

## Integrating climate change adaptation into coastal planning in Šibenik-Knin County (Croatia) <sup>[1]</sup>

Šibenik-Knin County in Croatia has 960 km of coast and 285 islands and rocks. Its coastal zone consists of seven municipalities and three cities including Šibenik, the administrative centre. The Coastal Plan for the Šibenik-Knin County focuses on the impacts of climate change in the coastal zone and adaptation to projected changes. The Coastal Plan (at December 2014) is being prepared by the PAP/RAC (Priority Actions Programme/Regional Activity Centre) in Split and the Plan Bleu: both are components of the UNEP Mediterranean Action Programme.

The work uses the DIVA (Dynamic Integrated Vulnerability Assessment) method and the participatory Climagine method, among others, to assess the climate variability and change in the coastal zone. The preparation of the Coastal Plan commenced in January 2013 and is to be finalised in 2015. The Plan will not be binding, but will inform national and regional processes and stakeholder actions.

### Case Study Description

#### **Challenges:**

Šibenik-Knin County has a population of about 110,000 inhabitants, with 2994 square km of land area and 2676 square km of sea. The county's coastal zone is urbanised (over 70% of the County's population resides in coastal settlements) and is characterised by a concentration of economic activities (tourism, metal industry, shipyards, sea transport and vineyards). In 2008, UNDP's Human Development Report for Croatia (entitled A Climate for Change), noted that the county had coastal areas that were highly vulnerable to climate change (for example, the island of Krpanj, with over 200 inhabitants, has an average altitude of only 2 m above the sea level). Background work for the Coastal Plan identified the main climate-related challenges for the area of Šibenik-Knin County:

- Coastal protection: (i) flooding of historical towns (e.g. Šibenik), (ii) negative impact on the Krka river basin, Krka river estuary, Šibenik bay and islands (e.g. islands of Krpanj and Žirje), (iii) limited erosion of the coastline, especially exposed parts not made out of rocks.
- Water services: (i) reduced precipitation during summer and autumn months and increased precipitation during winter months, (ii) groundwater scarcity, (iii) reduction of available freshwater sources in the coastal zone, (iv) reduced availability of water for tourism, agriculture and other economic activities (e.g. energy production).
- Agriculture and fisheries: (i) reduced soil moisture during summer due to increased evapotranspiration and decrease of precipitation, (ii) possible change in the plants cultivated, (iii) change to plants life cycle, (iv) reduction of possibility of cultivation of certain marine species due to higher temperatures and pollution (e.g. shellfish), (v) algal blooms due to the temperature increases.
- Conservation: (i) increase presence of invasive species, (ii) negative impact on nutrient balance, reduction of oxygen levels, increase of biological activity, ultimately changing biotopes and biocoenosis in the surface waters, (iii) increased frequency and intensity of forest fires which will impact ecosystems and which will impact erosion and creation of barren lands further impacting water ecosystems.
- Tourism: (i) risk of decrease in the number of tourists during hot periods, (ii) water scarcity during the touristic season in larger settlements (e.g. Šibenik, Vodice, Murter, Primošten, Rogoznica) and islands (e.g. Žirje and Kaprije), (iii) change in the landscape influenced by water scarcity and fires, impacting tourism.

- Other: (i) impact on the insurance industry (increased costs due to fires, increased premiums), (ii) impact on the banking industries (risks for mortgages taken on the property located in the coastal zone), (iii) increase of energy demand during hot periods, (iv) reduction of energy production (four hydropower plants are located in the Krka river basin), (v) possible impact on marine transport and ship building.

### **Objectives:**

The objectives of the Coastal Plan for Šibenik-Knin County are to:

- Promote accepting sustainability and resilience as coastal zone development criteria;
- Create prerequisites for defining sustainability in concrete domains (population, coast, space, water, sea, nature, production);
- Contribute to the strengthening of participation and education;
- Provide guidelines for sectoral policies and plans to achieve sustainability and resilience;
- Make recommendations for resolving conflicting issues in achieving sustainability and resilience;
- Offer a platform for sustainable development of the Šibenik-Knin County coastal zone based on water as its fundamental resource, blue economy and smart specialization.

The Coastal Plan may have an influence concerning allocation of EU funds linked to coastal development. In addition to other things, the Coastal Plan contributes to protection, restoration and preservation of the coastal zone's resources.

### **Solutions:**

The development of the Coastal Plan for Šibenik-Knin County as well as related activities, such as work in Croatia using the DIVA model, are part of a larger UNEP/GEF project entitled "Integration of Climatic Variability and Change into National Strategies to Implement the Protocol on ICZM in the Mediterranean".

The DIVA method provides forecasts of climate impacts and costs that are used in preparing the Coastal Plan. The DIVA method builds modular integrated computer models by bringing together knowledge from natural and social disciplines. DIVA enables users to choose scenarios and adaptation strategies and to compare results for different scenarios and adaptation strategies. It is being used to assess the possible costs of climate variability and change for all of Croatia's coast. Due to the small size of Šibenik-Knin County, DIVA results for Croatian coastal zone will be downscaled for Šibenik-Knin County for the purpose of the Coastal Plan. This task will be carried out by a group of international experts taking into consideration local data concerning tourism, agriculture, healthcare, infrastructure and possible forest fire costs.

Climate impacts and possible adaptation responses were discussed with stakeholders in the county using a participatory method called Climagine, which was developed as part of the larger UNEP/GEF project. Climagine is designed for sustainable coastal zone management needs in Mediterranean areas, with a special focus on climate variability and change. Local stakeholders are asked to define the sustainable development of the coastal zone and to come up with methods of how it should be attained. The work stimulates communication among local stakeholders on coastal and climate variability and change issues and facilitates participation in the development of the Coastal Plan. It engages stakeholders via a 4-step participatory process intended to describe, assess and examine the past, present and future levels of sustainability of a local socio-economic system, setting goals and monitoring the system's progress towards sustainable development.

Through its integrated approach, the Coastal Plan will recommend possible solutions concerning the following dimensions and issues:

- Water; adaptation to climate variability and change in: (i) water resources management (measures for rational use of fresh water resources, providing water for irrigation, water demand management, reduction of water losses); (ii) river management (regulation of low and high flows of rivers, flood protection measures, retaining, storing, drainage, giving more space to river). Solutions will also be proposed for problems caused by storm waters through an integrated approach for urban drainage.
- Infrastructure: adaptation measures for protection against coastal flooding, measures for adaptation of the

existing coastal infrastructure to the expected higher sea levels, and planning of future infrastructure so as to avoid negative impacts of climate change, including giving more space to sea.

- Forest fires: improvement of prevention through spatial planning, agriculture, cattle breeding, awareness raising and early warning system.
- Regional development; (i) Regional development within Šibenik – Knin County: balanced urban and rural development to reduce pressure on the coastal zone. (ii) Development of the entire Šibenik – Knin County region: adaptation to climate variability and change in tourism (strategic enhancement of the tourist offer aiming for the extension of the tourist season, compensating for climate variability). (iii) Other issues affecting both the regional development within Šibenik – Knin County and of the entire County: mariculture, agriculture, port management, recommendations for green and blue growth.
- Spatial planning: implementation of Article 8 of the ICZM Protocol for the Mediterranean; managed realignment to reduce vulnerability to climate change impacts; protection of the landscape; marine spatial planning for more sustainable sea use.
- Governance and management: ICZM coordination body at the regional level, creating favourable conditions for participation, awareness raising and capacity building.

### **Importance and relevance of the adaptation:**

Case developed and implemented and partially funded as a CCA measure.

#### **Additional Details**

#### **Stakeholder engagement:**

The “Climagine” method engages stakeholders within a four-step participatory process intended to describe, assess and examine the past, present and future levels of sustainability of a local socio-economic system, setting goals and monitoring the system’s progress towards sustainable development. For the preparation of the Šibenik-Knin Coastal Plan, the “Climagine” method was implemented through four workshops:

- 1st “Climagine” workshop, 8 April 2013 - The workshop was attended by 60 participants from all sectors apart from the business sector. The main objectives of the first workshop were to: achieve a common understanding among stakeholders of the context; draw up a territorial diagnosis of the covered coastal zone; identify priority issues in the coastal zone; and prioritise issues.
- 2nd “Climagine” workshop, 8 November 2013 - The workshop was attended by 50 participants from all sectors. The main objectives of the second workshop were to: select a final core set of indicators relating to the issues defined during the first workshop; define band of equilibrium of the selected indicators; use a matrix to rank the issues and indicators; and check what data is available to populate the indicators.
- 3rd “Climagine” workshop, 9 June 2014 - The workshop was attended by 40 participants. Representatives of NGOs and businesses from Šibenik-Knin county did not take part in the workshop. The main objectives of the third workshop were to: define the assumptions of scenarios; explore scenarios; present and discuss the results; and issue recommendations and determine priorities for the Coastal Plan.
- 4th “Climagine” workshop, January/February 2015 - The workshop will take place after the finalisation of drafting of this document.

In addition to the workshops, a set of interviews was conducted with key stakeholders. The aim of the interviews was to acquire local knowledge, elicit local creative ideas and create a relationship of trust on which the future implementation of the Coastal Plan relies. The following interviews were carried out:

- Governance and policy-making bodies – thirteen interviews;
- Regional and local authorities – eight interviews;
- State institutions represented in Šibenik-Knin County – three interviews;
- Education and research institutions – two interviews;
- Civil society (NGOs) – two interviews;
- Businesses – three interviews.

### **Success and limiting factors:**

Main success factors include:

- Stakeholder participation – The “Climagine” workshops and interviews succeeded in involving a large number of stakeholders from different sectors (governance and policy making; civil society; and business) in the preparation of the Coastal Plan.
- Establishing a link between relevant sectorial plans, spatial plans, the Development Strategy of Šibenik-Knin County, and the Coastal Plan –The Coastal Plan aims to assist in overcoming the current shortcomings spatial planning, in particular the absence of the consideration of climate change in the current plans. The Coastal Plan is not competing with spatial or development planning, but it adds a value by enhancing long term prospective and indicating “entry points” and solutions for integration. The Coastal Plan also establishes links with other relevant plans and strategies, such as the Development Strategy of Šibenik Knin County, which is to be reviewed in 2015.
- Collection and storage of data – The Coastal Plan – and the DIVA work – will also result in collection and storage of relevant information, knowledge and awareness on the climate variability and change, and on the possible impacts on the coastal zone.

Main limiting factors include:

- Ambiguity concerning the legal basis for preparation of the Coastal Plan therefore impacting the Plan’s effect - The relevant planning legislation in Croatia does not foresee the preparation of an Coastal Plan at county level. The lack of legal certainty concerning the status of the Coastal Plan for Šibenik-Knin County and its relationship with other planning documents could impact its effectiveness.
- The existing spatial and physical plans do not give special attention to the coastal zone - The Šibenik-Knin County has a full set of spatial plans, as required under the Croatian legislation. The county spatial plan, as well as municipal and city plans, do not give special attention to the coastal zone and its management.
- The issue of climate change is still very new for the stakeholders and inhabitants of Šibenik-Knin County and of Croatia. As a result, they may not fully grasp the importance of the issue resulting in failure to take timely measures to adapt to of climate change and minimize their negative impacts.
- Difficulties in obtaining relevant information. There were difficulties in accessing information on the past events, especially on the damages while preparing the Coastal Plan. Representatives of banking and insurance sectors did not become involved in the preparation of the Coastal Plan.

#### **Budget, funding and additional benefits:**

##### *Overall climate change costs and benefits for Šibenik-Knin County*

Costs and benefits related to climate change will be calculated on the basis of DIVA method for the Croatian coastal zone as a whole. The downscaling of the results for Šibenik-Knin County, for the purpose of the Coastal Plan, is being carried out by a group of international experts. The assessment of costs and benefits will concern priority sectors and issues identified via the Climagine workshops and interviews. These include: tourism, agriculture, mariculture, infrastructure and forest fires. Downscaled DIVA results for impacts of coastal flooding and erosion on population and assets, along with results of other analysis of the vulnerability of the Šibenik-Knin County coastal zone, will be used in the overall assessment of possible costs and benefits of climate variability and change on the local economy. The findings will aim to show the relative significance of estimated costs and benefits for the priority sectors and issues, and to inform and provide recommendations for adaptation priorities in the Coastal Plan.

##### *Overall Projects costs and benefits*

Information on the overall costs and benefits of the Coastal Plan itself was not available. The preparation of the Plan is supported by a UNEP/MAP GEF project, “Integration of Climatic Variability and Change into National Strategies to Implement the Protocol on ICZM in the Mediterranean”. Its objectives include: awareness raising concerning climate variability and change; and promoting ICZM as an effective tool to address climate variability and change impacts. Concerning project benefits, it is expected that implementation of recommendations and measures of the Coastal Plan will decrease possible damage caused by the climate variability and change,

assist in the process of internalizing environmental costs for more sustainable development and encourage the development of more resilient economy of the coastal zone of the Šibenik-Knin County.

**Legal aspects:**

The Coastal Plan will not be binding. Croatian national legislation does not foresee preparation of the coastal plans at county level. However, Article 18(3) of the ICZM Mediterranean Protocol, of which Croatia is a Party, provides for preparation of the Coastal Plan at “an appropriate territorial level”. According to the Croatian Constitution, the ratified international agreements, such as the ICZM Protocol, have a primacy over domestic law. However, there are no provisions in the Croatian legislation specifying a procedure for the adoption of a county ICM plan or its relationship to other planning documents. The Coastal Plan is nonetheless largely in line with Croatian legislation on the spatial and physical planning of the Šibenik-Knin County.

Work on the county's Coastal Plan is linked to the preparation of a national Strategy for Management of the Marine Environment and the Coastal Zone. This Strategy will fulfil Croatia's obligation to develop a coastal strategy under the Mediterranean ICZM Protocol, which Croatia ratified in 2012, and a marine strategy under the EU Marine Strategy Framework Directive (2008/56/EC).

**Implementation time:**

The preparation of the Coastal Plan started in January 2013 and is expected to be finalised during 2015. Once draft of the Coastal Plan is available, it will be discussed by relevant stakeholders to elaborate the Final Coastal Plan.

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**Websites:**

[http://pap-thecoastcentre.org/projects/coastal\\_plans.html#skc](http://pap-thecoastcentre.org/projects/coastal_plans.html#skc) [3]

**Sources:**

EC DG ENV Study "Sharing of Best Practices on Integrated Coastal Management (ICM) in a Context of Adaptation to Climate Change in Coastal Areas"

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[2] <mailto:daria.povh@paprac.org>

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