

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

**The activity: implementation of “*Climagine*” method in Croatia**

**Final Report**

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## I. Introduction: the context of "*Climagine* Croatia" activity

In the 2013-2015 period the Republic of Croatia cooperated in the implementation of two international projects focused on climate change adaptation. The first project was entitled "*Integration of climate variability and climate change impacts into national Integrated Coastal Zone Management (ICZM) strategies*" (*ClimVar* project / 2013-2015). The project was funded by the Global Environment Facility (GEF) and the UN Environment Programme (UNEP), and implemented in eleven Mediterranean countries<sup>1</sup>. The UNEP Mediterranean Action Plan in Athens (UNEP/MAP) and its two Regional Action Centres, Plan Bleu (BP/RAC) from Nice and the Priority Action Programme (PAP/RAC) from Split were the implementing institutions regarding *Climagine* method activity in *ClimVar* project. Under the scope of this project Croatia and Tunisia have been selected as pilot locations for two activities:

1. **Climate vulnerability and climate change cost assessment according to the globally recognised Dynamic Interactive Vulnerability Assessment (DIVA) model.** The results obtained for the entire Croatian coast have been recalculated for the Šibenik-Knin County, taking into account local available data and especially the local economy. Special attention was paid to the possible costs for the following socio-economic sectors and themes: tourism, agriculture, health and infrastructure, including potential costs caused by forest fires.
2. **Elaboration of the integrated coastal zone management plan with a special focus on climate variability and change impacts and ways for adaptation options.**

The creation of the Integrated coastal zone management plan (ICZMP) for the Šibenik-Knin County target area is in its final phase. This plan was developed by the Priority Action Programme (PAP/RAC) from Split.

The plan creation process was specific due to its emphasis on climate variability and change. The "*Climagine*" Croatia activity aimed to promote this topic, as well as the participatory method, involving local and national stakeholders, as "experts at their level". The project was implemented in from November 2013 to September 2015 by Plan Bleu (BP/RAC); the project leader was Mr Antoine Laffite, Plan Bleu programme officer. Professor Vladimir Lay PhD, a sociologist from Zagreb, led all activities in Croatia.

The "*Climagine*" Croatia activity focused on the analysis of climate variability and change projections and potential impacts of climate change in the Šibenik-Knin County coastal zone. Specific findings of this activity were used as baseline data for the creation of the final draft of the "Šibenik-Knin County - Integrated Coastal Zone Management Plan" which should be finalized by the end of 2015.

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<sup>1</sup> Algeria, Albania, Bosnia & Herzegovina, Croatia, Libya, Morocco, Montenegro, Morocco, Palestine, Syria and Tunisia.

## II. Basic concept and the methodology of the "*Clímagine* Croatia"

The implementation of the "*Imagine*" participatory method served as the basis for developing the "*Clímagine*" method". Plan Blue / RAC from Nice, France, applied this method from 2000 to 2006, in five Coastal Area Management Programmes<sup>2</sup> (CAMP). For the first time this method was applied to climate change for the purpose of developing integrated coastal zone management plans for Šibenik-Knin County (Croatia) and Kerkennah Archipelago (Tunisia).

It is a participatory method which includes: a. organisation of several workshops with local (county) actors in coastal zone management, production, habitation and development and b. optionally - conduction of interviews with individual leaders or experts working in institutions and companies dealing with activities relevant for coastal zone management.

The "*Clímagine*" participatory method was applied to the Šibenik-Knin County coastal zone as follows:

- A. From 2013 to 2015 four workshops were organised in Šibenik. The first one in April 2013, the second one in November 2013, the third one in June 2014 and the fourth one in April 2015. Introductory lectures were held by Croatian experts and discussions were led with local stakeholders in the area of Šibenik-Knin County coastal zone management. The basic scope of climate change impacts was determined locally.**

The identification of dimensions and specific and measurable climate change indicators were the final result of this participatory process.<sup>3</sup>

- B. The interviews with 20 subjects from Šibenik-Knin County in the summer of 2013 revealed:**

- The existence of basic understanding of the issues of global warming and climate change;
- Presence of individuals - potential social stakeholders and leaders of activities for mitigation and adaptation to climate change impacts, and in the more advanced phase of the activities leading to lower greenhouse gas emissions.

At this moment, the administrative bodies in Croatia lack organizational capacities in order to deal with climate change in general, thus a network of such active individuals is not yet established and their work on the local level is neither organized nor coordinated, instead their climate change adaptation activities remain isolated.

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<sup>2</sup> Malta (2000-2002), Lebanon (2002-2003), Algiers (2003-2005), Slovenia (2005-2006) and Cyprus (2006)

<sup>3</sup> The final indicators proposal applied to the Šibenik-Knin County with "the sustainability scope" criteria and the projected scope values for 2030, as well as the accompanying graphic tool called "amoeba" which show the trends and changes in the period 2001-2014 were initially presented in the "*Clímagine*<sup>4</sup>" workshop report. In this final report the proposed indicators can be found in Annex 1 and "amoeba" in Annex 2.

<sup>4</sup> The interviews were organized by PAP/RAC from Split and the field interviewers were PAP/RAC employee Daria Povh and Vladimir Lay the local coordinator of the "*Clímagine* Croatia" Project. These interviews significantly deepened our insights into the characteristics, knowledge and capacities of the local social actors who are in some way dealing with climate change and particularly its impact, or will be forced to deal with it in the future.

The networking of knowledgeable and competent individuals is a process which is yet to come. In order to tackle the new problem situations including the ones linked to climate change new institutional forms and activities need to be established.

Additionally, the knowledge of the general population in Croatia about the basic concepts of climate change, its causes and effects is still rather poor.<sup>5</sup> The "*Clímagine*" Croatia method has been applied to the coastal zone of Šibenik-Knin County, which is one of the Croatian counties with a low development index.<sup>6</sup>

The "*Clímagine*" method raised a solid interest and response from the local stakeholders, especially at the beginning. As we will see later on, this is rooted in some real life circumstances. Some problems which are directly or indirectly linked to global warming already started to impact the coastal zone in this county, as well as the wider area of the Croatian Adriatic coast and the Mediterranean in general.

The past decade on the Adriatic coast in Croatia was the warmest ever since the beginning of regular temperature measurements. The summer of 2015 (July and August) broke all "heat records". The expert analysis is yet to follow. Such trends will continue with certain variability (providing a false hope) in the following years. Taking into consideration all the aspects mentioned, our opinion is that the interest for the topic of climate change will not diminish, on the contrary, forced by external circumstances it will continue to grow. Respectively, the application of the "*Clímagine*" method" in the Šibenik-Knin County presents a **pioneer effort**, and its methods and results will be repeatedly consulted by other Croatian coastal counties in order to identify and establish their adequate and timely policies.

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<sup>5</sup> A Climate for Change: Climate change and its impacts on society and economy in Croatia, a report on social development of Croatia, 2008, UNDP, Croatia, Zagreb 2008, p. 214-216. ; Chapter 2. Public perception/Awareness of climate change. p. 19-28.

<sup>6</sup> Development index of the Šibenik-Knin county is 80,93% compared to the Croatian average, the county belongs to the group of counties with a lower development index (group 2 - 75 - 100% of the Croatian average) The least developed Croatian counties are several Slavonian counties with indexes ranging below 20% of the Croatian average. See in: "Development index by counties in 2013", Ministry of regional development and European funds, RC, 2014.

### III. Basic ecological and development resources of the Šibenik-Knin County (coastal) area: dimensions, status and process indicators

The first step was to select the phenomena, issues and topics linked to climate change from the perspective of the Šibenik-Knin County residents (hereinafter: ŠKC). This was the aim of the first two workshops held in 2013. The first "*Clímagine*" Croatia workshop was held in April 2013, and the second in November 2013. A total of 50 participants attended the one day events which included the introductory presentations, discussions and conversations. The remaining two workshops, one in June 2014 and one in April 2015, were focused on the identification and selection of specific measurable indicators.

"*Clímagine*" contributed to the ŠKC Integrated coastal zone management planning process by facilitating development of the indicator core and amoeba<sup>7</sup> - a graphic presentation of its movement through dimensions and time.

The analysis and analytical reading of the indicator tables and "amoeba" presentations led to several conclusions:

- a. The main dimensions to which we could assign measurable indicators, given the conditions in the Republic of Croatia, have been selected through the "*Clímagine*" participatory process in cooperation with local stakeholders in the Šibenik-Knin County. They correspond to the facts and socio-psychological reality in the ŠKC. These dimensions are: water, sea, fire, energy, space, people, nature protection, waste and soil; which correspond with the facts and socio-psychological reality in the ŠKC.

The scientific criticism could refer to the mixture of various categories of terms and phenomena addressed; however, this is not relevant in this context. These dimensions - phenomena - terms, were selected according to the following criteria : (i) the basic ecological media impacted by climate change and impacts on the local community, and (ii) situations which occur in the area (i.e. the fires, especially in summer) that could be put in a logical relation to climate change.

- b. The indicators were articulated and assigned to each of these dimensions, the expert associates from PAP/RAC contributed to this segment with their expertise and effort. For all 9 dimensions, 15 measurable indicators were identified for the 2001-2014 (or 2011) period. Following the empirical data review, theoretical and expert assessments were used and a "sustainability ratio" was provided - the key for understanding and ensuring sustainable management of the specific area in a certain ecological media or process.
- c. Based on the empirical data on one side and the expertise on the other, the "sustainability ratio" was identified. The values and estimates of the acceptable sustainability ratio for the year 2030 were provided for each dimension and all 15 indicators. The sustainability criteria were integrated in all these values and estimates. The values and estimates were presented numerically and can be used in the future planning process as an orientation. Certainly, these numbers and values are estimates

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<sup>7</sup> See in: Annex 1 and Annex 2

and somewhat arbitrary, but the purpose of this method and the procedure was respected.

- d. In the past 10 to 13 years the trends of the sustainability status of basic ecological (from Greek “oikos” means “home”) media or processes (for example fires) in the majority of dimensions and indicators was relatively positive. The basic trend is positive, but the numerical one is not always impressive. This refers to the dimensions of the sea, waters, fires, environment protection and the soil. It is important to emphasize that this is truly a precious set of quantitative data.
- e. The sustainability status trends of the coastal zone spatial dimensions are negative with some variability in speed.

The coastal zone is severely assaulted by secondary residence. Permanent residence in the majority of settlements of the ŠKC is not on the rise. The secondary residence, temporary and occasional residence is on the rise and it is accompanied by various interest groups’ interventions, preferential treatments, corruptive activities, crime and similar phenomena. Such coastal zones remain vacant for the largest part of the year, and the summer use is over excessive and non-functional on the long-term. Development of an adequate communal infrastructure subsystem for such seasonal outbreak of apartment and housing structure is a separate economical, developmental, financial and social problem.

The ratio of apartments for permanent residence in the total number of apartments in the ŠKC coastal zone has dropped in the period from 2001 to 2011 from 66.92% to 54.09%, by 13% in ten years only! Should this trend continue, numerous coastal zones in this county will become weekend/summer settlements exclusively? A realistic 60-80% sustainability ratio was proposed for this indicator, and for the year 2030 an optimistic estimate of 54% was provided.

The comparison of the population density in the coastal zone and the total area of the County:

**Table 1. Population density in the coastal zone and outside of the coastal zone**

	2001	2014
Population density in the CZ compared to the density outside of the CZ	4,11 (74,77 res/km2 in CZ/18,20 res/km2 outside the CZ)	4,12 (72,48 res/km2 in CZ/17,61 res/km2 outside the CZ)

For the year 2030 the estimated value is 3,5 and the appropriate sustainability ratio is 1,8 - 2,2. Faced by the reality of the daily processes, this appears to the local team as an unreachable dream.

The Šibenik hinterland, like the Dalmatian hinterland in general, has been systematically depopulated, on the other hand the concentration of local residents on the coast either remains stable or increases, and in some individual cases of exodus it decreases.



Taking into consideration the present trends and customs it will be very hard to reach the 2:1 ratio. The processes in the area will be led by private interests often fostered by the local government. The private interests which support building in the coastal zone are shared by many residents who actively participate. Ecological, aesthetic and functional value of the coastal ambience is disturbed and endangered by the excessive "apartmentisation" and the construction of holiday homes overpowers the public interest which in fact has no active advocates. There is a lot of talking and not much doing.

The control process of the physical space will remain without the "sustainability ratio" identified by experts, unless it gets transformed into a law that will require strict execution and penalize harshly the ones who breach it.

We think that these processes in the area clearly lack sustainability and will continue to diminish the aesthetic, ecological and functional values of the coastal zone. The key battle front for sustainability in the ŠKC coastal zone will take place in the spatial aspect, in the smart and speedy control of appetites for further building in the coastal zone.<sup>8</sup>

- f. The processes linked to waste are the following:

**Table 2. Waste in the Šibenik-Knin County - quantities in 2001 - 2011**

	2001	2011	sust. ratio	2030
Kilogramme per resident in ŠKC	228,3	388,6	270 - 330	495
Kilogramme per resident in CZ and outside CZ	1.47	2.13	1.35 - 1.65	1.65

The quantity of waste is growing in the area of ŠKC, and its disposal methods and management is predominantly outdated. The waste quantity trends are growing in the coastal zones and decreasing in the hinterland, both in the ŠKC and in the wider area of the Croatian coast. The continuation of waste quantity growth per resident is expected, and estimated at 495 kg per resident annually. The proposed acceptable "sustainability ratio" ranges from 250-330.

The expansion of space covered by buildings is accompanied by growing waste pressure. These are two sides of the same coin in the area with no concept for integrated sustainability.

The central questions regarding the sustainability impacted by the continuation of excessive building in the ŠKC and the entire Adriatic coastal zone are: Until when? What is the end point? Is the answer - there is no end to it? The end, it seems, will come once the decision makers and holders of power and/or money say it can come.

A pleasant coastal zone which is not overcrowded presents a private, but also a public treasure. In theory, everybody agrees on that. However, in practice, many will refute it by their own behaviour or passive approval.

<sup>8</sup> The spatial analysis needed for drafting the Integrated coastal zone management plan in ŠKC was created by Gojko Berlengi PhD in 2015 and it contains documented data which show that such estimates and positions are accurate and on the spot.

The climate change impacts - extreme weather conditions such as drought, fires, storms, hail storms and floods multiply and grow in the areas with high building density. It is the matter of simple mathematics.

- g. In respect of the dimension "people" - their employment and education, a comparative analysis of the coastal zone and the hinterland shows the following:

**Table 3. Ratio of employed/ratio of highly educated in coastal zone and outside coastal zone**

	2001	2014	sust. ratio	2030
Ratio of employed in the entire working population in CZ and outside CZ	1.43 (32,99 % in CZ/25,45 % outside CZ)	1.40 (33,91 % in CZ/26,65 % outside CZ)	0.9 - 1.1	1.25
The ratio of highly educated in population aged 15+ in CZ/outside CZ	1.37 (61,90 % in CZ/45,14 % outside CZ)	1.24 (71,12 % in CZ/57,36 % outside CZ)	0.9 - 1.1	1.1

Employment is steadily stagnant both on the coast and in the hinterland. The higher education is on the rise both on the coast and in the hinterland, somewhat sharply in the hinterland.

The existing unsustainable development patterns in the coastal zone are the over excessive building, as well as the neglect and under-development of the hinterland.

In this area, we expect no larger changes to occur. The capital, the people, the goods all concentrate in densely populated areas; however, this does not necessarily result with high quality of living.

The analysis of 9 dimensions, 15 indicators assigned to these dimensions and the "amoeba" show that current development patterns endanger physical and aesthetic qualities and sustainability of the ŠKC coastal zone on multiple levels. The objective of this analysis, based on exact and measurable indicators, was to indicate sustainable and unsustainable processes which occur in the coastal zone, in order to support development of the integrated coastal zone management plan for ŠKC in areas of physical planning and coastal zone development management.

In the climate change context, these indicators only partially focus our attention to the possible hazards to life and health of people and the entire living world and biodiversity of the coastal zone.

#### **IV. Source of potential climate change impacts and the period of the year when Šibenik-Knin County coastal zone is threatened the most**

The “*Climagine*” process triggered the participation of local stakeholders in the dialogue on climate change topic. The “*Climagine*” method" advocates for stakeholder participation in all phases of the climate adaptation process. From the initial phase of problem definition to the implementation of planned local mitigation activities, active stakeholder participation is one of the main preconditions for any local climate adaptation plan to succeed.

The actual data were processed based on the identified dimension and indicator matrix, the “amoeba” and the interviews. The interviews were conducted with 20 interviewees working in the area of coastal management and economics, predominantly in the city of Šibenik. The entire “*Climagine*” process resulted with a solid conclusion that the ŠKC coastal zone in the upcoming years will face negative climate change impacts. Consequently, this will cause several hazards to occur, out of which three are outstanding and can already be observed nowadays.

They happen almost as a rule at the end of August and beginning of September after full 60-70 days of summer. The soil, air and sea temperatures rise and reach its highest annual values. End of August is when these factors accumulate and present a climate-based hazard.

Therefore, we are in a position that it would be acceptable, based on data and analysis of the ŠKC coastal zone dimensions and indicators, to speak of “*the climate change August peak*” (shortly CCAP) as a cluster of existing relevant elements which could lead to certain dangerous situations and disturb normal life, both of individuals and the society.

This idea of cluster is supported by data which can be read using projective and not only positivist thinking as it is presented below:

*If at the end of August, in the area of ŠKC, a peak of certain phenomena occurs having negative ecological characteristics, we can suppose that in the future, as the global warming intensifies, these phenomena will become even more intense and extensive.*

CCAP as a cluster of very relevant indicators holds a certain socio-psychological mobilizing capacity. This indicator "calls for alarm", and does not approach the issue entirely from a cold scientific perspective. CCAP is a brief and clear message - “if we continue doing this – in the years to come it will probably get worse”. The dimensions and indicators matrix and “amoeba” hold an extremely low mobilizing capacity. The plans and studies are conducted and then get lost in the “investor's” drawers. They produce no messages which relate to real, everyday life.

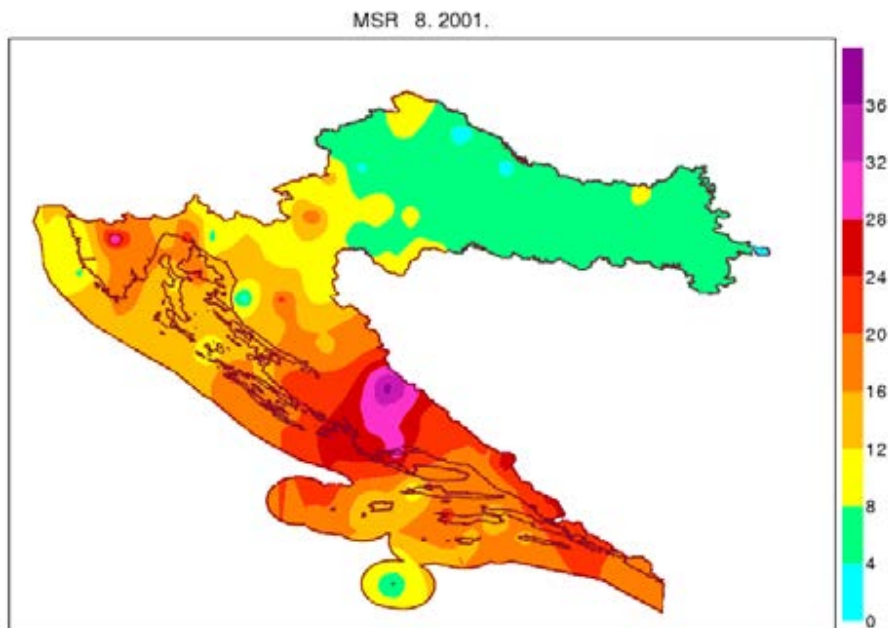
What is in the centre of the “the climate change August peak” CCAP cluster idea? We avoid getting into detailed elaboration of data that we base our idea upon (see table with indicators), instead we list the following statements:

##### **a. Fires - higher frequency of fires and fire torn areas in August**

The data indicate that the area of fire sites became smaller with time, subsiding from 6966 ha in the 1994-2001 period to 3656 ha in the 2003-2012 period.

However, the time distribution of the fire occurrence during summer months shows that in the peak of the summer, by end of August instead of decreasing the number of fires grows. This is the main tendency, however, the actual number of fires will, of course, depend on the temperature and some irrational circumstances (the number of planted fires, pyromaniac incidents).

**Graph 1. Average monthly fire intensity MSR August 2001**



**Source:** Milovan Kević, National Protection and Rescue Directorate 112, Department Šibenik. Presentation about fires in Šibenik-Knin County, during *Climage2* workshop, 8<sup>th</sup> November 2013

The fire is an indisputable element which calls for mobilization and active reflection of local people according to the CCAP cluster of relevant indicators.

**b. Water regime during seasonal peak pressure - potential water shortages in August**

Expected climate changes will have a negative impact on the water regime of the Krka river water-bearing area, this will additionally increase water vulnerability and limit the needs-based utilization of water resources in the future. The water quality and biodiversity of coastal waters will worsen even without increased water consumption, and with it, even more.

Currently, occasional summer shortages can be observed, which reach maximum at the end of August when waters from smaller karst rivers and the rich "upper" sources subside due to the several week-long droughts. At the same time, the tourist facilities on the coast work in full drive and consume maximum quantities of water for their guests.

When will the "red line" be crossed? When will the ŠKC coastal zone, due to peak consumption experience water cuts during August? Maybe, very soon, and this will

probably happen in some other urban areas of the Adriatic coast as well. Global warming, on the other hand, will not stop.

Therefore, the harmonisation of the new, amended water regime with future economic, social and ecological needs and climate conditions will be the major task in the Krka river water-bearing area management. Water regime changes, caused by climate change will come gradually, same as the management of the water regime tailored to the needs and the current state of play. Therefore, the precondition for an efficient problem solving is to set up harmonised long-term water and area management, along with sustainable development plans for the coastal zones.

The aim of the strategic management plan will be to redistribute seasonal needs for water in space and time. The short term seasonal peak load, both internal (water surfaces) and external (water quantities), should be lowered. Therefore, the aim is to redistribute loads from the summer peak season to spring and fall. This is the most important key objective - a pre-determinant for successful sustainable development and life in ŠKC. Lowering the seasonal peak load will not only mitigate the inevitable endangerment of waters and biodiversity, but also create preconditions for a more comprehensive and productive use of all other resources and the entire infrastructure.

**c. Warming and pollution of the "closed" part of the sea in the river krka area from the city of Skradin to the Šibenik city bay**

At the end of August this part of the Šibenik aquatorium, after the period of excessive use for tourism and the increased pollution, combined with higher water temperatures and salinity variations, becomes an area with lower sea water quality. Occasionally, the hypertrophy of mucliaginous aggregates occurs in the meanders of this specific, closed river-sea aquatorium.

As global warming progresses, accompanied by the ever-increasing tourist maritime transport, this phenomena will only intensify in this aquatorium.

To conclude, the fires, water shortage and pollution, and the warming of the closed Skradin - Šibenik city bay aquatorium are three phenomena which peak in August and draw significant attention.

These three phenomena as indicators support the idea of presenting important elements as a cluster named "the climate change August peak" (CCAP) occurrence in the ŠKC area. The local team find this indisputable, given the fact that the global warming will not subside and that these phenomena will progress locally, both in intensity and scope during the peak summer month of August and continue to endanger the local population safety and quality of life, as well as the summer guest residents of this area.

Finally, we mentioned the ongoing drafting of the integrated coastal zone management plan of the ŠKC with a special emphasis put on climate variability and change. This finding is an elaboration on those key focal points and as such it could be used as an addition to the plan in its final version.

## V. Guidelines and recommendations for the Šibenik-Knin County coastal zone management aiming at climate change vulnerability mitigation and long-term sustainability of living

By applying the “*Clímagine*” process, the dimensions and indicators have been articulated and the “amoeba” presentations have been created to show trends and variations in time and the changes of climate/phenomena relevant for the development of the ŠKC coastal zone, and partially outside of it. This was achieved by a “bottom-up” approach of communication (participatory workshops, series of interviews) with the representatives of the expert public and socio-economic stakeholders in the area of ŠKC coastal zone management.

The analysis of 9 dimensions, 15 indicators for these dimensions and the “amoeba” presentations show that the current development patterns endanger the physical and aesthetic qualities and sustainability of the ŠKC coastal zone. Similarly, it most probably endangers quality and value of many other Adriatic coastal zones in other Croatian counties.

In addition, this is accompanied by an extremely visible discrepancy between the development of the coastal zone and the hinterland. The hinterland is becoming a demographic desert, the agriculture, although it has potential, is not developed. In the coastal zone the excessive building, density and volume of areas covered by buildings increases, the ratio of the secondary residence grows and the tourism asks for a more developed communal infrastructure with larger capacity, which then remains unused for the larger part of the year.

What will all this mean for the total sustainability of life in the coastal zone, the islands and in the ŠKC hinterland in the following 10 or 20 years? Extrapolation of trends, replication of the actions taken and events which occurred in the period 2000-2015 in the ŠKC coastal zone into the 2015-2030 period will lead to a sustainability decline on the functional, ecological and aesthetic level. The environment will, affected by the pollution and climate change, degrade even further, the beauty will diminish under the pressure of crowds and greed, and the functionality of the area, although it may not decrease, will become more weary which will eventually lead to the quality of life decline.

What are the things we can recognize today as potential long term sustainability problems for the development of ŠKC in general and the ŠKC coastal zone specifically?

For the majority of dimensions and indicators in the past 10 to 13 years the sustainability of the basic ecological media status (sea, water, soil, nature, etc.) or processes (for example fires) has been relatively positive. The basic trend is positive, but "slow" and numerically modest and merely notable. This refers to the dimensions of the sea, waters, fires, environment protection and the soil.

The processes in the coastal zone physical space and in ŠKC in general are predominantly negative and are on the long term facing multi-level unsustainability. The initial analysis of dimensions and indicators for the observed phenomena and processes shows that on the long term several processes and phenomena can be determined as problematic.

**a. Processes and phenomena in the physical space**

The area covered by buildings is growing, the congestion, accumulation of housing and other facilities in a narrow coastal zone are impairing ecological, aesthetic and functional values and the basic comfort of living in a series of localities.

The secondary residence is on the relative rise compared to permanent residence. (See "spatial indicators"). Communal infrastructure is being expanded and on the other hand remains unused for the most part of the year. Settlements with a lot of secondary residence buildings, apartments, houses are ghost towns for the most part of the year. The weekend residents consume space only when they are actually there, during their absence they do not resume any responsibility for the area; apart from paying the local communal charges.

In the summer months the tourism calls for increased water supply, energy supply, (air conditioning) and communal costs (waste management). A construction system with adequate capacities is costly and the tourists do not participate sufficiently in sharing the cost. The tourist tax is very small.

The water consumption and the energy needed for cooling will rise due to the progressive growth of tourism, rising temperatures and climate change. Water supply may easily reach its limits. The same goes for the energy supply.

When these three processes combine we can evidently conclude that the coastal zone is on its path to macro-economic, social, organisational and ecological sustainability decline.

**b. Growing waste processes**

These processes are accompanied by parallel issues linked to the continuous growth and waste management methods in the coastal zone. This especially relates to the summer period when the population multiplies significantly.

The full implementation of the integrated waste management, reduction, recycling and reuse is delayed, same as in Croatia in general. However, the city sanitary landfill located in Bikarac makes Šibenik a positive example, especially if we compare it to Split or Makarska.

**c. Unsustainable practices in the Šibenik-Knin County local economy**

If we define the economy according to the Greek word it originates from "Oikonomia" – as "home management", and if we consider the ŠKC with its coastal zone, precious islands (out of them Zlarin, Žirje and Prvić are populated) and its deep hinterland all the way up to Knin as a home, then we can observe that this area has been poorly "home managed". Instead of having the entire local economy grow it is declining. Especially some branches of business activities and some aspects of the economy.

- d. **Agriculture and husbandry** - there are existing resources for food production which remain unused and the traditional, rich knowledge and workmanship is facing extinction. The volumes are very low and the modernisation of offer/assortment, technology and marketing is scarce. The climate change trends indicate potential changes of vegetation periods and prolonged drought periods. Vegetation will not survive without irrigation. Crops will deteriorate and losses will occur. Irrigation, however, is in a dead end, as if it were something very far and unknown, expensive and unreachable for our wallets and minds.
- **The synergy of the local agriculture and tourism is non-existent.** The tourism causes large food demand during the tourist season, but the ŠKC hinterland is not providing for it. No product variety, no quantities. This is a deeply unsustainable practice which impairs global production, as well as general economic and financial results of the ŠKC as a micro region. This proves the lack of a sustainable strategy, containing tactics and implementation measures for achieving the local sustainable development. No stakeholders or a group of actors (such as county government) exist in ŠKC that could become the key driver for reflection, production conceptualization and "*oikonomia*".
  - **The communal infrastructure** must adequately support the peak summer loads. On the other hand, the tourist activity does not provide adequate financial support for its development and maintenance. The expansion of the infrastructure, often, cannot be afforded by the county or municipal budgets. There is something profoundly wrong with this concept in the context of "*oikonomia* - home management".
  - **Unemployment** in ŠKC is relatively high, especially in the hinterland, and in the coastal area employment bursts seasonally and then it disappears. The development based on synergies between agriculture and tourism would employ the local population, especially the young. Innovative steps in the industry are scarce, but positive. A Norwegian citizen initiated the production of aluminium ships<sup>9</sup>, and the demand is solid and the production is stable.

#### **An example of a sustainable phenomenon and process**

ŠKC is even today a county outstanding for its renewable energy sources, primarily from water and wind. This is a positive aspect of the economy and sustainable practices in the ŠKC. In its further development and modernisation this county can be labelled as a leader in terms of energy production. The boost of the energy production powered by fossil fuel adds to greenhouse gas emissions the ŠKC production is clean.

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<sup>9</sup> This production start in the year 2010.



## VI. Conclusion

On the “*Clímagine*” process contribution, the local team can conclude that the final version of the integrated coastal zone management plan of the ŠKC will certainly draw upon its results. The analysis of indicators, causes and effects of climate change based on actual examples and locations visibly impacted the Plan content.

The local team already mentioned that the aim of the “*Clímagine*” process was to contribute to the drafting and creation of the Coastal zone management plan by putting a special focus on the climate variability and change. The “*Clímagine*” Croatia activity fulfilled its aim and purpose, with its specific findings it was able to produce baseline data for the final draft of the Integrated coastal zone management plan for Šibenik-Knin county.

The analysis of climate change impacts and creation of the table of indicators and “amoeba” presentations helped the local team to put into perspective other unsustainable processes in the coastal zone of ŠKC as well. These were not directly linked to climate change, however they hold a significant leverage when it comes to ecological, economical and the sustainability of life in general.

The trends of global warming and its negative impacts on climate change will continue, both globally and locally. The modern world is primarily focused on boosting profits and continuous satisfaction of the greed, and not on protecting human, animal or plant life, this includes the climate as the basis for complete functioning of ecosystems. At the moment, humans are not capable to change these negative trends. The conference in Paris planned for the end of 2015 will round up global decision makers and experts and show whether a convincing response and possibility for change exists.

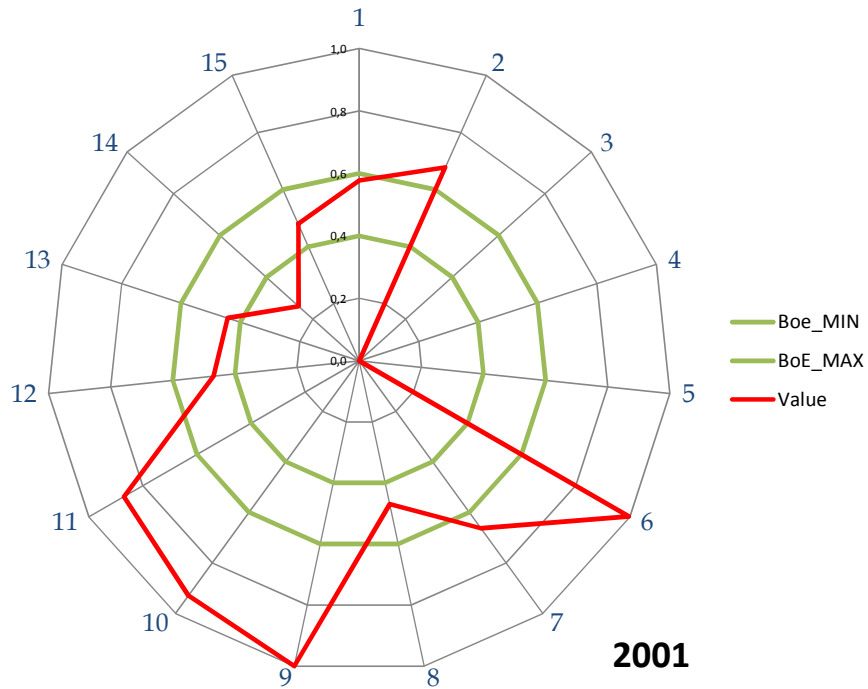
VII. Annex

Annex 1. Table of indicators

<b>Dimension</b>	<b>Indicator</b>
<b>Water</b>	1 Average annual consumption of water resources (%)
	2 Average consumption of water resources in August (%)
<b>Sea</b>	3 Average connection to waste water treatment facilities (%)
<b>Fires</b>	4 Annual fire site area size (ha)
	5 Average renewable energy in total energy consumption
<b>Physical space</b>	6 Apartments for permanent residence ratio in the total No. of app. in CZ (%)
	7 Population density in the CZ compared to the density outside of the CZ
<b>People</b>	8 Ratio of employed in the entire working population in CZ and outside CZ
	9 High school, grammar school and higher education graduates ratio in 15+ population in CZ/outside CZ
<b>Environment protection</b>	10 Protected sea areas in relation to total sea areas (%)
	11 Protected land areas in relation to total land areas (%)
<b>Waste</b>	12 Kilogramme per resident in ŠKC
	13 Kilogramme per resident in CZ and outside CZ
<b>Soil</b>	14 Irrigated agricultural land (ha)
	15 Soil used for organic plant production (ha)

**Annex 2. Graphic presentation of the indicators - "amoeba"**

**Figure 1. Amoebae graphical presentation for 2001**



**Figure 2. Amoebae graphical presentation for 2011**

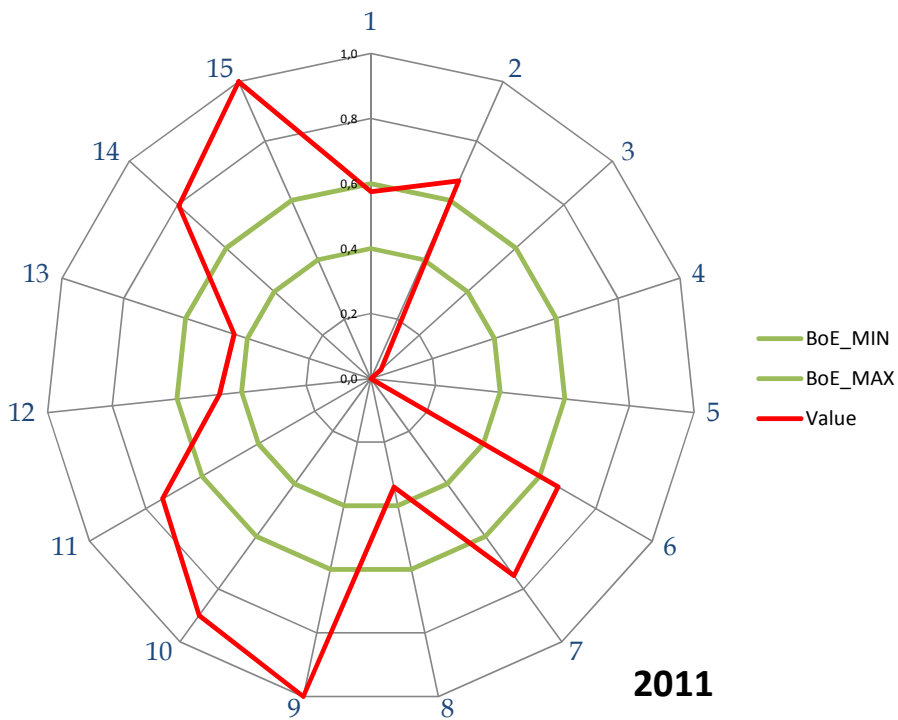


Figure 3. Amoebae graphical presentation for 2030

