

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

**Report on the 3<sup>rd</sup> "Climagine" workshop, 9<sup>th</sup> June, 2014**

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Hosted by the Municipality of Šibenik

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## I. Introduction

Initially, three workshops were planned in the Šibenik-Knin county under the scope of the “*Clímagine*” implementation activity. The third workshop should have been the final one. After the second workshop the working team proposed to organize the fourth workshop. The third workshop was held on June 9<sup>th</sup>, 2014.

The *Clímagine*2 workshop was held on November 8<sup>th</sup>, 2013, after the initial one held in spring of 2013. The main goals of the *Clímagine*2 workshop were to (i) select a final core set of indicators related to issues, (ii) define their band of equilibrium, (iii) use of a matrix to rank issues and indicators, (iv) check data available to populate indicators.

A series of preconditions needed for the realization of these ambitious goals, by end of 2013, were lacking. However, they have set a clear direction for the work to be done. Eventually, the goals were achieved at the *Clímagine* 4 workshop (see in *Clímagine* 4 report) through an analytical effort which followed the workshop. Finally, the entire process led to the definition of the final set indicators and parameters based on available statistical data in Croatia

## II. Goals and Results of the '*Clímagine*' Workshop 3

The basic goals of the "*Clímagine*3" were:

- A. **To provide the participants with experts knowledge on the issues of integrated coastal zone plan development and major climate change impact projections for the ŠKC coastal zone.**
- B. **To finalize and conclude the proposal of dimensions, and, consequently, the indicators to serve as a basis for the ŠKC coastal zone sustainable development.**

Furthermore, during "*Clímagine* 4" workshop, an attempt was made to present, within the limits of available Croatian statistical data, the specific empirical parameters for each indicators. The final idea and the goal of this workshop was to identify specific measurable national indicators, including the "sustainability ratios" which would then be used as exact and easy to read criteria for guiding ŠKC coastal zone sustainable development.

The programme of the *Clímagine* 4 workshop consisted of two sections. Three introductory presentations have been made by Croatian experts and then Vladimir Lay made a presentation concerning final proposal of dimensions and indicators.

- a. **Three introductory presentations elaborating three most important issues for Šibenik-Knin coastal zone were held by following experts:**

**Jure Margeta, Split: Water resources and infrastructure management.**

Mr. Jure Margeta is a university professor from Split, Croatia. He is an expert in the field of water resources and infrastructure management and specialized in coastal zone municipal water supply and drainage system analysis. He studies water supply systems in a wider context which includes phenomena such as water shortage in karst areas, climate change impacts on the watercourses, etc.

**Gojko Berlengi, Split: Sustainability analysis of the ŠKC coastal zone physical space development.**

Mr. Gojko Berlengi is an architect, urbanist and a physical planner from Split, Croatia. His area of work covers a series of problems which include issues of sustainable urban planning and city development with, especially in the coastal zone urban areas. Protection of the architectural heritage and natural resources, as well as harmonisation of the long-term sustainable urban development of the Croatian Adriatic coast are his major topics.

**Martina Baučić, Split: Geospatial analysis of the ŠKC coastal zone vulnerability.**

Mrs. Martina Baučić from Split, Croatia holds a Ph.D., her thesis "Geospatial semantic web in emergency management at airports" contains a precious synthesis and an overview of vulnerable areas of the ŠKC coastal zone.

Experts' presentations deepened the knowledge and provided accurate information on water resources and coastal zone vulnerability directly linked to the climate change impacts.

The state of water resources and infrastructure is associated to one of the three hazards already observed in ŠKC at the end of August - the escalating water shortage caused by the growth of the tourism industry.<sup>1</sup>

The presentation of ŠKC coastal zone vulnerability was particularly innovative and informative. The vulnerability originates from: (i) Gradual and slow sea level rising (3 mm annually, soon this could escalate) and (ii) thunderstorms, high tides, waves and possible smaller tornadoes. Correlation between these hazards and the coastal profile, elevation and physical characteristics has been calculated and analysed.

**Table 1 Total coastal vulnerability**



Source: Martina Baučić, Split : Geospatial analysis of the ŠKC coastal zone vulnerability

In the low-lying coastal areas, especially the inhabited areas such as parts of the city of Šibenik (for example Dolac) or Vodice significant problems can be expected and adaptation measures attuned to the severity of anticipated change are needed. The low-lying island of Krapanj located in vicinity of the coast presents a separate problem.

Sizeable part of the coast, according to this analysis, belongs to the "highly vulnerable" category, and its vulnerability partially originates from climate change and its impacts. This includes some parts of the Šibenik city bay, Tribunj-Vodice-Smirna Riviera, the Prvić Šepurine and Murter islands, and Zblaće peninsula.

In addition, attention should be paid to a series of locations where flooding of urban waterfronts was recorded. Both the intensity and the frequency of such flooding will probably escalate due to climate change, rising sea-levels, storms and high tides.

The expert Martina Baučić concluded her lecture with the following key takeaways:

<sup>1</sup> See the "*Climage Croatia*" Final report recommendation on CCAP (Climate Changes August Peak).

- The predominantly rocky and steep coast will mitigate the climate change impacts (rising sea-level and increased storm frequency and intensity);
- rocky, outer, uninhabited island shores will be exposed to high waves;
- "Šćige" (sudden sea-level rising) occurring in bay areas will present a danger to populated coastal areas and urban waterfronts;
- as much as 47% of the coast is occupied or will become occupied by residential buildings and economic facilities which increases the coastal vulnerability level significantly;
- the large number of historical venues, also raises the coastal zone vulnerability.

The analysis of coastal spatial processes revealed an increasing concentration of buildings, with growing density, decline of green areas and aesthetic pollution. Significant number of residential buildings in the coastal zone is used for secondary residence only, meaning that their owners are not residing there permanently. This is linked to serious problems in economic reproduction of coastal municipalities and their infrastructure, since it is calibrated to fit the needs of the peak summer season when the number of tourists drastically exceeds the number of permanent residents.

Information, analysis and knowledge provided by experts in this part of the workshop presented a fruitful introduction to the discussion about dimensions and indicators which occurred in the second part of the workshop.

**b. Vladimir Lay presented the final proposal of the "*Clímagine*" dimensions and process indicators<sup>2</sup>.**

The presentation held by Vladimir Lay referred to the general topic of the ŠKC coastal area in climate change context and the applicable set of dimensions and indicators. The basic characteristics of progressive upcoming challenges for ŠKC were presented.

Ideally, in the future, the ŠKC should become a resilient (to various negative impacts, including the climate change), productive, diverse, unique, attractive and healthy coastal zone. Having in mind the ongoing processes described by the experts, is it possible to imagine the ŠKC coastal zone that fits this description in twenty years' time, by 2035? What should we do today and each following year to allow this to happen?

In the years to come, the ŠKC coastal zone will face a series of climate and ecological challenges. The following phenomena can be expected on shore. First of all, the number of days with no rain will increase, as well as the quantity of flush flood waters from the inland. Then, low-laying urban waterfronts will continue to be flooded increasingly, and the sea-level rising will accelerate. Finally, the number and intensity of storms on coastline and on land will grow.

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<sup>2</sup> The list was based on the initially proposed set of dimensions and indicators presented at "*Clímagine 2*" in the autumn of 2013.

The following dimensions and indicators were presented to the participants and discussed:

| Dimension      | Indicator   |
|----------------|---|
| Physical space | Apartments for residence ratio in the total No. of app. in CZ (%)                             |
|                | Population density in the CZ compared to the density outside of the CZ                        |
| People         | Ratio of employed in the entire working population in CZ and outside CZ                       |
|                | High school, grammar school and higher education graduates in 15+ population in CZ/outside CZ |
| Water          | Average annual consumption of water resources (%)   |
|                | Average consumption of water resources in August (%)  |
| Sea            | Average connection to waste water treatment facilities (%)                                    |
| Energy         | Average renewable energy in total energy consumption in ŠKC <sup>1</sup>                      |
| Waste          | Kilogramme per resident in ŠKC <sup>2</sup>   |
| Soil           | Irrigated agriculture land (ha)   |
| Fires          | Annual fire site area size (ha)   |
| Biodiversity   | Protected area ratio in relation to total in CZ/outside CZ <sup>3</sup>                       |

During the period before the *Clímagine* 4 workshop in April 2015, this list of indicators was verified according to the relevant available statistical data in Croatia for two time periods (2001 and 2011), or another respective year.

For a certain number of indicators no baseline data could be found and they were excluded from the process, however the majority of indicators were applicable. Specific quantitative parameters have been identified, for the purposes of our analysis and creation of measurable indicators and criteria for monitoring the local sustainable development

### III. Conclusion

The *Clímagine* 3 workshop held in June, 2014 was rich in educational content and created a knowledge basis for finalization of the process which occurred ten months afterwards (during the *Clímagine* 4 workshop held in April 2015).

The work done during the *Clímagine* process was constantly closely linked to the entire set of activities related to the drafting of the ŠKC integrated coastal zone management plan. Many topics and activities of the *Clímagine* project were, more or less, closely related to the topics and activities of the Plan and were a constant and important, but still, only an ancillary part of the drafting process, led by the timing of the Plan development.

This caused delays in the "*Clímagine* project" implementation, along with the fact that several extensions in the drafting process of the ŠKC integrated coastal zone management plan occurred. At the *Clímagine* 4 workshop that was held on April 21th, 2015, the Final Draft of the Plan was presented. The PAP/RAC from Split - creators of the Plan, aims to finish it by the end of 2015.



## IV. Annex

### a. Agenda



## OBALNI PLAN

Plan integralnog upravljanja obalnim područjem  
Šibensko-kninske županije



Integracija klimatske varijabilnosti i promjena u obalne planove i nacionalne obalne strategije

## Obalni plan Šibensko-kninske županije

s posebnim naglaskom na klimatsku varijabilnost i promjene

*Climagine 3*

9. lipnja 2014

Gradska vijećnica, Šibenik<sup>1</sup>

### PROGRAM

|               |  |
|---------------|--|
| 09:00 - 09:30 | Registracija učesnika  |
| 09:30 - 09:40 | Otvaranje radionice i pozdravni govor (Šibensko-kninska županija)<br>Pozdravni govor (Plavi Plan, g. Antoine Lafitte, g. Vladimir Lay) |
|               | <b>Obalni Plan ŠKŽ: Nalazi dijagnostičke analize</b>   |
| 09:40 - 10:00 | Upravljanje vodnim resursima i infrastrukturom (g. Jure Margeta)   |
| 10:00 - 10:20 | Analiza održivosti prostornog razvoja obale ŠKŽ (g. Gojko Berlenji)  |
| 10:20 - 10:40 | Geoprostorna analiza ranjivosti obale ŠKŽ (gđa. Martina Baučić)  |
| 10:40 - 11:00 | Diskusija  |
| 11:00 - 11:15 | Pauza za kavu  |
| 11:15 - 11:35 | Konačni prijedlog matrice „Climagine“ indikatora (g. Vladimir Lay)   |
| 11:35 - 11:50 | Diskusija  |
| 11:50 - 13:30 | Indikatori – prošlost, sadašnjost  |
| 13:30 - 14:30 | Pauza za ručak <sup>2</sup>  |
| 14:30 - 17:30 | Nastavak – Climagine – kratkoročne i dugoročne strategije prilagodbe klimatskim promjenama za održivi razvoj obalnog područja ŠKŽ.     |

<sup>1</sup> Za učesnike koji dolaze iz Splita bit će organiziran autobus s polaskom u 7.30 s autobusne stanice u Sukoišanskoj.

<sup>2</sup> Učesnici su pozvani na ručak koji će biti poslužen u restoranu Gradske vijećnice

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