

**A systemic and prospective sustainability analysis within the Šibenik-Knin County (Croatia)**

**Report on the 2<sup>nd</sup> “*Climagine*” workshop, 8<sup>th</sup> November, 2013**

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Hosted by the Šibenik-Knin County at the Old Town Hall of Šibenik

Zagreb, 11<sup>th</sup> February, 2014

## Table of contents

List of acronyms .....	3
<b>I. Introduction .....</b>	<b>4</b>
<b>II. Empirical Analysis of Stakeholders in the Coastal Zone of Šibenik-Knin County (ŠKC) - (July-September, 2013.) .....</b>	<b>6</b>
<b>III. Interview Findings.....</b>	<b>10</b>
<b>IV. Goals, expectations and outcomes of ‘<i>Climagine</i>’ Workshop 2.....</b>	<b>21</b>
<b>V. Conclusion.....</b>	<b>28</b>
<b>VI. Annex.....</b>	<b>29</b>

## List of acronyms

CV&C: Climate Variability and Change

DEDUCE: Développement Durable des Zones Côtières Européennes

DIVA: Dynamic Interactive Vulnerability Assessment

DPSIR: Drivers – Pressure – State – Impact – Response

ICZM: Integrated Coastal Zone Management

MSSD: Mediterranean Strategy for Sustainable Development

NGO: Non-Governmental Organisation

PAP: Priority Action Program

RAC: Regional Activity Centre

## I. Introduction

This report presents the outcomes from the *Clímagine* Workshop 2, held at the Old Town Hall of Šibenik on November 8<sup>th</sup>, as the continuation of the *Clímagine* Workshop 1, held on April 8<sup>th</sup>, 2013, also in Šibenik.

The main objectives of the first workshop, determined within the framework of the agreed model of three steps (or workshops), were:

- To achieve a common understanding among stakeholders of the context, and draw up a territorial diagnosis of Šibenik-Knin County (ŠKC) with regard to the coastline, some parts of the inland area, especially the River Krka – “backyard” lakes and estuary, several small islands like Žirje, Prvić, Zlarin, Kaprije, Krapljan and part of the Kornati Islands,
- To draw “Rich Pictures” in order to identify priority issues on the coastal zone,
- To start to prioritize the issues.



Second *Clímagine* Workshop – Šibenik, November 8<sup>th</sup>, 2013, facilitated by Ph. D. Vladimir Lay, consultant for Plan Bleu.

The main objectives of the second workshop were to select a final core set of indicators related to issues defined during the first workshop.

The *Clímagine* workshops and their outcomes are not an end in themselves. They are part of a wider planning process that aims to design the Integrated Coastal Zone Management plan for ŠKC. In the report for the *Clímagine* workshop 1<sup>1</sup>, a detailed conceptual explanation was presented.

The whole coastal zone management process uses a graded matrix of ‘dimensions, indicators and variables’. The *Clímagine* process, which uses an inductive, empirical and bottom-up approach to deal with the causes and effects of climate change, develops its own separate ‘dimensions-indicators’ matrix through a participatory process.

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<sup>1</sup> A systemic and prospective sustainability analysis within Šibenik-Knin County (Croatia). Report on the 1st “*Clímagine*” workshop, April 8, 2013. Main author: report written by Vladimir Lay, local team co-ordinator.; Reviewer: Antoine Lafitte, Plan Bleu’s programme officer; Additional contribution: Daria Povh Skugor, PAP/RAC, Zagreb, May 27, 2013

In the process of finalizing an Integrated Coastal Zone Management (ICZM) plan for ŠKC, the main matrix of indicators for coastal planning and other separate matrices of indicators will need to be placed into an ordered relationship. As far as the *Clímagine* process is concerned, it is important to consider that there is a constant 'contemplative communication' within a wider planning context.

It therefore seems useful to briefly recall some basic conceptual explanations from the first report.

Plan Bleu has offered its experience in the participatory method "*Imagine*"<sup>2</sup> upgrading it into "*Clímagine*". PAP/RAC has offered its experience in working with the team that developed the DIVA model<sup>3</sup>, downscaling it to the local level and integrating these results into the ICZM Plan. The local socio-economic assessment and an ICZM Plan will be prepared for the coastal area of Šibenik-Knin County in Croatia. For the local assessment of environmental and socio-economic costs, PAP/RAC commissioned the "Metroeconomica" team led by Pr. Anil Markandya, in a separate activity to DIVA. This team works in close collaboration with a local team of experts on defining the ICZM plan. The "*Clímagine*" process is used to manage the participative aspects of the activity as a whole.

For the population of Šibenik-Knin County, similarly to the whole of Croatia, the issue of climate change is still generally a new one, even though we are in 2014. The first workshop introduced local stakeholders to general issues of climate change and the need to tackle these issues at the local coastal zone level. The main dimensions by which climate change influences the local environment in Šibenik-Knin County (which includes several small islands) were "*imagined*" in an initial way during the first Workshop in Spring 2013. This provided a good foundation for our second workshop, where the emphasis was on indicators.

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<sup>2</sup> <http://www.planbleu Imagine>

<sup>3</sup> <http://www.diva-model.net/>

## II. Empirical Analysis of Stakeholders in the Coastal Zone of Šibenik-Knin County (ŠKC) - (July-September, 2013.)

Analysis of stakeholders was carried out in two stages, in July and September 2013<sup>4</sup>. The identification of specific stakeholders is an extremely important part of the process of identifying issues of climate change in ŠKC, as well as the process of organizing local adaptation to climate change and local management of the coastal zone of ŠKC in the future.



Interview at NCP shipyard with Sales & Marketing Director, October 4<sup>th</sup>, 2013

We were initially interested, therefore, in stakeholders that are still insufficiently connected and insufficiently informed, but who nevertheless have a certain competence and significance in certain areas of life in the county. The goals in the analysis of these stakeholders were thus as follows:

- A. to use interviews to propose an initial network of socially active participants, relevant to these two main overlapping issues, i.e. 'to map' relevant individuals, institutions and functions that could potentially play a role in designing future coastal zone management policies and in managing the consequences of climate change, which are already present to a small extent in ŠKC.
- B. then, on the basis of an identified and articulated network of socially active stakeholders in ŠKC, and an insight into their activities and basic attitudes, to design and draft a Communication Strategy for the integrated coastal zone management plan for Šibenik-Knin County.

During the interviews, the goal was to understand the following:

- Firstly, the current roles (no matter how minor and specific), competences and capacity of the stakeholders themselves;
- Secondly, important activities that are not covered by the practice of existing stakeholders;
- Thirdly, activities in which several stakeholders partly overlap with the authorities;

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<sup>4</sup> This analysis was initiated, organized and carried out by PAP /RAC from Split. Interviews in the field were conducted by the team: Daria Povh-Škugor and Veronique Evers from PAP/RAC, and Ph. D. Vladimir Lay, Plan Bleu consultant,

- Finally, activities whose successful implementation requires synergy, mutual coordinated work that does yet not exist.

With the issue of creating and developing local public policy for managing climate change in ŠKC, the situation is more complex because local stakeholders do not feel strongly concerned about this issue, as it is usually regarded as 'distant', not at all urgent, an issue for some distant future. In 2014, the issue of climate change, its causes and consequences, does not move the world and the social protagonists in Croatia and ŠKC are no different in this respect. In other words, the attempt to connect the issue of climate change and adaptation with the everyday and strategic interests of local stakeholders is a very innovative and pioneering initiative within the Croatian context.

In 2014, development of the integrated coastal zone management plan, and the 'Climagine' project, will be run as pilot projects in Šibenik-Knin County, as a first step. Valuable results and experiences from this work could in subsequent years be applied in other coastal counties of Croatia, where, even today, people are only just starting to think about these issues.

#### **a. Initial map of stakeholders and interview specimen**

An initial proposal for the map of stakeholders for the integrated coastal zone management plan of Šibenik-Knin County (IUOP Plan in Croatian) and the protagonists of the Climagine project is presented below. The intention is to develop and strengthen local public policy (measures) in response to emerging effects of climate change in this County.

The fundamental socially systemic parts of this map of stakeholders are as follows:

- **Governance and policy-making bodies**
  - **Regional and local authorities** (the County and its coastal cities and municipalities), with their accompanying activities and professional services. In this category we include county bodies for environmental protection and municipal issues, for planning and construction, for the maritime economy, transport, island and regional development, for economy and entrepreneurship;
  - **State institutions** such as the Krka and Kornati National Parks, as well as other institutions that have their own local offices in ŠKC, such as the State Directorate for Protection and Rescue (112), Croatian Forest Management, the ŠKC Tourist Board, Regional Development Agency etc.;
  - **Education and research institutions**
- **Civil society**
  - NGOs and civil initiatives;
  - Wise, influential and respected citizens.
- **Businesses**
  - Maritime economy (shipbuilding; construction of coastal zone, harbor and other technical facilities by the sea and at sea);

- Fisheries, shellfish-farming and Mediterranean aquaculture;
- Tourism, hotel and catering trade in coastal cities and municipalities;
- Other businesses (production of goods and services).

This is an initial proposal, and is therefore subject to change. The “*Climagine*” local team tried to carry out interviews but did not get anybody from civil society or from Business. It should be noted that it is extremely difficult to get business people to take part in *Climagine* workshops and in interviews. In Croatia, businesses are not motivated about climate changes issues.

The local team should continue with interviews and try to cover all these sub-groups.

The integrated coastal zone management plan is in the early stages of development (and part of it is stakeholder analysis). Whether the authors who articulated the plan were aware of this or not, they are co-producers of the stakeholder opinions that feed into the plan itself.

A list of institutions where interviews were granted is presented below, listed by the title of institutions only<sup>5</sup>. The institutions in which we carried out interviews are classified into groups, as follows:

<b>Governance and policy-making bodies</b>
<b><i>Regional and local authorities</i></b>
1. ŠKC Department for Environmental Protection and Municipal Affairs 2. ŠKC Department for Maritime Affairs, Transport, and Insular Development 3. City of Šibenik Department for Economy, Entrepreneurship and Development 4. Institute of Physical Planning: Department for Physical Planning and Construction 5. Šibenik-Knin County Regional Development Agency 6. Šibenik-Knin County Tourist Board 7. Šibenik-Knin County Port Authority 8. Public institution for management of protected areas and other protected resources of the Šibenik-Knin County
<b><i>State institutions represented in ŠKC</i></b>
9. State Directorate for Protection and Rescue – Regional Office for Protection and Rescue, Šibenik 10. Krka National Park 11. ‘Croatian Forest Management’ – Šibenik Forest Management Authority
<b><i>Education and research institutions</i></b>
12. Polytechnic of Šibenik 13. Polytechnic of Knin
<b>Civil Society</b>
<b><i>NGOs and Civil Initiatives</i></b>
14. Argonauts: NGO for nature conservation, environmental protection and promotion of sustainable development 15. ‘Island Forum’
<b>Businesses</b>
<b><i>Maritime Economy</i></b>
16. iNavis – Maritime Innovation Centre - CroNoMar Ltd. 17. NCP Repair Shipyard Šibenik 18. Port of Šibenik

<sup>5</sup>The names of people who represented these institutions can be found in the interview documentation at the PAP/RAC offices in Split.



In conclusion, the interview sessions included:

- 8 regional/local government institutions
- 3 local offices of state institutions
- 2 local education institutions
- 2 civil society organizations (NGOs)
- 3 businesses

### III. Interview Findings

The interview records show that the quantity and quality of answers vary, but they offer, in general, high-quality material related to our issues of coastal zone management and managing the consequences of climate change in ŠKC. The findings will not be presented individually, as the details of conversations were often not relevant for our two topics. We will present them by groups of social protagonists / institutions, as defined previously.

#### a. Opinions of the local government institutions

Interviews were carried out within two county-level institutions, first, in one body responsible for environmental protection and municipal issues, and then a second body responsible for transport, maritime economy and island issues. After that, the Croatian "*Climagine*" team approached the public institution responsible for managing protected nature areas and other protected natural assets in ŠKC and the port authorities in ŠKC. Then in July 2013 the team also talked with the Head of the City of Šibenik department for economy, a gifted young person with an ability to clearly express plans and projects.

In September 2013, the team talked with the Head of the ŠKC department of economy, a representative of the public institution responsible for physical planning in ŠKC, the Director of the ŠKC Regional Development Agency and a young female official at the ŠKC Tourist Board. Special attention was paid to certain short-term, and recurring, problems that are of concern to the social protagonists of ŠKC. A brief description of some such problems is given below.

- Every year, the environment is endangered by fires. With the constant increase in global temperatures, it cannot be expected that the number of fires will decrease. The current systems of detection and identification of the causes are ineffective; fires are a repeated occurrence; there is suspicion of intentional arson, where the culprits are not found and so are not being punished. Laws against the local custom of burning stubble and weeds are not enforced, even though this is frequently the cause of local fires. Areas affected by fire remain bare of vegetation for years.
- Since the introduction of a mechanical water treatment facility some 6-7 years ago, the sea water in the bay near the city of Šibenik has been much cleaner. The second phase of construction of a biological treatment facility is planned in the future. Knin and Drniš only recently started to use sewage treatment facilities, and currently still have certain problems. A mechanical treatment facility is required under EU regulations at Skradin, for the Šibenik industrial zone, in order to allow new industries to start up. At the end of August almost every year, the sea water in Prokljan Lake is affected by algal blooms due to the temperature increases. If vegetation is being destroyed by fire and sea water pollution is currently flourishing, what will happen in the future, if the predictions of an average global temperature increase of about 2<sup>0</sup>C – or even more - become reality?
- The islands of the Šibenik archipelago are beautiful but neglected. Nobody actively cares for them on a systematic basis. Projects of bringing running drinking water to the islands have been talked about for years, but have not been implemented. Connections with the mainland are inadequate and expensive. The harbors have not been sufficiently

developed. The population is ageing and schools are being closed (Zlarin). The environmental resources on the islands for agriculture, for production of medicinal herbs and the like, remain unexploited. The current reality is “unsustainable development”, a form of non-development, in that there is a complete lack of resource management on these islands, or this part of the coastal zone. Due to a lack of active and competent protagonists on these islands, as well as on the county level, there is no management! Although the islands are scattered, they require care and management. Moreover, the demands of globalization for capital turnover through the production of goods and services for consumers on our islands will increase every year.

- Some coastal regions, for instance Dolac in Šibenik, are exposed to frequent floods. Dolac is an area where the coast is only 70 cm high, and not 140 cm, as it is elsewhere. This area, like the rest of the Šibenik waterfront, is affected by rising sea water, providing vivid evidence, right in the center of the city of Šibenik, of what coastal regions could look like in the future if sea levels rise. In addition to Dolac, Pirovac, Murter, Tisno, Jezera, Tribunj, Vodice, Srima, Prvić, Zaton, Bilice, Zablaće, Zlarin, the Island of Krapanj, Brodarica, Žaborić Rogoznica and some other low-lying coastal regions are also exposed to problems.



Šibenik, Dolac district - 20. 12. 2010

In addition to Dolac, Pirovac, Murter, Tisno, Jezera, Tribunj, Vodice, Srima, Prvić, Zaton, Bilice, Zablaće, Zlarin, the Island of Krapanj, Brodarica, Žaborić Rogoznica and some other low-lying coastal regions are also exposed to problems.

- The coastal zone of ŠKC, like the whole of the county, is a region with extremely abundant natural resources. In ŠKC, 7 outstanding landscapes and 2 significant nature sites are listed, as well as 70 locations, stretching from the source of the River Krka to the start of Krka National Park and numerous other places. Together with Krka National Park and Kornati National Park, these protected landscapes comprise a single unit of great natural wealth, unrivalled amongst other coastal zones in Croatia. The issue is how these areas, some of which are coastal, will be managed, in forthcoming years? Work has been underway in 2013 within the public institution, to design the management plan. The more significant issue is how the natural wealth of this region will be affected by climate change, and what can be done to adapt to these changes?

Some individual initiatives and activities nonetheless give evidence that there is significant awareness among stakeholders in ŠKC as to the value, significance and advantages of the coastal zone. Examples worth mentioning include the following:

- An extremely valuable project entitled 'Tourist Valorization of St. Anthony Channel in Šibenik', for a total cost of €1,443,485.00, carried out by the public institution responsible for Protected Natural Assets in ŠKC, in cooperation with Šibenik-Knin County and the State Institute for Nature Conservation, highlights recognition of the importance of public property, and its value for the coastal region. This is a means by which biodiversity conservation and landscape value can be secured, ensuring public access for the citizens of Šibenik, the county and tourist visitors.
- A festival of Croatian island products has been initiated on islands of Šibenik, and a 'Croatian Islands Products' label has been created for the sale of products originating from islands in a specially-designated area of ŠKC. The County has provided support for this initiative.
- Support of the town of Šibenik for the establishment of the Maritime Innovation Centre i-Navis, aiming to support start-up and other maritime companies. For the town of Šibenik, traditionally oriented towards the land, this is a major step in the direction of the sea.
- The cooperative 'Faust Vrančić, in Prvić Luka has established the 'Faust Vrančić' Memorial Centre, which is active today, and nowadays has seven products of its own.
- A conceptual design has been proposed to expand and improve the coastal area of Dolac in Šibeniku, under the direction of ŠKC Port Authority. The Port Authority has funded conceptual design work, by which 310 meters of the waterfront will be enlarged by 3 meters, to create an overall enlargement of 1,000 m<sup>2</sup>
- Implementation of the "Intermodal" project, aiming to develop a model of sustainable mobility, including improvement of the local public transport quality, and support to the development of sustainable tourism in the region.

In addition to the aforementioned points, some other findings on the part of the persons interviewed, or protagonists are worth mentioning.

The ŠKC Development Agency led a preparation of a Regional Development Strategy for ŠKC, covering the period from 2011 to 2013. This Strategy will be extended for one year, to 2014, which corresponds to the completion of the 'Integrated Coastal Zone Management plan for ŠKC'. In that sense it would be wise to promote cooperation on the final processing / implementation of these two documents.

The ŠKC Department of economy has been focusing on conflicts of interests in two areas of ŠKC, one narrower and one much broader. For instance, where Port Šibenik Ltd. is now located, there is commercial appetite for building a new hotel. The coastline is mainly 'sold out', any future use and development is likely to require substantial restructuring. In situations like this, the principle

of economic efficiency is decisive. Those who do not earn enough money and make losses are ruined, and those who would like to earn money at the same location with some other activity, are ready and waiting for new opportunities.

For the coastal hinterland area, linked with the sea by the River Krka, it is forecast that there will be significant economic growth and an increase in environmental agriculture activities<sup>6</sup>. As will be shown later in the report, staff at Knin College support this approach and forecast.

The Tourist Board of ŠKC employs young management staff and has modern concepts that have a significant impact on the use of the coastal region of ŠKC.

Efforts focus on extending the tourist season through new programs and by increasing the offer. Also, to manage the geographical issues, there are efforts linked with the concept of 'dispersed tourism' in Šibenik, whereby high-quality accommodation would be offered through a network of privately-owned houses and small hotels. This is an issue for the sustainability of tourism in ŠKC. Again from the tourist standpoint, it is observed that the islands of ŠKC are developmentally neglected or insufficiently and poorly used. In this respect, the 'Šibenik part' of the Kornati islands could be included. Around Krka National Park, economic and tourist activities are developing very successfully.

#### **b. Findings from interviews with local offices of State institutions & education and research institutions**

In July 2013, the *Climagine* Croatian team communicated with the following institutions and stakeholders from this category: 'Croatian Forest Management' – Šibenik Forest Management Authority, the State Directorate for Protection and Rescue - Šibenik Branch Office and Krka National Park. From education and research institutions, the team met with an expert biologist-ecologist from Šibenik College. In connection with the Integrated Coastal Zone Management Plan, the following issues came up again in conversations with these protagonists and institutions:

1. fires, especially in August, when risk factors accumulate and multiply,
2. biodiversity in the whole of ŠKC, and especially in the Krka National Park and Kornati National Park, problems with destruction and neglect of areas with local fauna and flora,
3. conservation of the River Krka, from its source near the city of Knin, conservation of the calcium carbonate rock formations, without which there would be no waterfalls on the river Krka.

With regard to point "1", any high-quality common-sense based coastal zone management plan in ŠKC would have to focus on phenomena and processes that damage vegetation, biodiversity and the coastal landscape on the islands, the coastline itself and surrounding areas. Within ŠKC, fires are a recurrent phenomenon every year, especially during the hot summer months. Our interviewee from the State Directorate for Protection and Rescue – Šibenik Branch Office for Protection and Rescue, who has extensive, rich and very systematic statistics on all interventions

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<sup>6</sup> Austria uses 18% of its agricultural land for environmental agriculture. In 2011, only 2.45 % of agricultural land in Croatia was recorded as used for environmental agriculture. Austria is about 150 kilometres from Croatia, and it has not got the sea, while the climate is less favourable.

from this branch office, warned us that the occurrence of fires increases at an almost regular pace from May to August, in terms of frequency, intensity and spread.

DHMZ (State Weather Bureau) monitors and offers to the general public a series of indicators that can also be connected with the fire risk. Among other indicators, there are the FWI (Fire Weather Index) and ISI (Initial Speed Index) that indicate a cluster of parameters such as air humidity, air temperature, humidity / aridity, and the wind direction of the bora (north-eastern wind) and sirocco (warm moist south wind), etc. When the magnitude of the indicators as a whole increase and reach critical points, fires can start, even when there is almost an insignificant cause! This all sounds rational, scientific, comprehensible, and very logical. The causes of fires are always the same - the most frequent unintentional cause is traditionally weed burning, when local people lose their control over the fire. The damage caused in this way is immeasurable in comparison with the benefits from weed burning. This is an example of repeated human stupidity. Burning weeds outdoors is forbidden from June 1<sup>st</sup> onwards, but this rule does not help. People constantly repeat the same mistake, violate regulations and nobody seems to care!

The second cause is deliberate arson, and according to some sources on the ground in ŠKC (see the reaction of firefighters in September 2014!) a huge percentage of fires are caused by arsonists or pyromaniacs. These causes include mentally ill people, various local conflicts, local interests and other irrational human stories and states. The forest monitoring system is weak, and the system of finding and punishing the culprits is ineffective. Arsonists, some of whom use technical devices for starting fires with a time delay, obviously know this well.

But this is not the end of the trouble with fires and destructions of vegetation and landscape in ŠKC and across Dalmatia. Over the last decade, air temperatures were at their highest since records began. Gradual global warming will intensify the rhythm of fires, and worsen the destruction of vegetation and landscape. Bare rocky landscapes, scarred by fire, are noticeable in several areas of Dalmatia, as well as in ŠKC, where, for years, nobody has worked this soil, waiting for nature itself to renew the vegetation (Aleppo pine trees play a vital role in this process, since it is the only species that can survive with so little soil available). This damage stands as a 'monument' to the power of fires that are unsustainable and destructive to the activities and practice of local people.

In conclusion, the biggest current challenge for management of the coastal zone of ŠKC is controlling the issue of fires.

This is not the only prominent, short-term problem that exerts pressure every year in the summer months, but it is nonetheless very devastating. It is by far the most urgent, compared for example with the sea-level rise, a process that is advancing by a millimeter or so every year, and for which there is still time to prepare the proper behaviors and actions over a longer period of time.

Within 'Croatian Forest Management', there is keen awareness of the problem with fires and they are working as much as they can within the framework of their legal authority and economic capabilities. During the fire prevention season, from June 1<sup>st</sup> to September 15<sup>th</sup>, an organized team of 'patrollers' constantly walk around coastal areas, especially there where there are many tourists. The routes are fairly passable, and fire prevention roads are constantly

being created, as well as new observation posts. In this way, they can warn of simultaneous fire outbreaks at several locations (an invention of a pathological and destructive mind). These observations again suggest acts of deliberate arson. Even when culprits have been caught, it was pointed out to us reparations are almost never paid to cover the damage caused by fires.

Dalmatian forests do not have an economic function. They are protected forests that play a social function in conserving the soil and landscape. Fire-damaged soils lose their vegetation cover and become vulnerable to floods and torrents that can erode the soil and carry it away, because nothing remains to keep it in a state of minimal cohesion. In state-owned forests, according to the rules of the profession, reforestation usually only begins on fire-damaged soils two years after the fire, when living organisms start to return in the soil. For forests that are in areas covered by private properties, the owners do all the jobs by themselves, the vegetation overgrows, there are no regular clearing activities, and the result is general disorder. Constant decrease of the livestock breeding contributes to the ever-increasing overgrown surfaces.

As far as point "2" is concerned, biodiversity in ŠKC as a whole, and especially in Krka National Park and Kornati National Park, is under threat. A significant part of coastal zone management involves protecting and managing the quality of the onshore and marine flora and fauna in the area. The bodies responsible for managing local biodiversity are the Krka and Kornati National Parks, county-level public bodies that monitor 70 locations, as well as private landowners (there is always some vegetation on private land). Private owners frequently neglect their land and do not work on it at all. When, for reasons of environmental protection, Krka National Park offers somebody to clear the vegetation, the reaction is often misunderstanding and refusal. This favors fires.

Generally speaking, dehydration of the soil leads to dehydration of forests, and consequently to a reduction in biodiversity. Forests are also attacked by the pine-moth, and so they dehydrate even more.

Swampy areas are drying out (several locations in ŠKC) and swampland fauna is disappearing. Soil dehydration has been monitored for several years, and the trend is negative. This requires the agricultural world to focus on cultivating different crops that are more resistant to the changing conditions. At the Polytechnic of Knin, there are several experts and scientists (8 of them with Ph. D.) who are working on agriculture with karstic soils, and could be an important driver for the agriculture in the region.

In the summer months, particularly in August, the temperature of the sea increases to levels at which algae proliferate. This is particularly noticeable in the stretch running from the Skradin waterfall, to the city of Šibenik. In conjunction with contamination of the sea, this leads to algal bloom, which is not beneficial to bathing spots and tourist activities, and causes economic disruption.

Trends connected with temperature fluctuations, the porous karstic soil and local water resources all point towards a gradual decrease in drinking water reserves. The situation is starting to become critical in the summer months. The drinking water sources Jaruga and Torak are gradually becoming less and less productive. Saline water has appeared in some parts of the coastal zone (for instance, in the area of the Cursor family vineyards, near Vrpolje).

Since global warming is already a reality and is forecast to increase over the years<sup>7</sup>, such trends are unlikely to be reversed. This highlights the new and very significant challenges for management of the coastal zone of ŠKC in the future.

As far as point “c” is concerned, the waters of the River Krka, from its source near Knin, have been endangered by pollution. A filter-based treatment facility for Drniš and Knin is under construction, so there is a chance that the situation will become significantly better.

The calcium carbonate waterfalls on the River Krka, in the Krka National Park, are affected by low water levels. Krka National Park is now arguing over this with HEP (Croatian Power Utility), which is responsible for two hydroelectric power plants, HE Manojlovac and HE Jaruga, further upstream. There is also a third small, private HE plant at the Roški Waterfall. Experts from the National Park are of the opinion that the minimum level should be 90 centimeters, below which the hydroelectric plant operations should stop. In contrast, HEP regards a minimum level of 80 centimeters as appropriate. Sometimes, water levels even go below 80 centimeters (for example in the summer of 2012). The overall impression for those on the ground in Šibenik is that ‘those up at HEP’ are alienated from problems in the field, looking down from on high with insufficient insight, endangering basic knowledge on natural processes in karstic rivers.

The calcium carbonate rock formations cannot be dealt with in such a way, because the rock becomes dry and cracks. The formations themselves end up dissolving and, with them, the emergent waterfall. The rock formations can also be endangered by sudden floods and torrents, because they break them with their force.

We also learned that the ŠKC county authority is ‘pushing’ small HEs (Hydroelectric power plants) on the River Čikola.

The quality of water is monitored by ‘Croatian Waters’, and water level and flow are monitored on a daily basis under the ‘Hodras’ project. Protection work is carried out on the whole of the left bank of the Skradin Waterfall on the River Krka in Krka National Park. On the right bank, a filter-based treatment facility should be built. There are ongoing arguments between ‘Croatian Waters’ and Krka National Park about the investments required in this treatment facility, and the project is currently deadlocked.

Although the River Krka is more generally associated with land areas, it is included in the Integrated Coastal Zone Management Plan for ŠKC, because of its influence on the coastal zone of ŠKC. Indeed, the definition of a coastal zone has to be changed in this context, because of the phenomenon of the River Krka and its ‘meandering’ approach to the sea. Anything that affects the river has an influence on the coastal zone, on river tourism, on shellfish-farming in the area from Skradin Waterfall to Šibenik city bay, and much more. River Krka is not like the River Nile and Dalmatia is not like Egypt. Events related to the source and estuaries of rivers that are connected with sea are always unusual and challenging in terms of management.

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<sup>7</sup> The latest UN IPCC (International Panel Climate Changes) came out near the end of 2013 and argued that temperatures are increasing systematically ‘in a creeping manner’, and that the anthropogenic part of the cause is continuing. Despite many plans and initiatives, it is difficult to see how there can be any improvement in such circumstances.



### c. Findings from interviews with representatives of civil society & NGOs

An appointment was organized in Murter with the leader of an NGO for environmental protection called 'Argonauts'.

The local *Clímagine* team gained a rich insight into the work of an environmental protection NGO in Croatia, and concluded that 'Argonauts' is above average in its levels of activity. The association's activities are predominantly connected with environmental education. The team is very diligent, even though in terms of number of members it is a small local NGO. Their approach to projects, selection of projects, and the qualifications of those employed and around means that it does not deal with issues that are directly or indirectly connected with coastal zone management or problems of climate changes on the island of Murter.

The local team talked with a representative of the NGO 'Island Forum', who lives both on the island of Kapri and in the city of Šibenik. This dual experience gives him an opportunity to compare the quality of life and developmental problems and opportunities in the two locations. The islands of the Šibenik archipelago (Žirje, Kaprije, Zlarin, Prvić, Krapanj and others that are less inhabited or totally uninhabited) are notable for their state of environmental preservation, their beauty and rich biodiversity, some fertile lands, and a partial water supply system (old supply and outlet pipes built by the Yugoslav National Army). On the other hand, the islands are in the process of demographic decline<sup>8</sup> and in a state of economic and developmental neglect, disrepair even. The summer tourist trade and related income last for too short a period.

Our interviewee suggested that, in order to develop activities on this island, it would be good to:

- initiate or 'introduce' developmental and income-generating activities on the islands, and renovate elementary school buildings and kindergartens;
- launch social initiatives to promote small-scale economic activities;

It was also suggested that the 'narrow-minded' local social environment on the islands, insufficient access to modern knowledge and envy of success create a fertile ground for destructive attitudes towards any new initiatives / projects.

The interviewee highlighted one phenomenon on the islands of Šibenik that has a particularly destructive impact. The state administration on the island of Žirje has been initiating legal action against local people, in order to carry out compulsory purchase of their properties. He said: *"The system operates in order to sell the land, it does not act for the benefit of the people"*. In the context of the interview, whose focus was on coastal zone management and climate change, the local team could not dig deeper into this subject.

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<sup>8</sup> Our interviewee described the islands as an 'insular pensionner's home'.

#### **d. Findings from the interview with business representatives**

The word 'economy' comes from the Greek 'oikonomia' (meaning stewardship or management of a household). The economic aspects are at the heart of coastal zone management, and are particularly important for ensuring the coherent and firm organization of long term sustainable management in these valuable areas.

In July 2013, drawing on the sample of 'business' protagonists in the area, the local team carried out an interview in the 'Cronomar' company, a very innovative and unusual business. In its emergence, it has been supported by financial resources from the Norwegian government and material resources from the city of Šibenik. This company operates within the maritime economy. In its activities and the projects it has initiated, there is often a significant connection with the coast. The company's first successful project was to produce a catamaran built of aluminum. Production in the ship repair yard started on September 1<sup>st</sup>, 2012. To date, 10 ships have been built and exported. The first was built in 10 months, and now they can be built within three months. This modern company is active in the maritime economy, connecting needs and producers. It is an unusual, innovative, high-quality business that offers productive solutions.

In September 2013, we talked with the representative of the Port of Šibenik Ltd. and a representative of a ship repair yard.

The ship repair yard belongs to the NCP Group (Nautical Centre Prgin Group) and is a typical coastal zone business, connecting with the economic and ecological issues of coastal zone management. Following the financial crisis, the shipyard these days employs about 200 people. The production program currently includes aluminum fishing boats in cooperation with Norwegian partners. 22 such vessels are due to be delivered between now and February 2014. In addition, the shipyard repairs and renovates yachts, cargo and passenger ships.

The shipyard is in the process of technological modernization, and the system of waste management is being improved as part of this process. Hazardous waste is also managed, especially metal and wood waste.

As an economic facility in the coastal zone, within the city bay, the shipyard is in some ways a typical stakeholder in co-management of the coastal zone, but with its own specific issues.

Port Šibenik Ltd. is also a typical stakeholder in the coastal zone economy. It is also located on the Šibenik city bay. Our interviewee was the Head of the Quality Management department.

Ports are important for the Republic of Croatia, as our interviewee believes, but are neglected in Croatia, as is the Adriatic orientation in general. The Port of Koper in Slovenia has traffic larger than three times that of all the Dalmatian ports put together. Croatian ports run at 8,000,000 tonnes, compared with 800,000,000 tonnes for the Port of Shanghai alone..

Port Šibenik does not have enough business. Its capacity is 2.5 million tonnes, and it would be profitable with 1.5 million of tonnes. Currently it handles approximately 500,000 tonnes per year. The majority shareholder (86%) is 'Petrokemija Kutina'. It chiefly deals with bulk cargo.

It appears that, in considering future development of the coastal zone, the City of Šibenik and ŠKC may be prepared to give up on Port Šibenik. According to our interviewee, the main emphasis is on tourism, perhaps excessively so. In this light, the port is viewed as a potential area of the city bay for future use.

#### **e. Concluding remarks**

Analysis of the stakeholders in ŠKC, and their attitudes, analysis of problems and concerns led the local team to the conclusion that there is currently no such a thing as integrated management of the coastal zone in the ŠKC region. There are some individual and isolated steps, such as the project “Tourism valorization of the St. Anthony Channel”, first educational underwater trail in Tisno, or the long time established ‘Blue Flag’ initiative for beaches on the Adriatic coast, for instance. There are individual activities and branch of industries, such as the innovation incubator in Maritime Innovation Centre-iNavis, restructuring success story of the NCP shipyard, or renewal of docks and harbors in ŠKC, for instance.

In 2014, across Croatia and in Šibenik-Knin County in particular, there are no systematic policies or measures to deal with the impacts of climate change in coastal areas or to promote adaptation to the future consequences of increasing climate change. This is simply a fact.

In environments that are more professionally, scientifically, economically and politically developed, the social protagonists have also developed more in these two specific areas of practice. Examples of this are some of the measures applied on the French, or Italian or even Algerian coasts of the Mediterranean.

Nevertheless, the interviews showed that in ŠKC, there are high-quality individuals. Each individual stakeholder in the initial map of stakeholders deals with issues of coastal zone management every day in his or her sector of activities and considerations. However very little or none of these efforts are connected to a wider whole - some form of integrated coastal zone management across the county.

This picture of individual acts, as well as the lack of relationships or mutual activities among the stakeholders highlights the shortcomings in the current work of institutions in managing the coastal zone. There is no synergy! There is a lack of modern and integrating concepts of work, and perhaps even a lack of new, modern institutions that are capable of cultivating new approaches and ways of working, to cope with the new and complex challenges of integrated coastal zone management and problems connected with climate change. As we all know, sector-based approaches and disunity between individuals and institutions does not lead to an integrated approach to activities and management. Each sector, and each institution works on their own, and the problem is not tackled as a whole. The situation is far from optimum.

The *Clímagine* Workshop 1 helped in identifying suitable interviewees for the ‘Analysis of Stakeholders’. The interviews with stakeholders provided the local team with useful data and information on valuable individuals and institutions who were then invited to *Clímagine* Workshop 2. In the same way, the significant outcomes from the first workshop also helped define the questions for interviews, while the answers from the twenty or so interviews provided empirical sources that fed into the initial list of indicators.

In connection with further work on dimensions and climate indicators, on designing the ŠKC Strategy of Adaptation to Climate Change, and developing an Action Plan (priorities for action) for the county, 'the realistic picture of the capacity and characteristics of local stakeholders' could be a significant help.

The local *Clímagine* team can make good plans, but who will implement them on an organizational, political and developmental level?

How can desirable and concrete adaptations to the consequences of climate change be developed in ŠKC? There is not any wise 'head office' in ŠKC that considers the impact of climate change on the coastal zone of the county, nor any current measures to adjust to the consequences of climate change. This is the reality in 2014! There are currently no institutions in ŠKC, nor any concepts that deal with these problems in an integrated manner.

In conclusion, the 'analysis of stakeholders' has proved how beneficial and useful it will be to pursue the *Clímagine* process further.

The local team propose that, in applying the Imagine model to the new issue of climate change (*Clímagine*), an empirical analysis of stakeholders should systematically be used as a methodological step between the first and second workshop. The first workshop is not quick and reliable enough in identifying the key local stakeholders for this new topic of climate change.

#### IV. Goals, expectations and outcomes of 'Clímagine' Workshop 2

##### a. Analysis of Workshop Participants

At *Clímagine* Workshop 1 there were 60 participants, out of 91 persons invited.

The structure of participants was as follows:

Business sector	0
Europe Aid	0
Ministry of construction and spatial planning:	1
Towns and communes	1
National public institutions – “Croatian waters” and others	1
Spatial planners	2
Plan Bleu/RAC	2
Speakers from two scientific institutions in Split	2
Local Island Boards <sup>9</sup> (local committee)	2 +1
Ministry of protection of the environment and nature (Republic of Croatia)	4
NGOs	4
Public organisations (protection of the environment and nature, health, tourism, etc.)	5
Academic institutions (faculties and institutes)	6
PAP/RAC	8
Šibenik-Knin county administration - different sectors	12

Additional participants who were not invited but attended:

Šibenik-Knin county institution for the protection of nature	Additional 2 ( <i>one is on the list of invited participants</i> ).
National public institutions – “Croatian waters” and others	Additional 2 ( <i>two are on the list of invited participants</i> ).
Port of Šibenik office (Luka kapetanija)	2
Hydrological Institute	2
Office for Protection and Rescue(Šibenik)	Additional 1 ( <i>one is on the list of invited participants</i> ).

According to Mr. Lay, the Plan Bleu consultant, the ratio of persons invited to actual attendees was very positive, because the participation rate was very high. This data helped us compile a new, more complete invitation list for *Clímagine* Workshop 2. First of all, it was decided that business people and people from the city of Šibenik (including Port Šibenik Office) and the cities of Skradin, and Vodice, needed to take their part in these workshops. Another observation was that the participation of NGOs needed to be improved.

A total of 48 participants attended *Clímagine* Workshop 2. 92 people were invited, and 35 responded (38%). If we discount the organizers (9) and expert speakers from outside Šibenik

<sup>9</sup> Nice detail: one person, an old man from the island, Prvić Luka, Mr. Blaž Renić, President of the Local Island Board (Mjesni odbor otoka Prvić) came at 8 o'clock in the morning and apologized as he had to be with his elderly wife in hospital.

(3), 23 invited participants attended *Climagine* Workshop 2, and in addition 13 voluntary attendees. Therefore, in total there were 36 participants - 'beneficiaries' of the *Climagine* process. The structure of participants in *Climagine* Workshop 2 was as follows<sup>10</sup>:

Ministry for the Protection of Environment and Nature (Republic of Croatia)	1
Academic institutions (faculties and institutes)	1
Maritime business sector	1
Representatives of the coastal Zadar County	1
Scientific institution from Split	1
Local island population (Prvić)	1
Šibenik-Knin County physical planners	2
Plan Bleu	2
Towns and municipalities (Pirovac and Vodice)	2
NGOs	3
Public organizations (Protection of Environment and Nature, health, Šibenik fire brigade)	3
Experts from Split and Rijeka	3
National public institutions - 'Croatian Waters' and others	4
PAP/RAC	7
Šibenik-Knin County administration - different sectors	7

Once again, there were very few representatives from the business sector. This is already an 'old problem'. There were also very few representatives of the academic world this time. NGOs from coastal area were mostly absent, and local island people also<sup>11</sup>. The first 'local' speaker, from Šibenik, featured at this workshop<sup>12</sup>. It was nice to have a local person explain the problem of fires in Šibenik-Knin County to his own local people, in a very expert manner.

#### **b. Expert analysis as a basis for participatory consideration of the dimensions and indicators of climate change in the coastal zone of ŠKC**

Before considering the initial proposal of indicators of climate change in the coastal zone of Šibenik-Knin County, four experts presented four papers related the influence of climate change on fires, groundwater and the sea.

A sustainable development expert from Rijeka, Zoran Skala, presented a general paper on '*Climate change and energy*'.

Milovan Kević from Šibenik presented a paper on '*Climate change and fires*' in Šibenik-Knin County. This presentation was based upon several years of precise monitoring of fires in this county. It was an extremely well-argued presentation, supported with data, and in conclusion indicated that, with the temperature increase observed over the last ten years, especially from May to September, the fire risk has systematically increased.

<sup>10</sup> For 8 of the people, no information is available about their institutional position.

<sup>11</sup> Only one private fisherman J. Lučev from Prvić Luka came. He took the floor and argued strongly that climate change does not exist!

<sup>12</sup> His name is Milovan Kević from the State Directorate for Protection and Rescue (service 112) in Šibenik. He presented the topic 'Climate Change and Fires in Šibenik-Knin County'.

An expert from the company 'Croatian Waters', Želimir Pekaš, expert for the UNESCO's component on Management of Coastal Aquifers, presented a paper on '*Climate change and groundwater*'. The presentation included large quantities of precise data and for many of the workshop attendees, it was an opportunity to discover a previously unknown world of groundwater. Climate change also endangers groundwater supplies.

A scientific expert from Split, Ivica Vilibić, explained that climate change also influences the sea. These expert presentations served an educational purpose, in helping participants gain a better understanding of the dimensions and indicators of climate change, and fostered a more constructive discussion in subsequent activities at the workshop.

The first workshop provided an opportunity to start to define some dimensions of climate changes. In the Croatian context, these environmental questions are specifically characterized by the Mediterranean climate and related issues. For the introductory expert papers we therefore chose the following four topics for the workshop:

**c. Initial proposal of dimensions and indicators**

➤ **Initial recognition of the dimensions of climate change in the coastal zone of ŠKC - Summary of *Clímagine* Workshop 1**

The first workshop recognized and defined the main dimensions and influences, of climate change on the coastal zone of Šibenik-Knin County. The local *Clímagine* team assumed that people from the Šibenik-Knin County were not familiar with these issues and that they should be given an opportunity to reflect and think about them.

A certain number of activities/drivers and social stakeholders will be 'affected' in some way, to a greater or lesser extent, by the consequences of climate change. The list of priorities identified is as follows:

1. Safety:
  - Elements of risk across the whole area - fires are very frequent in summer time;
  - 'Heat waves' in summer can be dangerous for inhabitants and animals.
2. Sources of drinking water can be jeopardized by rising sea levels.
3. Rising sea levels is not really a dramatic issue in Croatia in terms of erosion, because it has a rocky coast. Nevertheless, it is significant issue in terms of damage to dikes and flooding. The whole estuary and coastal zone of Šibenik Bay is a very vulnerable to sea level rises, as are the islands. For example, one participant said, "If the sea level rises, we will have problems hosting ferries on our island quays".
4. Tourism (sailing, beaches, cultural monuments near the sea, etc.)
5. Maritime activities (shell-fish farming, fisheries, etc.). Shell-fish farming is a major activity in all these areas; the increasing salinity of water in this area, where the River Krka and the sea water mix, is an issue that can harm species.
6. Agriculture & activities related to biodiversity (water level for flora and fauna / hunting / cultivating medical herbs etc.).
7. Infrastructure - especially sewage / waste water management in the city of Šibenik, and in all settlements in the coastal zone of Šibenik-Knin County.

8. All industries and businesses (like banks, insurance companies) which come into direct or indirect contact with the consequences of climate change.
9. Local economy on the islands: it has been noted that local inhabitants are currently moving to the mainland, even though there is a potential for development on islands. For instance, inhabitants could grow fruit, raise free range chickens, etc.
10. The eutrophication of lakes is an issue, due to wastewater inflow from the city of Knin.
11. There is a significant issue of factory pollution, in the city of Knin, near the River Krka, but the nature of the pollution needs to be defined. According to one participant, there is no filter in the factory (metal production).

It was not possible in this initial survey to draw up a fully comprehensive list of all consequences of climate change in Šibenik-Knin County. To do this would require access to every area and hidden part of the coastal zone across the county, which was not possible for this first workshop. It would have been necessary to imagine climate change and list issues that would affect the everyday life and work of local people. For the first introductory workshop, the idea of drawing up an exhaustive list was too ambitious to be an immediate goal.

➤ **Initial proposal of climate change indicators for ŠKC**

The local *Clímagine* team took as a starting point all the specific ecological elements that form a natural basis for human life and the living world and that climate change can, in one way or another, harm or endanger.

In this matter, the local team differentiates between short-term indicators (for instance, emblematic and visible issues such as the frequent intense fires in August) and long-term indicators (those that will appear more frequently and with more intensity in the future, but that are not yet present to a great extent, for instance, rising sea level).

We started from the following basic elements in expressing the indicators:

- quality conditions and processes affecting the sea and shore (sea level, salinity of the sea water, etc.);
- conditions and processes around drinking water sources and freshwater generally in ŠKC;
- conditions and processes affecting biodiversity, in the sea, in freshwater and on the land;
- conditions and processes affecting the soil (food production - Mediterranean agriculture);
- conditions and processes related to energy - exploitation of renewable energy sources (wind, sun, tide/waves, etc.);
- conditions and processes related to forests and brush fires, causing devastation every summer, especially in August, destroying biodiversity across the whole of Dalmatia;
- conditions and processes related to transport activities (vehicles as source of greenhouse gases - intensity, type, non-environmental friendly fuels, etc.);
- conditions and processes directly related to rising temperatures, with consequences for human health, and the organization of health care and the emergency response system, for example, the consequences of heat stroke on part of the endangered population of the coastal zone area of ŠKC.



- conditions and processes related to the production of goods and their (un)sustainable consumption (waste in production and consumption).

To promote the clarity and help individuals identify more easily with the proposal, the local team decided to differentiate between two semantically parallel approaches.

The first approach focuses on individual / human needs. Aspects related to the “Individual Level – Human Needs” are grouped together in one cell. This approach tackles the issues from an individual point of view. Success in communicating about the issues of climate change will depend on the extent to which individuals can identify with these issues.

The second approach is ecosystem-focused (hydrosphere, pedosphere, biosphere, etc.), and also addresses constructed and organized systems (water supply, port management, fire-fighting service, etc.). Aspects related to the “Systemic Level – Eco-sphere”, including built systems, are all grouped together in one cell.

This second approach looked at indicators from the point of view of “natural and built systems”, rather than from the individual perspective. This is the level at which actions /steps for adaptation must be taken.

An initial proposal of indicators, based on the above-mentioned approach, is given below:

<b>Issue: WATER</b>	
Individual Level	Systemic Level
(Human Needs)	(Eco-sphere & Built systems)
Drinking water and other water-related needs	Natural hydrological systems
	Production and distribution
<b>Proposed Indicators</b>	
<ul style="list-style-type: none"> <li>• Water courses that dry out in the summer</li> <li>• Number of inhabitants with drinking water supply</li> <li>• Water for animals and plant life / forests</li> <li>• Frequency of storms, floods and torrents</li> </ul>	
<b>Issue: SEA</b>	
Individual Level	Systemic Level
(Human Needs)	(Eco-sphere & Built systems)
Food (Seafood)	Maritime System as Part of the Planetary Eco-sphere
Comfort (Bathing)	
Earnings (Tourism)	Fisheries and aquaculture
	Seaside Tourism
Maritime Traffic	Sea traffic
<b>Proposed Indicators</b>	
<ul style="list-style-type: none"> <li>• Increase in the sea-level - influence on sewage networks, drinking water networks - on what else?</li> <li>• Increase in sea-water temperature - influence on what?</li> <li>• Increase in sea-water salinity - influence on species /aquaculture activities?</li> <li>• Twisters, seawater/tidal damage and unusually intense storms (We do not yet have tornadoes and typhoons!) - Physical damage.</li> <li>• Coastal erosion, where it is not rocky</li> </ul>	

<b>Issue: FIRE</b>	
Individual Level	Systemic Level
(Human Needs)	(Eco-sphere & Built systems)
Life and Property	Safety Conditions for biosphere and People
Safety	Protection of Forests and other Vegetation
<b>Proposed Indicators</b>	
<ul style="list-style-type: none"> <li>• Frequency of fires during the year</li> <li>• Frequency and temporal dynamics of fires during the summer months (cumulative)</li> <li>• Area affected by fires annually</li> <li>• Annual physical and biological damage</li> </ul>	
<b>Issue: FOOD</b>	
Individual Level	Systemic Level
(Human Needs)	(Eco-sphere & Built systems)
Famine / Food (Soil)	Pedosphere
	Biosphere - Biodiversity
	Systems of Food Production & Distribution
<b>Proposed Indicators</b>	
<ul style="list-style-type: none"> <li>• Annual distribution of precipitation – floods</li> <li>• Occurrence of drought (number of days annually)</li> <li>• Occurrence of adverse weather (hail, frost, etc.) that damage plant life ('natural disasters')</li> <li>• Increase in food prices affected by climate change (Croatia, world)</li> </ul>	
<b>Issue: ENERGY</b>	
Individual Level	Systemic Level
(Human Needs)	(Eco-sphere & Built systems)
Electricity / Heat	Natural Resources (sun, gas, wind, oil, etc.)
	Renewable Resources
	Non-renewable Resources – Fossil Fuels
	Systems of Production and Distribution of Electrical and Thermal Energy
<b>Proposed Indicators</b>	
<ul style="list-style-type: none"> <li>• Production and consumption of electrical and thermal energy in ŠKC, distribution of renewable vs. non-renewable resources</li> <li>• Production and consumption in ŠKC (decentralization – location of resources)</li> <li>• Production and consumption from domestic resources / from import / energy dependence</li> <li>• Energy efficient lifestyle changes (walking, bicycle, and firewood heating, use of solar panels, more fresh raw food, etc.). Decrease in wasteful types of personal and social behavior!</li> </ul>	
<b>Issue: SPACE</b>	
Individual Level	Systemic Level
(Human Needs)	(Eco-sphere & Built systems)
Landscape/ Ambience/ Beauty	Nature, Natural Resources, Natural Heritage
Space as Resource for Building Housing Capacities	Relation of Built and Natural Environment – Trends
Space as Resource for Building Private Business Capacities	Systems for Managing Space
<b>Proposed Indicators</b>	
<ul style="list-style-type: none"> <li>• Variation in m<sup>2</sup> of built-up area in coastal zone, on islands and in hinterland</li> <li>• Variation in m<sup>2</sup> of green areas, especially in cities</li> <li>• Investments in nature conversation areas</li> <li>• Management methods used for NPs (National Parks) and PPs (Park of Nature) in ŠKC</li> </ul>	

<b>Issue: HEALTH</b>	
Individual Level	Systemic Level
(Human Needs)	(Eco-sphere & Built systems)
Be Healthy	Hydrosphere
	Pedosphere
	Biosphere
	Atmosphere & Climate
Access to treatment	Systems of Prevention and Treatment
	Health Service
<b>Proposed Indicators</b> <ul style="list-style-type: none"> <li>• Number of people who have health issues from heat stroke – focus on particularly threatened groups</li> <li>• Increase of new species (i.e. mosquitoes, etc.) that migrate from warmer southern areas, some of which can endanger the health of people in Dalmatia</li> <li>• Increase of mental imbalanced behaviors during hot weather (i.e. in traffic)</li> </ul>	
<b>Issue: WASTE – AIR POLLUTION – GREENHOUSE GASES</b>	
Individual Level	Systemic Level
(Human Needs)	(Eco-sphere & Built systems)
Goods and Services to feed consumption requirements	Whole Eco-sphere
	Systems of Production, Transport and Consumption
	Technologies that emit Greenhouse Gases
<b>Proposed Indicators</b> <ul style="list-style-type: none"> <li>• Solid waste and waste management methods: quantities and trends</li> <li>• Wastewater: quantities and trends</li> <li>• Air pollution: quantities and trends</li> <li>• Greenhouse gas emissions: quantities and trends</li> </ul>	

In total, 33 indicators were proposed, organized into eight thematic groups<sup>13</sup>. Through the conversations and communication during *Climagine* Workshop 2, the local team supplemented the initial proposal, and the proposal presented here includes those supplements. This proposal of indicators focuses above all on their relevance to the topics of integrated coastal zone management and climate change. This is only first stage. The second step is to check the availability and reliability of these indicators.

In defining indicators it is important to take into account the following criteria:

- **Relevancy:** the data for any chosen indicator has to be related to the environmental condition and sustainable development problems.
- **Availability:** there has to be historical data available for any chosen indicator, and it must be possible to collect the data in the future.
- **Reliability:** for any chosen indicator, the data has to be reliable and the indicator should as far as possible reflect appropriate measuring conditions.

The most demanding of these criteria is reliability.

<sup>13</sup> The proposal was put forward by Plan Blue consultant Ph D.Vladimir Lay, based on the one hand on foreign experiences with indicators, and on the other on specific features of Mediterranean Croatia and Croatian society.

## V. Conclusion

The main goals planned for *Clímagine* Workshop 2 were to:

- Select a final core set of indicators related to the issues,
- Define their band of equilibrium,
- Use a matrix to rank the issues and indicators,
- Check what data is available to populate the indicators.

The band of equilibrium has not been defined and the availability of data to populate the indicators has still not been checked. This job has to be done before starting the next *Clímagine* Workshop 3 in early spring 2014.

The third *Clímagine* workshop, as planned at the beginning of the *Clímagine* process, will have the following goals:

- Define the assumptions of scenarios and explore them using scenarios,
- Present and discuss the results,
- Issue recommendations and determine priorities for a local ICZM action plan.

The implementation of *Clímagine*<sup>3</sup> is linked to (i) the need to fine-tune the final core set of indicators (expected in February 2014), (ii) the need for adequate time to define the assumptions of scenarios and (iii) the need to synchronise the steps of the *Clímagine* process with the steps required to complete ICZM action plan for ŠKC (including the DIVA method).

All this work needs to take place, despite a national context of “low social importance” of climate change issues in Croatia.

The “*Clímagine*” local team proposes implementing the next steps, such as *Clímagine*<sup>3</sup> (early spring 2014), but also an additional step, *Clímagine*<sup>4</sup> as a final stage in the process (late spring 2014)!<sup>14</sup>

The local team feels that this would help achieve a higher quality of final output from the *Clímagine* process, with a higher level of harmonization with the ŠKC ICZM action plan as a whole.

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<sup>14</sup> An initial consultation with PAP/RAC has indicated that this proposal could be useful. Some support could also be expected from PAP/RAC.

## **VI. Annex**

### **a. Agenda**

09:00 - 09:30 Registration of participants

09:30 - 09:40 Opening of the workshop and welcome addresses (Šibenik-Knin County)

Welcome addresses (Plan Blue, Mr. Antoine Lafitte, PAP/RAC, Ms. Željka Škaričić)

09:40 - 09:50 Introduction to the workshop (Mr. Vladimir Lay)

09:50 – 10:00 ICZM Plan and participatory approach (Mr. Ivica Trumbić)

10:00 - 10:15 Presentation of Croatian efforts towards adjustment to Climate change (Ministry of Environmental and Nature Protection)

10:15 - 10:30 Climate change and its effects on the sea (Mr. Ivica Vilibić)

10:30 – 10:45 Climate change and fires in ŠKC (Mr. Milovan Kević)

10:45 – 11:00 Climate change and energy (Mr. Zoran Skala)

11:00 – 11:15 Climate change and groundwaters (Mr. Želimir Pekaš)

11:15 - 11:30 Coffee break

11:30 - 13:30 *Clímagine*

13:30 - 14:30 Lunch break

14:30 - 17:30 Continuation – *Clímagine*

## **b. List of participants**

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