures	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall and storms from the sea. ▪ Possible development of sustainable mariculture in an area far enough from the coast, using offshore technologies. ▪ Stimulate non-invasive diving tourism at locations with rich biodiversity.
Rogoznica / Kanica	
State	The settlement is located on a peninsula, partly protected from open-sea waves. The coast is moderately steep and rocky, partly cemented in front of tourist and housing buildings, municipal infrastructure is not developed.
Guidelines	<ul style="list-style-type: none"> ▪ Coastal settlements resilient to extreme weather and climate hazards ▪ Sustainable mariculture as the basis of blue growth and economic development. ▪ Preservation of marine biodiversity as the basis of sustainable development.
Measures	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall and storms from the sea. ▪ Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise ▪ Possible development of sustainable mariculture in an area far enough from the coast, using offshore technologies. ▪ Stimulate non-invasive diving tourism at locations with rich biodiversity.

ULS/settlement	Description
Rogoznica / Podglavica	
State	The settlement is partly located on the coast, at the enclosed end of the Rogoznica bay. It well protected against sea influences. The coast is moderately steep, with parts covered in concrete and in part artificial beaches in front of tourist and family buildings built without any plan, municipal infrastructure is not developed.
Guidelines	<ul style="list-style-type: none"> ▪ Coastal settlements resilient to extreme weather and climate hazards ▪ Adaptation of the coastline to sea-level rise
Measures	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall. ▪ Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise. ▪ Continuous maintenance of the beaches and planned construction of beach defences to minimise erosion. ▪ Prohibition of new mariculture facilities within the bay due to insufficient exchange rate of water masses in the enclosed waters of the settlement and impact on the landscape.
Rogoznica / Ražanj	
State	The settlement stretches along the coast, n the homonymous peninsula. In most part it is protected against the sea influence. The coast is moderately steep, partly covered by concrete promenade and partly with artificial beaches in front of tourist and family houses built without any plan. Municipal and road infrastructure is not developed.
Guidelines	<ul style="list-style-type: none"> ▪ Coastal settlements resilient to extreme weather and climate hazards ▪ Adaptation of the coastline to sea-level rise ▪ Sustainable mariculture as the basis of blue growth and economic development. ▪ Preservation of marine biodiversity as the basis of sustainable development.
Measures	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall. ▪ Arrangement of the coastline and construction of seaside promenades high enough and adapted to the expected sea-level rise. ▪ Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise, especially when planning their reconstructions. ▪ Continuous maintenance of the beaches and planned construction of beach defences to minimise erosion. ▪ Stimulate non-invasive diving tourism at locations with rich biodiversity.

ULS/settlement	Description
Rogoznica / Rogoznica	
State	The settlement is on an island connected to a peninsula within the bay, protected from open-sea influences. The coast is mildly and moderately steep, the centre and most of the settlement are developed with seaside promenade and seafronts, interventions along the coastline, limited to peripheral parts, have degraded the coastline itself. Secondary housing and tourist apartments have been built without plans so that the municipal and road infrastructure is not adapted to the requirements, except in the centre of the settlement. There is a large marina in the settlement, in the immediate vicinity of Zmajev Otok, a unique sea lake.
Guidelines	<ul style="list-style-type: none"> ▪ Coastal settlements resilient to extreme weather and climate hazards ▪ Adaptation of the coastline to sea-level rise ▪ Sustainable mariculture as the basis of blue growth and economic development. ▪ Preservation of marine biodiversity as the basis of sustainable development.
Measures	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall and sea-level rise. ▪ Adaptation of the existing coastal structures to the future sea-level rise, especially when planning their reconstructions. ▪ Arrangement of the coastline and construction of seaside promenades high enough and adapted to the expected sea-level rise. ▪ Arrangement of promenades around the Zmajev Otok lake in order to give that natural phenomenon touristic importance, while applying the highest standards for the protection of the area and its biodiversity. ▪ Continuous maintenance of the beaches and planned construction of beach defences to minimise erosion. ▪ Prohibition of new mariculture facilities within the bay due to insufficient exchange rate of water masses in the enclosed waters of the settlement and impact on the landscape.
Rogoznica / Stivašnica	
State	The settlement is located in the bay, partly protected from open-sea waves, except when there is the lobecchio wind. The coast is moderately steep and rocky, partly covered in concrete in front of tourist and family buildings, municipal infrastructure is not developed.
Guidelines	<ul style="list-style-type: none"> ▪ Coastal settlements resilient to extreme weather and climate hazards ▪ Sustainable mariculture as the basis of blue growth and economic development. ▪ Preservation of marine biodiversity as the basis of sustainable development.
Measures	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall and storms from the sea. ▪ Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise. ▪ Possible development of sustainable mariculture sufficiently far from the coast using off-shore technologies. ▪ Stimulate non-invasive underwater tourism at locations with rich biodiversity.

ULS/settlement	Description
Rogoznica / Zatoglav	
State	The settlement is located in the bay, partly protected from open-sea waves. The coast is moderately steep and rocky, partly covered in concrete in front of tourist and family buildings, developed without any plan, interventions along the coast have degraded the coastline. Municipal infrastructure is not developed.
Guidelines	<ul style="list-style-type: none"> ▪ Coastal settlements resilient to extreme weather and climate hazards ▪ Adaptation of the coastline to sea-level rise ▪ Sustainable mariculture as the basis of blue growth and economic development. ▪ Preservation of marine biodiversity as the basis of sustainable development.
Measures	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall. ▪ Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise. ▪ Prohibition of new mariculture facilities within the bay due to insufficient exchange rate of water masses in the enclosed waters of the settlement and impact on the landscape.
Rogoznica / Zečevo	
State	An old settlement located away from the coast, with unplanned construction of secondary homes and tourist apartment buildings on the coast. The coast is moderately steep and rocky, partly covered in concrete in front of tourist and family buildings, developed without any plan, interventions along the coast have degraded the coastline. Municipal infrastructure is not developed.
Guidelines	<ul style="list-style-type: none"> ▪ Coastal settlements resilient to extreme weather and climate hazards ▪ Adaptation of the coastline to sea-level rise ▪ Sustainable mariculture as the basis of blue growth and economic development. ▪ Preservation of marine biodiversity as the basis of sustainable development.
Measures	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall and storms from the sea. ▪ Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise. ▪ Possible development of sustainable mariculture sufficiently far from the coast using off-shore technologies. ▪ Stimulate non-invasive underwater tourism at locations with rich biodiversity.
Skradin / Bićine	
State	The settlement is located inland, at a distance from the Prokljan lake, the coast is moderately steep, pristine and free from construction.
Guidelines	<ul style="list-style-type: none"> ▪ Preservation of marine biodiversity as the basis of sustainable development.
Measures	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Development of non-invasive tourism and arrangement of the existing roads and walking paths in the nature.

Uls/Settlement	Description
Skradin / Gračac	
State	The settlement is located inland, far from the Prokljan lake, the coast is moderately steep, pristine and free from construction.
Guidelines	<ul style="list-style-type: none"> Preservation of marine biodiversity as the basis of sustainable development.
Measures	<ul style="list-style-type: none"> With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. Biodiversity preservation measures in this ecologically sensitive area. Development of non-invasive tourism and arrangement of the existing roads and walking paths in the nature.
Skradin / Sonković	
State	The settlement is located inland, far from the Prokljan lake, the coast is mostly pristine and free from construction, except at the Prokljan hamlet where the coast is low. The settlement comprises the protected area of the Guduća river mouth.
Guidelines	<ul style="list-style-type: none"> Preservation of marine biodiversity as the basis of sustainable development.
Measures	<ul style="list-style-type: none"> With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. Biodiversity preservation measures in this ecologically sensitive area. Development of non-invasive tourism, especially in the area of the Guduća river mouth, and arrangement of the existing roads and walking paths in the nature.
Skradin / Skradin	
State	The settlement is in the upstream part of the Krka river estuary, in the vicinity of the Krka national park. The coast in the centre of the settlement is developed and low, with seaside promenades and a marina. The Skradinsko field is indented into the settlement and extremely low.
Guidelines	<ul style="list-style-type: none"> Coastal settlements resilient to extreme weather and climate hazards Adaptation of the coastline to sea-level rise Preservation of marine biodiversity as the basis of sustainable development.
Measures	<ul style="list-style-type: none"> With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall and storms from the sea. Arrangement of the coastline in the part of the settlement where it hasn't been done yet, and protection of the Skradinsko field against future sea-level rise. Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise. Development of non-invasive tourism and arrangement of the existing roads and nature trails.

ULS/settlement	Description
Šibenik / Brodarica	
State	The settlement spreads along the coast, partly protected from the influence of the open sea. The slope of the coastline is moderate, and most of the settlement is located on a coastal plain 5-10 m a.m.s.l. Seaside promenade stretches along the entire settlement with mooring for boats, while an artificial beach is located in the north-western part of the settlement. Secondary houses and tourist apartment buildings have been constructed without any plan, so that the municipal and road infrastructure is mostly unsuitable for the needs of the settlement.
Guidelines	<ul style="list-style-type: none"> ▪ Coastal settlements resilient to extreme weather and climate hazards ▪ Adaptation of the coastline to sea-level rise ▪ Preservation of marine biodiversity as the basis of sustainable development.
Measures	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall and storms from the sea. ▪ Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise, especially when planning their reconstruction.
Šibenik / Donje Polje	
State	The settlement is at a distance from the coastline towards hinterland. The coastline is very low, pristine and undeveloped, and subject to flooding during the storm surge.
Guidelines	<ul style="list-style-type: none"> ▪ Coastal settlements resilient to extreme weather and climate hazards ▪ Adaptation of the coastline to sea-level rise ▪ Preservation of marine biodiversity as the basis of sustainable development.
Measures	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Development of non-invasive tourism and arrangement of the existing roads and nature trails.
Šibenik / Grebaštica	
State	The settlement is located along the coast of the deepest bay of the Šibenik-Knin County, protected from the influence of the open sea. The coast is moderately steep, partly covered in concrete, with a seaside promenade and artificial beaches. Secondary houses and tourist apartment buildings have been constructed without any plan, so that the municipal and road infrastructure is mostly unsuitable for the needs of the settlement.
Guidelines	<ul style="list-style-type: none"> ▪ Coastal settlements resilient to extreme weather and climate hazards ▪ Adaptation of the coastline to sea-level rise ▪ Sustainable mariculture as the basis of blue growth and economic development. ▪ Preservation of marine biodiversity as the basis of sustainable development.
Measures	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall and sea-level rise. ▪ Adaptation of the existing coastal structures to the expected sea-level rise, especially when planning their reconstruction. ▪ Arrangement of the coastline and construction of seaside promenades high enough and adapted to the expected sea-level rise. ▪ Prohibition of new mariculture facilities within the bay due to insufficient exchange rate of water masses in the enclosed waters of the settlement and impact on the landscape. ▪ Development of non-invasive tourism in pristine parts of the settlement, and arrangement of the existing seaside promenades and nature paths, especially on the Grebaštica peninsula.

ULS/settlement	Description
Šibenik / Jadrtovac	
State	The settlement stretches along the inner part of the Morinj bay. It is well protected from the influence of the sea. The coast has a mild slope. The poor main road is located immediately along the coastline, the coast filled without any plan and undeveloped, with numerous small marinas for the local population's boats, and interventions along the coast have degraded the coastline. Municipal infrastructure is not developed.
Guidelines	<ul style="list-style-type: none"> ▪ Coastal settlements resilient to extreme weather and climate hazards ▪ Adaptation of the coastline to sea-level rise
Measures	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Arrangement of the coastline in the part of the settlement where the road passes, construction of seaside promenades high enough and adapted to the expected sea-level rise. ▪ Adaptation of the existing coastal structures to the future sea-level rise, especially when planning their reconstructions. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall. ▪ Prohibition of new mariculture facilities within the bay due to insufficient exchange rate of water masses in the enclosed waters of the settlement and impact on the landscape.
Šibenik / Kaprije	
State	The settlement is located in a bay, protected from the influence of the open sea. The coast is mildly steep, developed in the centre of the settlement as a seaside promenade, with a small marina, mooring site for larger vessels and numerous small piers for boats outside the centre of the settlement. Most of the coast is covered in concrete. Except for a small part, beaches are mostly undeveloped. Except in the centre of the settlement, secondary homes and tourist apartment buildings have been built without any plans, so that the municipal infrastructure is, in most part, not adequate for the needs of the settlement.
Guidelines	<ul style="list-style-type: none"> ▪ Coastal settlements resilient to extreme weather and climate hazards ▪ Adaptation of the coastline to sea-level rise ▪ Sustainable mariculture as the basis of blue growth and economic development. ▪ Preservation of marine biodiversity as the basis of sustainable development.
Measures	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Arrangement of the coastline, a road and seaside promenades outside the settlement centre high enough and adapted to the expected sea-level rise. ▪ Adaptation of the existing coastal structures to the future sea-level rise, especially when planning their reconstructions. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall. ▪ Development of non-invasive tourism and arrangement of the existing roads and nature trails. ▪ Stimulate non-invasive underwater tourism at locations with rich biodiversity. ▪ Possible development of sustainable mariculture sufficiently far from the coast using off-shore technologies.

ULS/settlement	Description
Šibenik / Krapanj	
State	The settlement is located on the homonymous island, on its north-western coast, protected from direct influence of the open sea. The coast is low, as well as the entire island, mostly below 2 m a.m.s.l. and only slightly higher in its north-western part. Old stone houses prevail, partly restored as secondary homes or tourist apartment facilities. Road infrastructure is undeveloped, the coast mostly developed as a seaside promenade, artificial beaches are rare.
Guidelines	<ul style="list-style-type: none"> ▪ Coastal settlements resilient to extreme weather and climate hazards ▪ Adaptation of the coastline to sea-level rise ▪ Preservation of marine biodiversity as the basis of sustainable development.
Measures	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Arrangement of the existing waterfront, streets and promenades, and adaptation of the existing coastal structures to the future sea-level rise, especially when planning their reconstructions. ▪ Arrangement of the streets and water drainage system to make it resilient to future extreme weather conditions, especially extreme rainfall and sea-level rise. ▪ Stimulate non-invasive underwater tourism at locations with rich biodiversity, in the area with developed sponge fishing.
Šibenik / Lozovac	
State	The settlement is located in the area above the Skradinski Buk, and encompasses the coastal part of the Krka river estuary oriented towards Skradin.
Guidelines	<ul style="list-style-type: none"> ▪ Preservation of marine biodiversity as the basis of sustainable development.
Measures	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Biodiversity preservation measures in these ecologically sensitive areas. ▪ Development of non-invasive tourism and arrangement of the existing roads and nature trails.
Šibenik / Raslina	
State	The settlement stretches along the coast of the Prokljan lake. The coast has a mild incline. The road runs along the coastline which is mostly undeveloped, except in the centre of the settlement where it is covered in concrete and there is a seaside promenade. The coast is mostly filled without any plan and undeveloped, with numerous small mooring sites for the boats of the local population, while interventions along the coast have degraded the coastline. Municipal infrastructure is undeveloped.
Guidelines	<ul style="list-style-type: none"> ▪ Coastal settlements resilient to extreme weather and climate hazards ▪ Adaptation of the coastline to sea-level rise ▪ Preservation of marine biodiversity as the basis of sustainable development.
Measures	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall. ▪ Arrangement of the existing waterfront, streets and promenades, and adaptation of the existing coastal structures to the future sea-level rise, especially when planning their reconstructions. ▪ Development of non-invasive tourism, and arrangement of the existing roads and nature trails, especially in the area of Guduća river mouth.

ULS/settlement	Description
Šibenik / Šibenik	
State	Šibenik is the largest settlement and the centre of the Šibenik-Knin County. In the north-western part of the town the coast is mostly moderately steep to steep, while in the south-eastern part it is moderately to mildly steep and flat. The seaside promenade in the town centre stretches from the Banj beach to the harbour. The oldest part of the town, Dolac, is the lowest and exposed to high tide and flood waters of the Krka river when coastal structures and houses in the historic core get flooded. In the area of the estuary, to the north-west of the town all the way to Zaton, there are numerous shell-fish farms. In the area of the Šibenik channel towards the open sea and the St. Nicholas fort there is a well developed promenade. The areas around Zablacé and Solaris, including the salt lakes of Mala and Velika Solina, are very low and exposed to flooding. In the area of Mandalina there is a marina for small and medium-size vessels, while the one for large yachts is in construction.
Guidelines	<ul style="list-style-type: none"> ▪ Coastal settlements resilient to extreme weather and climate hazards ▪ Adaptation of the coastline to sea-level rise ▪ Sustainable mariculture as the basis of blue growth and economic development. ▪ Preservation of marine biodiversity as the basis of sustainable development.
Measures	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-lying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall and sea-level rise. ▪ Reconstruction and raising of the banking in the city centre, the Dolac area, and taking measures to protect coastal structures against the effects of the sea on their stability. ▪ Adaptation of the existing low-lying coastal structures to the future sea-level rise in the Zablacé and Solaris areas, especially when planning their reconstruction. ▪ Arrangement of the coastline and of seaside promenades where it hasn't been done yet, high enough and adapted to the expected sea-level rise. ▪ Arrangement and rehabilitation of the Male and Velike Soline areas. ▪ Continuous maintenance of the beaches (Banj, Jadrija). ▪ Development of the coastal area to the north-west of the Banj beach ▪ Careful evaluation of requests for setting up new shellfish farms within the estuary, given the current load due to the existing farms, insufficient exchange of water masses and general load on the area.
Šibenik / Zaton	
State	The settlement is in the Krka river estuary. The coast has a mild incline. The road runs along the coastline, and in the settlement there are seafront and seaside promenade. Most of the settlement has been built up without any plan, except for the very centre, so the municipal and road infrastructure do not meet the needs of the settlement.
Guidelines	<ul style="list-style-type: none"> ▪ Coastal settlements resilient to extreme weather and climate hazards ▪ Adaptation of the coastline to sea-level rise ▪ Sustainable mariculture as the basis of blue growth and economic development. ▪ Preservation of marine biodiversity as the basis of sustainable development.
Measures	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-lying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall. ▪ Arrangement of the existing waterfront, streets and promenades, and adaptation of the existing coastal structures to the future sea-level rise, especially when planning their reconstructions. ▪ Careful evaluation of requests for setting up new shellfish farms within the estuary, given the current load due to the existing farms, insufficient exchange of water masses, environmental state and general load on the area. ▪ Development of non-invasive tourism, and arrangement of the existing roads and nature trails.

ULS/settlement	Description
Šibenik / Zlarin	
State	The settlement is located in a bay on the homonymous Island. The coast is mildly to moderately steep, partly covered in concrete with a seaside promenade and artificial, mostly concrete beaches in the settlement itself. Secondary homes and tourist apartment buildings in the centre have been built long ago, while in the peripheral parts of the settlement those have been built without any plan. Municipal infrastructure is mostly adequate for the needs of the settlement.
Guidelines	<ul style="list-style-type: none"> ▪ Coastal settlements resilient to extreme weather and climate hazards ▪ Adaptation of the coastline to sea-level rise ▪ Sustainable mariculture as the basis of blue growth and economic development. ▪ Preservation of marine biodiversity as the basis of sustainable development.
Measures	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall. ▪ Arrangement of the existing waterfront, streets and promenades, and adaptation of the existing coastal structures to the future sea-level rise, especially when planning their reconstructions. ▪ Development of non-invasive tourism, and arrangement of the existing roads and nature trails. ▪ Possible development of sustainable mariculture in the off-shore parts of the island, sufficiently far from the coast using off-shore technologies.
Šibenik / Žaborić	
State	The settlement stretches along the coast, to the south-east of the town of Šibenik. The coast has mild to moderate incline, is partly covered in concrete, with a seaside promenade and artificial beaches. Secondary homes and tourist apartment buildings have been built without any plans, so that the municipal and road infrastructure is not adequate for the needs of the settlement.
Guidelines	<ul style="list-style-type: none"> ▪ Coastal settlements resilient to extreme weather and climate hazards ▪ Adaptation of the coastline to sea-level rise
Measures	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall. ▪ Arrangement of the existing waterfront, streets and promenades, and adaptation of the existing coastal structures to the future sea-level rise, especially when planning their reconstructions.
Šibenik / Žirje	
State	The settlement is scattered all over the island of Žirje although most of the settlement is in the central part of the island, while some bays are also inhabited (Riva, Mikavica, Koromašnja).
Guidelines	<ul style="list-style-type: none"> ▪ Coastal settlements resilient to extreme weather and climate hazards ▪ Adaptation of the coastline to sea-level rise ▪ Sustainable mariculture as the basis of blue growth and economic development. ▪ Preservation of marine biodiversity as the basis of sustainable development.
Measures	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall. ▪ Arrangement of the existing waterfront, streets and promenades, and adaptation of the existing coastal structures to the future sea-level rise, especially when planning their reconstructions. ▪ Development of non-invasive tourism, and arrangement of the existing roads and nature trails. ▪ Stimulate non-invasive underwater tourism at locations with rich biodiversity. ▪ Possible development of sustainable mariculture on the near-shore side of the island, sufficiently far from the coast using off-shore technologies.

ULS/settlement	Description
Tisno / Betina	
State	The settlement stretches along the north-western coast of the Murter island. It is well protected from influences of the open sea. Secondary homes and tourist apartment buildings have been built without any plan, except in the centre of the settlement. The coast is developed in the centre, partly developed and undeveloped in the peripheral parts of the settlement. The coast has a mild incline, the settlement is at a low height a.m.s.l., road infrastructure is located along the coast, a number of marinas and mooring sites are located in the settlement.
Guidelines	<ul style="list-style-type: none"> ▪ Coastal settlements resilient to extreme weather and climate hazards ▪ Adaptation of the coastline to sea-level rise ▪ Sustainable mariculture as the basis of blue growth and economic development. ▪ Preservation of marine biodiversity as the basis of sustainable development.
Measures	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Arrangement of the coastline in the peripheral parts of the settlement where the road runs, construction of new and adaptation of the existing seaside promenades high enough and adapted to the expected sea-level rise. ▪ Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise, especially when planning their reconstructions. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall. ▪ Development of non-invasive tourism, and arrangement of the existing roads and nature trails. ▪ Stimulate non-invasive underwater tourism at locations with rich biodiversity.
Tisno / Jezera	
State	The settlement stretches along the eastern coast of the Murter island. It is well protected from influences of the open sea. Secondary homes and tourist apartment buildings have been built without any plan, except in the centre of the settlement. The coast is developed in the centre, partly developed and undeveloped in the peripheral parts of the settlement. The coast has a mild incline, the settlement is at a low height a.m.s.l., road infrastructure is located along the coast, a number of marinas and mooring sites are located in the settlement.
Guidelines	<ul style="list-style-type: none"> ▪ Coastal settlements resilient to extreme weather and climate hazards ▪ Adaptation of the coastline to sea-level rise ▪ Sustainable mariculture as the basis of blue growth and economic development. ▪ Preservation of marine biodiversity as the basis of sustainable development.
Measures	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Arrangement of the coastline in the peripheral parts of the settlement where the road runs, construction of new and adaptation of the existing seaside promenades high enough and adapted to the expected sea-level rise. ▪ Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise, especially when planning their reconstructions. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall. ▪ Development of non-invasive tourism, and arrangement of the existing roads and nature trails. ▪ Stimulate non-invasive underwater tourism at locations with rich biodiversity.

ULS/settlement	Description
Tisno / Tisno	
State	The settlement is located along the coasts of the Murter island and the mainland. It is well protected from influences of the open sea. Secondary homes and tourist apartment buildings have been built without any plan, except in the centre of the settlement. The coast is developed in the centre, partly developed and undeveloped in the peripheral parts of the settlement. The coast has a mild incline, the settlement is at a low height a.m.s.l., road infrastructure is located along the coast, a number of mooring sites are located in the settlement.
Guidelines	<ul style="list-style-type: none"> ▪ Coastal settlements resilient to extreme weather and climate hazards ▪ Adaptation of the coastline to sea-level rise ▪ Sustainable mariculture as the basis of blue growth and economic development. ▪ Preservation of marine biodiversity as the basis of sustainable development.
Measures	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Arrangement of the coastline in the peripheral parts of the settlement where the road runs, construction of new and adaptation of the existing seaside promenades high enough and adapted to the expected sea-level rise. ▪ Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise, especially when planning their reconstructions. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall. ▪ Development of non-invasive tourism, and arrangement of the existing roads and nature trails.
Tribunj / Tribunj	
State	The settlement stretches along the coast to the north-west of the Vodice town. Secondary homes and tourist apartment buildings have been built without any plan, except in the centre of the settlement. The coast is developed in the centre, partly developed in the north-western part of the settlement, artificial beach and seaside promenade in the south-eastern part of the settlement. The coast has a mild incline, the settlement is at a low height a.m.s.l., road infrastructure is located along the coast, a number of marinas and mooring sites are located in the settlement.
Guidelines	<ul style="list-style-type: none"> ▪ Coastal settlements resilient to extreme weather and climate hazards ▪ Adaptation of the coastline to sea-level rise ▪ Sustainable mariculture as the basis of blue growth and economic development. ▪ Preservation of marine biodiversity as the basis of sustainable development.
Measures	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Arrangement of the coastline in the peripheral parts of the settlement where the road runs, construction of new and adaptation of the existing seaside promenades high enough and adapted to the expected sea-level rise. ▪ Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise, especially when planning their reconstructions. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall. ▪ Development of non-invasive tourism, and arrangement of the existing roads and nature trails. ▪ Stimulate non-invasive underwater tourism at locations with rich biodiversity. ▪ Possible development of sustainable mariculture in the off-shore part of the Logorun island, sufficiently far from the coast using semi-off-shore technologies.

ULS/settlement	Description
Vodice / Prvić Luka	
State	The settlement lies on the coast of a bay located in the south-eastern part of the Prvić island. The coast, seaside promenades and infrastructure in the settlement centre are developed. The coast is mildly to moderately sloping. Secondary homes and tourist apartment buildings have been built without any plan, except in the settlement centre. In the settlement there is a port and a marina for boats and yachts.
Guidelines	<ul style="list-style-type: none"> ▪ Coastal settlements resilient to extreme weather and climate hazards ▪ Adaptation of the coastline to sea-level rise ▪ Sustainable mariculture as the basis of blue growth and economic development. ▪ Preservation of marine biodiversity as the basis of sustainable development.
Measures	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Arrangement and adaptation of seaside promenades to the expected sea-level rise. ▪ Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise, especially when planning their reconstructions. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall. ▪ Development of non-invasive tourism, and arrangement of the existing roads and nature trails. ▪ Stimulate non-invasive underwater tourism at locations with rich biodiversity.
Vodice / Šepurine	
State	The settlement is located on the south-eastern part of the Prvić island. The coast, seaside promenades and infrastructure in the settlement centre are developed. The coast is mildly to moderately sloping. Secondary homes and tourist apartment buildings have been built without any plan, except in the settlement centre. In the settlement there is a port and a marina for boats and yachts.
Guidelines	<ul style="list-style-type: none"> ▪ Coastal settlements resilient to extreme weather and climate hazards ▪ Adaptation of the coastline to sea-level rise ▪ Sustainable mariculture as the basis of blue growth and economic development. ▪ Preservation of marine biodiversity as the basis of sustainable development.
Measures	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Arrangement and adaptation of seaside promenades to the expected sea-level rise. ▪ Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise, especially when planning their reconstructions. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall. ▪ Development of non-invasive tourism, and arrangement of the existing roads and nature trails. ▪ Stimulate non-invasive underwater tourism at locations with rich biodiversity.
Vodice / Srma	
State	The settlement is located on the coast, to the south-east of the Vodice town. The coast, seaside promenades and infrastructure in the settlement centre are developed in a smaller part. Artificial beaches stretch along the coast. The coast is mildly sloping. Secondary homes and tourist apartment buildings have been build without any plan, resulting in mostly inadequate municipal and road infrastructure.
Guidelines	<ul style="list-style-type: none"> ▪ Coastal settlements resilient to extreme weather and climate hazards ▪ Adaptation of the coastline to sea-level rise

ULS/settlement	Description
Measures	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Development of the coastline, arrangement and adaptation of seaside promenades high enough to be adapted to the expected sea-level rise. ▪ Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise, especially when planning their reconstructions. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall. ▪ Continuous maintenance of the beaches and planned construction of beach defences to minimise erosion.
Vodice / Vodice	
State	<p>The town of Vodice is the second largest settlement of the coastal zone of the Šibenik-Knin County. The coast is low and mildly sloping, so that during winter sirocco periods the waterfront in the centre is exposed to flooding. Seaside promenades are developed and stretch along the entire coast of the settlement. The municipal and road infrastructure in the settlement centre is partly developed. Artificial beaches stretch along the coast, especially in the north-western part of the settlement. Secondary homes and tourist apartment buildings have been built without any plan in both peripheral and central parts of the settlement. In the settlement there are large hotel establishments, a marina and a number of mooring sites.</p>
Guidelines	<ul style="list-style-type: none"> ▪ Coastal settlements resilient to extreme weather and climate hazards ▪ Adaptation of the coastline to sea-level rise
Measures	<ul style="list-style-type: none"> ▪ With the obligation to respect the regulation regarding setback⁷, construction at low-laying parts of the coast, and especially those lower than 2 m, should be allowed only exceptionally, and exclusively on the basis of vulnerability analysis of the given site and respecting the specific building conditions, as well as applying measures for the protection against sea flooding and other hazards relative to sea-level rise and extreme weather phenomena. ▪ Development of the coastline and adaptation of seaside promenades high enough to be adapted to the expected sea-level rise, extreme weather phenomena and waves. ▪ Adaptation of the existing coastal structures, seafronts, piers and marinas to the future sea-level rise and increased extreme weather conditions, especially when planning their reconstructions. ▪ Adaptation of the coastal municipal infrastructures to the future sea-level rise and increased extreme weather conditions. ▪ Arrangement of the road network and water drainage system to make them resilient to future extreme weather conditions, especially extreme rainfall. ▪ Development of the municipal wastewater drainage, treatment and discharge system in accordance with the expected increase of temperature, precipitations and sea-level. ▪ Continuous maintenance of the beaches and planned construction of beach defences to minimise erosion. ▪ Development of non-invasive tourism, and arrangement of the existing roads and nature trails. ▪ Plan construction or reconstruction of the urban water infrastructure in accordance with cumulative influence of the sea, local precipitation and groundwater, as well as waters from the hinterland, all in view of the expected increase of extreme weather conditions and sea-level rise. ▪ Apply integrated concept of storm water drainage wherever possible in the settlement (drainage without canals and pipelines). ▪ Implement water saving measures, especially measures for reduction of water losses from the water supply system. ▪ Renew and use traditional water supply systems (use of rain water) wherever it is acceptable from the economic, social and ecological points of view. ▪ Implement measures of education for general public, relevant organisations and services with regard to climate change effects on urban water resources and urban water infrastructure, and present possible local solutions for strengthening resilience to climate change. ▪ When planning settlement development implement water sensitive designs.

3. Specific measures for water resources management

3.1. Specific guidelines for defining measures of urban water resources management for coastal settlement

Specific measures relevant to water resources management in the coastal zone do not refer just to water infrastructure within a settlement. The measures regarding the water resources management in the Šibenik-Knin County, i.e. in the Krka river basin are given in chapter 7.5.1. The necessary measures by individual settlements have been defined and ranked according to the following indicators:

1. Coastal water infrastructure in the coastal belt 10-30 m wide (water supply, wastewater drainage, separation of rainfall and surface waters)
2. Water supply of settlement
3. Wastewater drainage and treatment
4. Storm/surface waters inside the settlement
5. Storm/surface waters from immediate hinterland, or local coastal watershed

Each indicator was graded according to the following degree of the problem:

- A. Greatest problems and costs of construction and rehabilitation;
- B. Moderate problems and costs of construction and rehabilitation;
- C. Minor problems and costs of construction and rehabilitation;
- D. Very small problems and costs of construction and rehabilitation.

The rank of the settlement, i.e. belonging to a certain category of settlements with regard to exerted degree of problem is given in Table D1-4. The cumulative index of all indicators is given in the last column on the right on the Table S1-4 and in the Figure D1-2. Since no detailed analysis of the state of individual urban water infrastructure was performed during the Plan preparation, for some settlements the assessment of consequences was made on the basis of spatial and town-planning data.

It is important to know that settlements are often connected by both town-planning and natural spatial processes, so that an administrative border is not always the actual border of the processes and problems occurring in coastal settlements. Therefore, the assessments and ranking of the state for individual settlements have been integrated with the neighbouring settlements. A part of a settlement, coastal space, will be threatened by ground waters which are in interaction with the sea and waters from the hinterland, which has to be taken into consideration when implementing protection measures. In the ranking presented here, the specific influence of groundwaters on the state in the settlements has not been included due to the unavailability of appropriate bases. Such an analysis is beyond the framework of this task and has to be made within detailed analyses for individual settlements.

All the measures have to be harmonised with the current water resources management plans for the Adriatic catchment area prepared and implemented by the Croatian Waters, and regard the water resources state management and flooding risk management. At present the plan for the period 2016-2021 is under discussion.

Table D1-4: Ranking of the state of water resources by settlements

ULS settlement (municipality)	Agglomeration	I Coastal water infrastructure in the 10-30 m wide coastal belt		II Settlement water supply		III Wastewater drainage and treatment		IV Storm waters of the settlement		V Storm/surfa ce waters of the hinterland		Index	
		Built-up cost in settlements (km)		Population density (inh/km ²)		Sewerage network (% connections)						Cumulative (A=5, B=4, C=3, D=2)	
Betina (Tisno)	Tisno	9.67	B	38	C	0	A		C			15	C
Bilice (Bilice)	Bilice	2.95	C	108	B	0	A		C			15	C
Brodarica (Šibenik)	Šibenik	1.03	C	401	A	20-40	B		A			17	B
Donje Polje (Šibenik)	Šibenik	0.42	D	28	C	0	A		C			13	D
Grebaštica (Šibenik)	Šibenik	1.83	C	61	C	0	A		C		A	19	B
Jadrtovac (Šibenik)	Šibenik	1.24	C	18	C	0	A		C			14	D
Jezera (Tisno)	Tisno	6.42	B	99	B	0	A		C			16	B
Kanica (Rogoznica)	Rogoznica	1.09	C	50*	C	0	A		C			14	D
Kaprije (Šibenik)	Šibenik	4.77	B	14	C	0	A		C			15	C
Krapanj (Šibenik)	Šibenik	7.97	B	23	C	0	A		C			15	C
Murter (Murter)	Murter	10.74	A	218	B	0	A		B			18	B
Šibenik (Šibenik)	Šibenik	28.35	A	780	A	>60	D		B		A	21	A
Pirovac (Pirovac)	Pirovac	3.59	B	66	C	0	A		B		A	21	A
Podglavica (Rogoznica)	Rogoznica	2.46	C	61	C	0	A		C			14	D
Primošten (Primošten)	Primošten	8.75	B	140	B	40-60	C		B			15	C
Primošten Burnji	Primošten	4.50	B	26	C	0	A		C			15	C
Prvić Luka (Vodice)	Vodice	2.26	C	33	C	0	A		B			15	C
Prvić Šepurine (Vodice)	Vodice	3.34	B	58	C	0	A		B			16	B
Ražanj (Rogoznica)	Rogoznica	2.44	C	50	C	0	A		C			14	D
Raslina (Šibenik)	Šibenik	1.69	C	64	C	20-40	B		C			13	D
Rogoznica (Rogoznica)	Rogoznica	5.05	B	442	A	40-60	C		A			17	B
Skradin (Skradin)	Skradin	1.24	C	450	A	20-40	B		B		A	21	A
Sonković (Skradin)	Skradin	0.34	D	16	C	0	A		C			13	D
Srima (Vodice)	Vodice	3.70	B	73	B	0	A		B			17	B
Stivašnica (Rogoznica)	Rogoznica	1.27	C	50*	C	0	A		C		A	19	B
Tisno (Tisno)	Tisno	7.76	B	66	C	0	A		A			15	B
Tribunj (Tribunj)	Tisno	5.25	A	99	B	0	A		A		A	17	A

ULS settlement (municipality)	Agglomeration	I Coastal water infrastructure in the 10-30 m wide coastal belt		II Settlement water supply		III Wastewater drainage and treatment		IV Storm waters of the settlement		V Storm/surface waters of the hinterland		Index	
		Built-up cost in settlements (km)		Population density (inh/km ²)		Sewerage network (% connections)						Cumulative (A=5, B=4, C=3, D=2)	
Vodice (Vodice)	Vodice	7.45	B	194	A	20-40	A		A		A	22	A
Zatoglav (Rogoznica)	Rogoznica	2.51	C	50*	C	20-40	B		A			15	C
Zaton (Šibenik)	Šibenik	1.75	C	47	C	20-40	B		C			13	D
Zečevo Rogozničko	Rogoznica	1.73	C	6	C	0	A		C			14	D
Zlarin (Šibenik)	Šibenik	2.51	C	29	C	0	A		C			14	D
Žaborić (Šibenik)	Šibenik	4.79	B	53	C	0	A		C			15	C
Žirje (Šibenik)	Šibenik	2.94	C	6	C	0	A		B			15	C

* estimation

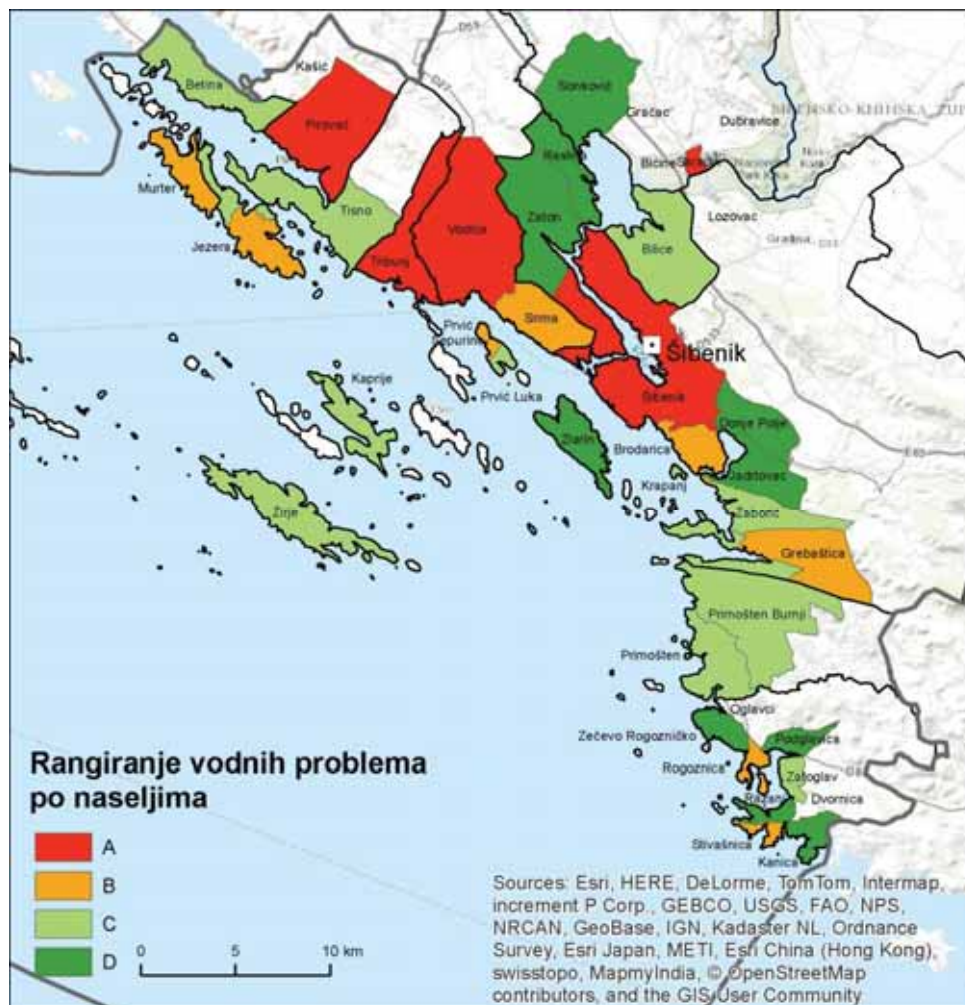


Figure D1-2: Ranking of coastal settlements according to intensity of water resources management problems

3.2. Specific water resources management measures by settlements

The water resources management measures by settlements are presented in a somewhat different way than in the case of measures for sustainable spatial development and adaptation to climate change. The reason lies in the fact that the water resources management problems are extremely complex and do not respect administrative borders, the solutions are sought using a larger number of criteria, and the solutions themselves are much more expensive than in other cases.

For each indicator we give a description (**cause, state and problems, consequences**), definition of generic **measures**, and description of the **intensity** of the problem for each indicator, which then need to be consulted in the application in order to modify the generic measures. Thus, when identifying measures for each settlement it is necessary to depart from Table D3 and then read the detailed description of the measure in the following text.

I – Coastal water infrastructure in the 10-30 m wide coastal belt

Causes: Due to climate change increase is expected of the mean sea level (by approximately 60 cm), storm sea and big waves, and accordingly threat for all low-lying coastal zones in urban environments.

State and problems: Underground water infrastructure (pipelines, structures, armatures, outfalls) is exposed to constant moistening by the sea and hinterland groundwaters which leads to degradation, leaking and crumbling. All coastal outfalls will not be able to function due to a higher backflow resulting from higher sea levels, which will lead, in turn, to retention of waters in discharge systems, up-stream spillage of storm and surface waters and flooding.

Consequences: More intensive and more frequent flooding of low-lying coasts in settlements, especially those that already experience it, the resulting increased salinity of the coast and land, flooding of coastal water and other infrastructure (water supply and sewerage) and objects, spillage of faecal and other waters in the coastal environment. The result: considerable potential consequences on public health, safety of the population and performing coastal activities, as well as sustainability of the environment. Considerable damage and losses for people and municipal coastal infrastructure, and coastal economy.

Measures: Necessary relocation of the infrastructure and raising of outfalls at higher terrains, and introduction of protection measures for all underground and surface structures. This particularly refers to main and transit canals, pipelines and pumping stations. It is necessary to make changes to the existing physical plans in order to define very precisely the threatened space and make plans for adaptation and protection of infrastructure, as well as all buildings. The larger a space and the longer a coastline, the more complex the problem becomes resulting in higher costs of rehabilitation and adaptation and more complex and longer implementation. The mentioned building measures are implemented jointly with other measures for protection of the coastline and the structures on it.

Intensity/extent is defined according to the length of the coast:

- A** – Length of the built-up coast > 10 km; high complexity of the problems, very high costs of adaptation to changes, very large potential effect on the state of environmental health, damage to structures in the coastal zone
- B** – Length of the built-up coast 3–10 km; moderate complexity of the problems and moderate costs
- C** – Length of the built-up coast 1–3 km; minor costs and complexity of the problems
- D** – Length of the built-up coast < 1 km; small costs and problems

Future detailed analyses have to take into consideration the contents of individual infrastructure in the coastal belt.

II – Settlement water supply

Causes: Due to climate change it is expected that in summer months the availability of water quantities for water supply will be reduced at all water capitation points. Storms will cause interruptions in energy supply. Water quality degradation is possible due to increased erosion processes in the catchment area. Competition and conflicts among various users will grow.

State and problems: Water supply system with somewhere insufficient summer capacity with large real or ostensible water losses, mostly higher than 50%.

Consequences: Reduction of the already, in some places, insufficient available capacity of sources combined with large losses in the water supply network will result in water shortages and irregular water supply in summer months, and interrupted water supply due to interrupted energy supply. Deteriorated public health, safety of living and working, and environmental hazards. Considerable economic losses are possible in tourism and other activities.

Measures: It is necessary to rationalise summer water consumption using a series of measures. At the level of end users water consumption should be reduced by replacing old appliances with new, more frugal ones, and by reducing the pressure in the water supply system, especially in winter months when water consumption is smaller. All of the old pipelines, fixtures and connectors should be replaced by new ones. All illegal connections and water stealing have to be eliminated. Watering of urban green areas has to be rationalised, as well as that of agricultural areas in the periods of peak consumption during summer months. Back-up water sources and supply from more directions have to be secured, as well as back-up energy supply systems. Enough water reserves have to be secured in retentions for all emergency situations. All these activities have to be performed in cooperation with the company in charge of water supply of the settlement.

Intensity:

A – Water supply network of a settlement with population density above 220 inh/km²

Major consequences for a settlement with high population density. Business loses. Considerable cost of replacing long water supply pipelines and the belonging connectors and fixtures. If the losses are mostly due to leakages at connectors than most part of the water supply network has to be replaced. It is also necessary to replace the pipelines made of asbestos-cement pipes. Good preparation, organisation and planning of the operation are necessary. The process is long and complex, and should be coordinated with other interventions on the roads where rehabilitation is performed.

B – Water supply network of a settlement with population density of 70–220 inh/km²

Moderate socio-economic consequences for a settlement with smaller population density. Some business losses. Moderate cost of replacing the water supply pipelines and the belonging connectors and fixtures. It is necessary to perform testing to identify the lines and locations where the losses are greatest. Good preparation, organisation and planning of the operation are necessary. The process is complex and, if necessary, should be coordinated with other interventions on the stretches and locations where rehabilitation is performed.

C – Water supply network of a settlement with population density below 70 inh/km²

Minor consequences for the population and economic activities. Considerable cost of replacing long water supply pipelines and the belonging connectors and fixtures. It is necessary to identify all critical lines and locations, and focus on rehabilitation of those with highest losses. The process is complex and, if necessary, should be coordinated with other interventions on the stretches and locations where rehabilitation is performed.

III – Wastewater drainage and treatment

Causes: Climate changes are expected to bring about increase in summer temperatures and with it acceleration of all bio-chemical processes in the system of collection, drainage and treatment of bio-degradable wastewaters which will, in turn result in occurrence of bad smell at the places where sewerage is ventilated due to discharge of gasses, and especially harmful gasses such as hydrogen sulphide, methane and CO₂. This means higher emission of greenhouse gasses and smell in the environment, and deterioration of air quality in the vicinity of the sewerage network and structures. Storms will cause interruptions in energy supply, longer retention of wastewaters in the system and evaporation of larger quantities of gasses.

State and problems: Insufficient/small connection of structures/population to the sewerage system, absence of adequate wastewater and sludge treatment plant, absence of a receiving station and solution for dealing with septic waters. Possible interruptions in the functioning due to power cuts. Possible overloading of canals due to sea water intrusion into collectors laid below the expected mean sea levels. Increased discharge from the sewerage system of greenhouse gasses and gasses harmful for the population (hydrogen sulphide and methane).

Consequences: Public health, safety and environment, as well as economic damage for business subjects, especially in summer when the temperatures are highest.

Measures: It is necessary to build a sewerage network and a wastewater treatment plant, and get the level of connection to 80%. Resolve the problem of disposing the sludge from the treatment plant as well as septic waters from the tanks of the structures not connected to the sewerage system. Build a long submarine outfall in order to protect the coastal sea from bacterial pollution which can be caused even by treated wastewaters. Repair and build new septic tanks with adequate system of infiltration of waters into the underground, or use impermeable tanks in all small settlements and isolated structures far from the sewerage network (more than 200 m). Separate street or roof storm waters from sewerage wastewaters (industrial wastewaters). Repair (raise to a higher level all collectors currently under the future sea levels (approximately 60 cm above the geodetical zero) in order to prevent sea water intrusion into collectors and treatment plant. All these works have to be implemented in collaboration with town planners and the company in charge of wastewater management. The works will be financed mostly by money from the EU funds, with local participation of 20-40%. It is necessary to build a system with as low operational costs as possible in order to keep the price of the wastewater drainage and treatment service for the population and businesses as low as possible. Particular attention has to be paid to planning, operation and management of a system with very high seasonal load oscillations.

Intensity:

A – Settlement without sewerage network

Very high potential negative health problems and effects on population and environment until the sewerage is built. This means that in the considered space there is no common sewerage system, which is still to be built. Extensive works and high expenses are involved. Such situation with connections means that it is necessary to build a sewerage network in the entire urban space. The works have to be well planned and interventions made in coordination with other municipal infrastructure. For the sections in which the works are being done it is advisable to repair and build all water and other municipal infrastructure, water supply system, waste and storm waters drainage. The plant has to be made in accordance with the already defined agglomerations, as well as regional sludge treatment and disposal plans. A high price of wastewater drainage and treatment service is expected (15-20 kuna).

B – Sewerage system/network with connection of 20-40%

Possible considerable negative health effects on population and environment. Low level of connection that has to be increased to 80%. This means that in the considered space there is no common sewerage system, which is still to be built. Extensive works and high expenses are involved. Such situation with connections means that it is necessary to build a sewerage network in more than 80% of the urban space. Since the existing network probably does not meet the requirements of a new, integral concept of sewerage, it results that an entirely new sewerage system is being built. The works have to be well planned and interventions made in coordination with other municipal infrastructure. Particular attention has to be paid to the execution of coastal collectors and outfalls. For the sections in which the works are being done it is advisable to repair and build all water and other municipal infrastructure, water supply system, waste and storm waters drainage. The plant has to be made in accordance with the already defined agglomerations, as well as regional sludge treatment and disposal plans. A considerable increase in the price of wastewater drainage and treatment service is expected.

C – Sewerage system/network with connection of 40–60%

Possible moderate negative health effects on population and environment. Low level of connection that has to be increased to 80%. Extensive works and high expenses are involved. Such situation with connections means that it is necessary to build a sewerage network in more than 50% of the urban space and replace a part of the existing sewerage. It is necessary to repair and build coastal portions according to the future sea levels. The works have to be well planned and interventions made in coordination with other municipal infrastructure. Particular attention has to be paid to the execution of coastal collectors and outfalls. For the sections in which the works are being done it is advisable to repair and build all water and other municipal infrastructure, water supply system, waste and storm waters drainage. The plant has to be made in accordance with the already defined agglomerations, as well as regional sludge treatment and disposal plans. A considerable increase in the price of wastewater drainage and treatment service is expected.

D – Sewerage system/network with connection higher than 60%

Possible minor negative health effects on population and environment. Moderate level of connection that has to be increased to 80%. It is necessary to repair all bad portions, separate storm waters and repair low-lying portions according to the future sea levels. The works have to be well planned and interventions made in coordination with other municipal infrastructure. Particular attention has to be paid to the execution of coastal collectors and outfalls. For the sections in which the works are being done it is advisable to repair and build all water and other municipal infrastructure, water supply system, waste and storm waters drainage. The plant has to be made in accordance with the already defined agglomerations, as well as regional sludge treatment and disposal plans. A moderate increase in the price of wastewater drainage and

IV – Storm waters of the settlement

Causes: Climate changes are expected to bring about increased intensity of short-term precipitations (storms) and their variability throughout the year. This means that we expect stronger and more powerful surface waters in settlements and the resulting increased risk of flooding and harmful effects of the waters.

State and problems: Insufficiently developed or even absent storm water drainage systems in the settlements, i.e. gutters, drains, canals, retention basins and outfalls. Most of the existing outfalls are inadequate for the present and especially future medium highest (60 cm) sea levels and oscillations. Backflows occur in the existing canals and flooding of streets and lower parts of the settlements lacking storm waters drainage systems. Damage is made to structures and infrastructure, and problems occur in everyday activities and living in the settlement. Uncontrolled spreading is possible of pollution from

sewerage and septic tanks, as well as dumping sites of various wastes, including hazardous, to the environment and the sea. Due to the expected increase in rainfall intensity larger capacities of water drainage system are necessary, and as a result higher financial resources for the construction and operation of the system, i.e. it is necessary to change the rules for deciding on the dimensions of the system.

Consequences: Public health, safety of working and living, environmental pressure, and economic damage and costs for population and businesses.

Measures: In the settlements it is necessary to build systems of storm water drainage, treatment and discharging according to the future climate characteristics, and particularly precipitation regime. Those are the waters that flow over the catchment surfaces of the settlement, roofs, walkways, roads and parking lots, as well as terrains with low permeability. In densely built urban centres traditional drainage systems should be built, while in all other parts of the settlement the so called integrated drainage system should be applied without the construction of storm water canals or other expensive solid (concrete) structures and outfalls into the sea. The storm waters have to be locally retained, stored, infiltrated into the terrain (renewal of "blue water"), at the same time increasing evapotranspiration using the vegetation (renewal of "green water"). Roof waters from individual structures have to be accumulated and used locally. This way secures better functioning of the local hydrological cycle, improves the arrangement of the settlement and improves the micro-climate of the settlement and air quality, and reduces discharges of greenhouse gasses from the settlement. Building of pumping stations is avoided and there is no energy consumption, and discharging of greenhouse gasses is reduced. Such a system as a whole should be applied in the coastal belt, that is in all low-lying coastal zones of the settlements, in all parts of the settlements where individual building type prevails, and in all other parts of the urban space where it is possible and economically feasible. All these works have to be implemented in collaboration with town planners and the company in charge of wastewater management. The works will be financed mostly by money from the EU funds. It is necessary to build a system with as low operational costs as possible in order to keep the price of the wastewater drainage and treatment service for the population and businesses as low as possible.

Intensity:

A – Settlement without a storm waters sewerage network, except for some minor surfaces, and the building area in the 1 km belt larger than 40%:

It is necessary to build a completely new system of drainage of and protection against storm waters. It is best to build an integrated drainage system by which the water would be retained in the basin, infiltrated into the underground and evapotranspired into the air. This particularly refers to smaller settlements. This means avoiding the construction of large canals and outfalls wherever possible. Marine outfalls have to be adapted to future sea levels. Operating costs of such a system are low so that the costs of the service for the population and businesses are also low, and the arrangement of settlement better.

B – Storm water drainage system/network with coverage of the settlement higher than 40% of the built-up area, and the proportion of the building area in the 1 km belt larger than 40%:

Good coverage by the storm water drainage system, especially for smaller settlements with prevalingly individual construction. The network has to be expanded to the areas not yet covered and adapt all outfalls to the new sea levels. Check the capacity of the existing system against the expected increased rainfall intensity, and replace or develop parts that will have insufficient capacity. It is best to make interventions in the system, i.e. drainage area, and build system by which the water would be retained in the basin, infiltrated into the underground and evapotranspired into the air. This means avoiding the digging the existing canals to replace them with new, bigger ones. Operating costs of such a system are low so that the costs of the service for the population and businesses are also low, and the arrangement of settlement better.

- C** – Storm water drainage system/network with coverage of the settlement 20-40% of the built-up area, and the proportion of the building area in the 1 km belt 20-40%:

Insufficient coverage by the storm water drainage system, especially for smaller settlements with prevalingly individual construction. The network has to be built in the areas not yet covered and adapt all outfalls to the new sea levels. Check the capacity of the existing system against the expected increased rainfall intensity, and replace or develop parts that will have insufficient capacity. It is best to make interventions in the system, i.e. drainage area, and build system by which the water would be retained in the basin, infiltrated into the underground and evapotranspirated into the air. This means avoiding the construction of new canals and outfalls and replacement of the existing canals with new, bigger ones. Operating costs of such a system are low so that the costs of the service for the population and businesses are also low.

- D** – Storm water drainage system/network with coverage of the settlement 10-20% of the built-up area, and the proportion of the building area in the 1 km below 20:

Very low coverage by the storm waters drainage system, or it does not exist at all. It is necessary to build a completely new system of drainage of and protection against storm waters. It is best to build an integrated drainage system by which the water would be retained in the basin, infiltrated into the underground and evapotranspirated into the air. This means avoiding the construction of large canals and outfalls wherever possible. Operating costs of such a system are low so that the costs of the service for the population and businesses are also low.

V – Storm/surface waters of the hinterland

Causes: Climate changes are expected to bring about increased intensity of short-term precipitations (storms) and their variability throughout the year and therefore we expect increased quantities of surface waters flowing from the hinterland to the settlements. This means that we expect increased risk of flooding and harmful effects of the waters in all inhabited areas on the way of water flow from the hinterland to the sea. This refers particularly to the settlements, and areas, where there is coincidence of large quantities of surface and ground waters generated from wide areas in the

State and problems: The problem is posed by the currently insufficient or even absent drainage systems for surface waters flowing from the watersheds around the settlement, i.e. canals, retention basins and sea outfalls. Through urbanisation the existing natural water flows are covered and modified and as a result the water from the hinterland flows over urban surfaces instead of canals. This causes flooding of streets and low-lying parts of the settlements. Damage is caused to structures and infrastructure as well as problems relevant to everyday activities and living in the settlement. The waters wash pollution and waste from the catchment area of the settlement and wider and carry them uncontrolled into the sea. Due to increased intensity of rainfall and the resulting water waves larger capacities of water drainage system are needed as well as greater financial resources for the construction and operation of these systems.

Consequences: Public health, safety of working and living, environmental pressure, and economic damage and costs for population and businesses.

Measures: In the settlements it is necessary to build a drainage and discharge system for surface waters flowing from the hinterland to the settlement. Those are the waters flowing from the catchment area of the land above/in the hinterland of the settlement and flow down the natural slope of the terrain through ravines, torrents and, sometimes, streams. In order for the waters to flow freely to the sea it is necessary to build/restore all natural flows of those waters to the sea. Particular attention has to be paid to local sources. At that care should be taken of the fact that the sea level will rise and cause backflow of the water on all outfalls of the surface waters, so that the level of groundwater will also rise and those can also flow into those canals. Water quantities will increase also due to increased storms so that it is necessary to increase

the capacity of all the existing canals within the urban areas. Apart from regulation of ravines and canals, it is possible to build, upstream from the settlements, retentions to keep back large quantities of water that could, perhaps, be used for irrigation and fire fighting. A broader integrated approach is needed to solving problems in cooperation with town planners and relevant institutions. All these works have to be realised in cooperation with the Croatian Waters which are in charge of regulation of surface water drainage outside settlements.

Intensity:

- A** – Settlement with large catchment area in hinterland and steeply sloping terrain towards the settlement, as well as significant groundwaters, and large population density.

Such basins generate very large quantities of water and very fast and destructive water waves, and thus represent a great danger for settlements, i.e. people and their properties, as well as functioning of the urban environment. It is necessary that settlements, with water resources management authorities, assess the current and expected needs, define an action plan and organise the implementation of the project. That is a long-term project (several years) which requires good preparation, organisation, personnel, stable financing and construction. Activities within the settlement and outside its area have to be analysed and implemented jointly and make part of the same integrated system of protection of the settlement against both hinterland and ground waters. The settlements and relevant authorities have to harmonise town plans and their plans with the needs of an efficient system of protection against hinterland waters.

- B** – Settlement with moderately large catchment area in hinterland and moderately sloping terrain towards the settlement, as well as smaller quantities of groundwaters, and moderate population density.

Such basins generate considerable quantities of water and comparatively fast and dangerous water waves, and thus represent a considerable danger for settlements, people and their properties, as well as functioning of the urban environment. It is necessary that settlements, with water resources management authorities, assess the current and expected needs, define an action plan and organise the implementation of the project. It is also necessary to analyse the needs regarding the collection and discharge of groundwaters if those pose threat for the settlement. That is a long-term project (several years) which requires good preparation, organisation, personnel, stable financing and construction. Activities within the settlement and outside its area have to be analysed and implemented jointly and make part of the same integrated system of protection of the settlement against both hinterland and ground waters. The settlements and relevant authorities have to harmonise town plans and their plans with the needs of an efficient system of protection against hinterland waters. The storm waters drainage system of the settlement can be integrated with this system, but not *vice versa*. By retaining and storing at least a part of these waters a useful resource can be obtained to be used for irrigation and use in and around the settlement.

- C** – Settlement with small catchment area in hinterland and mildly sloping terrain towards the settlement, without significant groundwaters, and with small population density.

Such basins generate small quantities of water and water waves that could endanger settlements, people and their properties, as well as short-term functioning of the urban environment. Most of the problems can be solved by interventions within the settlement itself. Those refer to the revitalisation of the natural water flows and increasing their capacity through the settlement to the sea. The problem is simple but complex to realise if uncontrolled urbanisation has disturbed the natural flow of waters from the hinterland to the sea. In that case the construction of new canals will be complex and costly. The solution for drainage has to include appropriate solution for collection and discharging of groundwaters. The costs can be reduced by building retention basins before the settlements. Activities within the settlement and outside its area have to be analysed and implemented jointly and make part of the same

integrated system of protection of the settlement against both hinterland and ground waters. The settlements and relevant authorities have to harmonise town plans and their plans with the needs of an efficient system of protection against hinterland waters. The storm waters drainage system of the settlement can be integrated with this system. By retaining and storing at least a part of these waters a useful resource can be obtained to be used for irrigation and use in and around the settlement.

- D** – Settlement with very small catchment area in hinterland and very mild slope of the hinterland terrain, with comparatively small quantities of groundwaters

Such basins generate small quantities of surface waters that can be accepted by the storm waters drainage system of the settlement. It would be best if the natural system of surface waters flow through the settlement to the sea could be revitalised. If that is too expensive and problematic, the hinterland waters have to be retained in the catchment area before the settlement, diverted away from the settlement if possible, and infiltrated into the underground where possible and acceptable. By retaining and storing of these waters a useful resource can be obtained to be used for irrigation and use in and around the settlement. If precipitations cause significant rise and appearance of groundwaters, works have to be undertaken to collect the groundwaters and get them to the sea without harmful effects for the settlement area.

ANNEX II: „Climagine“

1. Introduction

The „Climagine“ method was developed within the project “ Integration of climate variability and change into national strategies for implementation of the Protocol on Integrated Coastal Zone Management”, funded by the Global Environment Facility (GEF) and the United Nations Environment Programme (UNEP). This activity was implemented by two UNEP/MAP Regional Activity Centres, Plan Bleu (PB/RAC) of Nice, France, and Priority Actions Programme (PAP/RAC) of Split, Croatia.

The method is based on the experience of the participatory method „Imagine“, used earlier within UNEP/MAP CAMPs (Coastal Area Management Programme). Similarly like „Imagine“, „Climagine“ is a participatory method focused on designing a vision of sustainable development of an area through the engagement of local social stakeholders. During several workshops with local stakeholders from the fields of management, production, living and coastal zone development, minds were put together to find ways of securing sustainable future for the coast of the Šibenik-Knin County. This participative process had the following goals: describe and re-evaluate past, present and future sustainability levels of the local socio-economic system; set objectives; and monitoring of the system movement towards sustainability. A specific feature of „Climagine“ compared to „Imagine“ is focus on climate variability and change, so its final objective is to define the basic dimensions and indicators of sustainability with special reference to climate variability and change effects on the local environment. In this project, the „Climagine“ method was implemented alongside the preparation of the Coastal Plan of the Šibenik-Knin County, the implementation of the DIVA (Dynamic Interactive Vulnerability Assessment) method for the assessment of costs of climate variability and change for the Croatian coast, and recalibrating the DIVA method for the area of the Šibenik-Knin County. Simultaneous implementation of those four activities resulted in synergy which was beneficial for all of them. Thus, for example, within the activities on the preparation of the Coastal Plan for the Šibenik-Knin County 20-odd interviews was made with selected social stakeholders of the County important for ICZM in this area which has greatly improved the implementation of the „Climagine“ method. On the other hand, challenges recognised by social stakeholders during the first „Climagine“ workshop served as orientation for selecting topics of both the Plan and the local application of the DIVA study.

In this Annex we shall summarise the experience gained during the application of the „Climagine“ method in order to integrate the climate variability and change issues into the Coastal Plan of the Šibenik-Knin County, prepared by the PAP/RAC expert team in cooperation with local stakeholders.

2. Flow of the Climagine process

Between spring 2013 and spring 2015, a total of four „Climagine“ workshops were held in which stated their views on critical issues of coastal development in the Šibenik-Knin County. A great deal of those views were eventually included in the Coastal Plan, which underlines the participative nature of the Plan preparation. The analysis of social stakeholders identified 100-odd persons either directly involved in, or can contribute to the improvement of coastal zone management. The workshops were attended by 60-odd participants, although their number showed a slight decline with each following workshop. Apart from presenting the progress in the preparation of the Coastal Plan, each workshop had its educational part where the selected experts presented topics of interest for the coastal zone of the County. Overall, a high degree of two-way communication was achieved between the end-users of the Plan and the expert team preparing it.

Apart from the four workshops mentioned above, in which the basic dimensions were defined of the climate variability and change effects on the local community, interviews were held with the stakeholders relevant

for the County coastal zone management. The following was found through the interviews with 20-odd interlocutors from the Šibenik-Knin County during summer 2013:

- There is initial understanding of the problem of climate variability and change; and
- There are individuals – potential holders of the activity relevant to the concern for the consequences of climate change, and preparation for and adaptation to it.

3. Results

In the end five dimensions of sustainability have been selected (Water, Sea, Soil, Fires, Energy, Space, People, Environmental Protection, and Waste) represented by 15 indicators of particular importance for climate change effects on the local community, and for achieving sustainable development (Table D2-1). The values of the indicators and their position with regard to sustainability range have been visualised through AMOEBA (radar) diagrams for each time period. With AMOEBA diagrams, the sustainable values of the selected indicators are between the two green circles (Figure D2-1). The values beyond the outside green circle are higher than sustainable, while those outside the inner green circle towards the centre are lower than sustainable.

The selection of indicators and the years of measurements have been selected on the basis of availability of data, which was the most common limiting factor for the selection. The year 2001 was used as the initial time period, the year 2014 for the next one and, finally, the year 2030 as the indicator of the desired yet potentially achievable future. It should also be borne in mind that often, due to insufficient data, the values of the same indicator for two time periods were taken from two different sources.

It has to be pointed out that, besides the above mentioned unavailability of data, the greatest problems for the „Climagine“ actors was defining the sustainability range for each of the indicators. Apart from expert opinions and advices by the participants, literature was used as guidelines, including various national plans, strategies and regulations, although those very rarely present their goals in numbers, and it is the numbers that are crucial for the preparation of relevant AMOEBA diagrams.

Within the application of the „Climagine“ method, the so called CCAP (Climate Change August Peak) approach was developed which warns that a large number of conflicting phenomena reach their peak in the month of August. The greatest heat and droughts, with the largest number of tourists, with the highest demand for water (the quantities of which are then, naturally, smallest), electricity (the capacity of which is also lowest then due to the majority of production by hydro-power plants), demand for water by agriculture, fire hazard (and the resulting demand for water), effects of extreme heat on human health, as well as on the state of coastal waters in which the heat causes decrease in oxygen concentrations, are some of the phenomena culminating in August. The announced climate change will be most pronounced exactly in that period. So, August is the month in which we should pay particular attention to the management of all recognised conflicts.

Detailed results by dimensions of the AMOEBA diagrams follow.

1. Water

For the Water dimension the selected indicators refer to the average yearly use of water resources, and the average yearly level of water resources use in August. As we can see in the Figure D2-1, the value of the former indicator (around 9%) is near the outer border but still within the sustainability range (1-10%), and it is expected to remain the same in 2030. On the other hand, the water resources use in August is already today beyond the limit of sustainability (13%) and it is expected to go even further from it by 2030 (18%). All

the values of the indicators for this dimension, as well the values of the sustainability range, have been provided by the expert in water resources management who was a member of the expert team preparing the Coastal Plan of the Šibenik-Knin County. Assumption of such trends for this indicator is a result of the analysis made within the Plan preparation, and has largely been confirmed by the CCAP approach.

2. Sea

As for the Sea dimension, the selected indicator of the average rate of connection to the public drainage system is considerably below the set sustainability range. However, it has to be said that the values show a slight increase between 2009 and 2014 (from 23.5 to around 28%), and will probably grow further since several projects are in course of connection to the public drainage system in the Šibenik-Knin County. The sustainability range was deducted from the planned average rate of connection of around 60% in 2023, taken over from the water resources protection measures of the national Water Resources Management Strategy (2009).

3. Soil

Two indicators were selected for the Soil dimension. The first one, showing the irrigated agricultural areas, says that, at the time of the national agricultural survey (2003), very small surface of agricultural land of the Šibenik-Knin County was irrigated, around 60 ha, which then accounted for 0.5% of the total agricultural land of the County. The state is slowly improving but it has to be pointed out that since 2003 in Croatia there has been no detailed inventory of agricultural land so that the values for subsequent time periods can be discussed just as approximations (it is estimated that around 120 ha were irrigated in 2012, which makes 1% of the total agricultural land). The sustainability range has been deliberately defined as almost double irrigated land ratio compared to the current situation. It must also be borne in mind that different sources give different data regarding the surface area of the total and used agricultural land. As for the second indicator, i.e. land used for ecologic production of plants, the surface area has almost tripled in just six years (from 140 to 407 ha between 2008 and 2013) although it is still below the sustainability range which has been defined on the basis of the objectives of the National Action Plan for Development of Ecological Agriculture (2011-2016).

4. Fires

The surface of burnt areas of the County is mildly decreasing according to the indicator used here. However, caution is needed when interpreting data since those are average values for two time periods (1994-2002) and (2013-2011). A clear trend is not discernible since the number of burnt hectares varies considerably from one year to another, and the years with exceptional fires (such as 2000) can raise those average values considerably. It should also be noted that, in spite of a decrease of burnt hectares, the sum of burnt areas over the years results in a continuous decrease of areas that can burn, i.e. green areas. All the values for the Šibenik-Knin county were provided by an expert in fire risk management who was a member of the team preparing the Coastal Plan of the Šibenik-Knin County.

5. Energy

In the period 2006-2010 the direct energy consumption in the County increased from 5.6 to 6.0 PJ, according to the data for the Programme of energy efficiency in direct energy consumption in the Šibenik-Knin County of 2012. Thus, the direct energy consumption is moving away from the sustainability range, defined approximately based on the desired reduction of the direct energy consumption of 10% by the year 2020 compared to the average consumption in the period 2001-2005 (Strategy of Energy Development in the Republic of Croatia, 2009). Concerning the electric energy, the Šibenik-Knin County has an exceptionally high potential for the production of electric energy from renewable sources. The share of electric energy

production from renewable sources makes some 68% of the total electric energy consumption. Here, the estimates were taken into consideration of production by solar panels (14 GWh), hydro power plants (188.5 GWh) and wind turbines (80 GWh) provided by the County Department for Economy, and the total electrical energy consumption from the above-mentioned Programme of energy efficiency. The estimates are from 2010, but due to a lack of credible data for earlier periods, these were not taken into consideration as an indicator for the preparation of AMOEBA diagram.

6. Space

For the Space dimension indicators were used whose values were calculated on the basis of the national censuses of 2001 and 2011. The fact that the values of those indicators are measurable at the municipality level enabled us to present the relation between the Protected Coastal Zone (PCZ) and the hinterland. So, there are two indicators for Space:

- share of housing units for permanent residents in the total number of housing units in the PCZ, and
- population density within the PCZ compared to that outside the PCZ.

The former indicator showed a decrease in the share of housing units for permanent residents in the total number of housing units from 67 to 54% which makes a decrease of 13% in just 10 years. That could be the indicator of fast tourism development and its effect on the use of real estate. The values are below the sustainability range, but since such a rapid tourism growth can hardly be expected to continue, the share of 54% was kept for the year 2030 as a desirable situation of halted deterioration state. The latter indicator shows four times higher population density within the PCZ than outside it, which indicates exceptional concentration of population in the coastal municipalities. The fact that in 2011 the coastal municipalities had 72 inh./km² and the ones in the hinterland 17 inh./km² suggests that there will probably never be a total balance. Such balance does not exist at the global level either, since the global population is concentrated on the coasts, but we should hope that a misbalance such as the one in the Šibenik-Knin County can be at least a little mitigated. Of course, this can only be achieved through persistent and well thought-out work on this issue.

7. People

The relation PCZ/outside PCZ was used for this dimension as well. It is represented by the indicators of the share of employed in the working-age population, and the share of those with higher education levels in the population above 15 years of age. The share of educated and employed is noticeably higher in the PCZ than in the hinterland amounting to 34% and 27% respectively (employment), and 71% and 57% respectively (education) in the year 2011. It has to be pointed out that the Šibenik-Knin County is one of the worst placed in Croatia with regard to employment rate. Although the relations PCZ/outside PCZ have been constantly improving over the past decade or so, it is still going very slowly. Certainly, measure should be defined here as well in order to increase the create work in the hinterland, and secure education in the domains which ensure the practical use of the knowledge thus gained in this area. With regard to that we welcome the studies of energy efficiency and sustainable sources of energy recently launched in Šibenik, and especially the studies of agriculture and carst animal husbandry in Knin.

8. Protected areas

The indicators used here regard the protected sea surface area compared to the total sea surface area, and the protected terrestrial surface area compared to the total surface area, both at the level of the County. The values of both indicators (16% of the protected coastal area and 9% of the protected sea area) are within the sustainability range which is based on the global objectives of the Convention on Biological Diversity (CBD, 2010) which has, as its final goal, the global increase of protected terrestrial areas from 12% to 17% and on

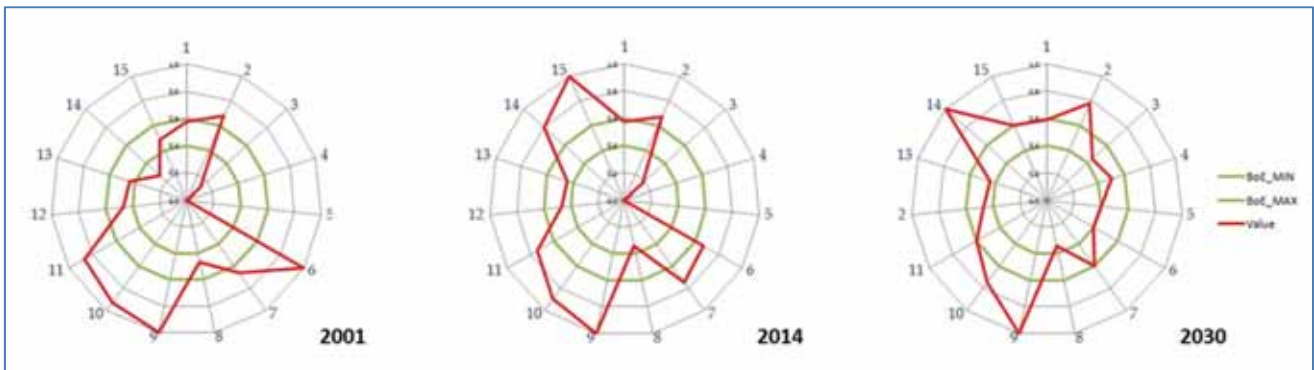
the sea from 6% to 10% by the year 2020. It has to be pointed out that the surface area of the protected areas have been taken into consideration, but not

9. Waste

The first indicator regards the quantity of waste *per capita*, and it increased from 228 kg/inh. in 2001 to 388 kg/inh. in 2011. The data for 2001 have to be taken with certain dose of reserve since those are estimates from the Waste management programme of the Šibenik-Knin County. On the other hand, for 2011 data are taken from measurements made by the Environmental Protection Agency. The availability of data at the municipality level enabled us here as well to get an insight into the misbalance between PCZ and outside PCZ. Namely, the waste quantity *per capita* in 2011 inside the PCZ was more than double that outside the PCZ (519 kg/inh. within the PCZ compared to 244 kg/inh. outside PCZ), which is far beyond the defined sustainability range. This misbalance is the result of population concentration on the coast, as well as of most of the activities producing waste (especially tourism).

Table D2-1. Dimensions, indicators and their values

Dimension	Indicator	2001	2014 (for Space and People 2011)	2030	Sustainability range
Water	Average yearly level of water resources use (%)	9.0	8.9	9.5	110
	Average August level of water resources use (%)	13.5	13	18	1–10
Sea	Average connection rate to public drainage system (%)	23.5 (2009)	28.1	55	55–65
Soil	Irrigated agricultural land (ha)	60.11 (2003)	120	200	200–240
	Soil used for ecological production of plants (ha)	140 (2008)	407 (2013)	800	800–1.000
Energy	Direct energy use in Šibenik-Knin County	5.616 PJ (2006)	6.046 PJ (2010)	5300	4.300–5.300
Space	Share of permanent housing units in total number of housing units in PCZ (%)	66.92	54.09	54	60–80
	Population density in PCZ and outside PCZ	4.11 (74.77 inh/km ² in PCZ/18.20 inh/km ² outside PCZ)	4.12 (72.48 inh/km ² in PCZ/17.61 inh/km ² outside PCZ)	3.5	1.8–2.2
People	Share of employed population in the total number of working-age population in PCZ and outside PCZ	1.43 (32.99% in PCZ/25.45% outside PCZ)	1.40 (33.91% in PCZ/26.65% outside PCZ)	1.25	0.9–1.1
	Share of higher-educated population in the 15+ population in PCZ and outside PCZ	1.37 (61.90% in PCZ/45.14% outside PCZ)	1.24 (71.12% in PCZ/57.36% outside PCZ)	1.1	0.9–1.1
Nature protection	Protected sea areas of the total sea surface area (%)	9.37	9.37	9.37	8–12
	Protected coastal areas of the total surface area (%)	15.86	15.86	15.86	15–19
Waste	Kilograms of waste <i>per capita</i> of Šibenik-Knin County	228.3	388.6	495	270–330
	Kilograms of waste <i>per capita</i> in PCZ and outside PCZ	1.47	2.13	1.65	1.35–1.65



Dimension	Indicator
Water	1. Average yearly level of water resources use (%)
	2. Average August level of water resources use (%)
Sea	3. Average connection rate to drainage system (%)
Soil	4. Irrigated agricultural land (ha)
	5. Soil used for ecological production of plants (ha)
Fires	6. Yearly burnt area surface (ha)
	7. Direct energy consumption (PJ)
Space	8. Share of permanent housing units in total number of housing units in PCZ (%)
	9. Population density in PCZ and outside PCZ
Population	10. Share of employed population in the total number of working-age population in PCZ and outside PCZ
	11. Share of medium, college and higher-educated population in the 15+ population in PCZ and outside PCZ
Environmental protection	12. Protected sea areas of the total sea surface area (%)
	13. Protected coastal areas of the total surface area (%)
Waste	14. Kilograms of waste <i>per capita</i>
	15. Kilograms of waste <i>per capita</i> in PCZ and outside PCZ

Figure D2-1. AMOEBA diagrams as indicators of sustainability trend

4. Conclusion

The final results of the „Climage“ participative process was the definition of the sustainability dimensions, measurable indicators and their values, and assessing the possibility of achieving sustainable values. The results of the „Climage“ workshops help define ICZM priorities for the Šibenik-Knin County, a task that the coordinating body should perform immediately after its establishment. Apart from the importance of the „Climage“ method results themselves, it is important to point out that the method has achieved considerable success in gathering and joint discussion of the stakeholders relevant for coastal management in the County. The response to workshops and interviews was very good, with pronounced participation (discussions, questions, ...), and a high degree of communication was achieved between the users of the Plan and the expert team preparing the Plan. Although among the local stakeholders there is an initial understanding of the climate variability and change issues, there is the problem of absence of systematic and organised network of stakeholders and institutions aimed at mitigating of and adaptation to those issues. At the present level of organisation of management bodies relevant to climate change in Croatia, these stakeholders are not yet linked in a network and they don't act at a local level in an organised and coherent way, but individually, if at all. Networking of experts and competent individuals is a process still to be started. For new challenging situations such as the one regarding climate change, new institutional forms and new activities are necessary. The „Climage“ workshops showed that there was a “critical mass” with many stakeholders in the Šibenik-Knin County that could serve as a driving force in raising awareness of the need to adapt to climate change, as well as integrated approach to coastal zone management in order to achieve sustainable development and resilience of the coastal zone.

Finally, „Climage“ has provided a tool to monitor changes in the trends of the selected indicators which tell us at which point the County coastal zone is regarding the achievement of sustainability and resilience. The use of numerical data enabled a fairly clear insight into the situation across various dimensions of sustainability. „Climage“ AMOEBA is like a “traffic light” of sustainability. The values proposed by this method are just an initial impetus to the local stakeholders. Through future institutional and non-institutional action these thresholds have to be further assessed and the data improved and updated.

Regarding the contribution of the „Climage“ process to the Coastal Plan we can say that it has primarily helped identify the crucial problems in the area that have to be dealt with by the Plan. Due to the intensive use of the coastal zone, and the resulting high complexity of the challenges for sustainable development, ICZM today does not deal with a comprehensive analysis of the area, but rather focuses on priority issues. In that sense, „Climage“ is the ideal complement, since it acts like a holistic fast assessment of the state of sustainability. Also, the focus of the „Climage“ was all the time on the County, i.e. the regional balance was analysed as well, since most of the indicators were used with regard to PCZ and outside PCZ.

In defining the indicators, besides the leader of „Climage“, the key role was played by the experts working on the Coastal Plan. Namely, with the absence of a uniform database, and with data coming from various sources, the role of sectoral experts was crucial. Also, their opinions on the most representative indicators were extremely useful and contributed greatly to the quality of the results in the topics in which they were involved in the Plan.

On the other hand, the implementation of „Climage“ alongside the Coastal Plan preparation, gave the opportunity to the participants in the workshop to attend thematic lectures on the problems of their coastal zone. In a way education was performed on the topics of climate change adaptation and sustainable development using concrete examples that the participants encounter every day in this area. This had significantly increased the quality of the cognitive process, the interest of the stakeholders strengthened, and synergies created useful for both processes. We can conclude that the implementation of „Climage“ alongside the Coastal Plan preparation was the ideal combination.



PAP/RAC

PAP/RAC, established in 1977 in Split, is a part of the Mediterranean Action Plan (MAP) of the United Nations Environment Programme (UNEP). Its mandate is to provide assistance to the Mediterranean countries in the implementation of the Barcelona Convention and its protocols, and primarily the Protocol on Integrated Coastal Zone Management in the Mediterranean. PAP/RAC is focused on the implementation of activities which contribute to sustainable development of coastal zones and strengthening the relevant capacities. At that, it collaborates with national, regional and local authorities, as well as numerous international organisations and institutions.



Šibenik-Knin County

Following the provisions of the Constitution of the Republic of Croatia, the Šibenik-Knin County was founded in 1993. The county performs tasks of regional importance relevant to education, health, economic development, maritime affairs, traffic and traffic infrastructure, maintenance of public roads, environmental and nature protection, physical and land-use planning, issuing building and location permits and other documents relevant to construction, implementation of land-use planning documents, planning and development of the network of educational, health, social and cultural institutions, and other tasks according to special laws. On behalf of the County, the work on this Plan was led by the Administrative Department for Environmental Protection and Municipal Affairs in collaboration with other Administrative Departments and other bodies of the County, and coordinated by the County Prefect.



Together for the Mediterranean Sea

