

II –Coastal areas, marine biodiversity and fisheries

Parallel session A – Monday 10th March 14:00-15:30

ID N°: [113]

Title: GENERAL PLAN OF COMPLEMENTARY ADAPTIVE MEASURES TO CLIMATE CHANGE FOR VENICE

Authors: [Emiliano Ramieri](#)¹; Maria Brotto²; Giovanni Cecconi²; Cristina Nasci³; Pierluigi Rossetto³; Valerio Volpe⁴

Institutions: ¹Thetis - ETC-CCA; ²Consorzio Venezia Nuova; ³Thetis; ⁴Magistrato alle Acque di Venezia

Venice has a long tradition of adaptation to changes of environmental driving forces, including those related to climatic issues. This tradition is historically expressed as a process of co-evolution between the natural and the anthropic systems that influenced and shaped each other, with the twofold aim of maintaining the ecosystem services provided by the Venice lagoon and the functions expressed by lagoon urban settlements, including the related socio-economic activities. These historical adaptive attitude and experience are relevant assets to cope with possible future effects of climate change on this highly vulnerable coastal system.

Within this general perspective, Venice Water Authority (Magistrato alle Acque di Venezia), which is primary responsible for the safeguard of the Venice lagoon, recently completed the “General Plan of complementary adaptive measure to climate change for Venice”. The Plan development included three phases: (i) vulnerability assessment, (ii) identification and evaluation of adaptation options, (iii) design of the plan through the definition of adaptation strategies and related measures.

Vulnerability assessment was based on three local scenarios of climate change and sea level rise (at 2050 and 2100), that had been elaborated with the scientific contribution of SCRIPPS Institution of Oceanography – UCSD. Vulnerability assessment focused on key sectors considered more relevant in terms of climate change implication and competences of the Venice Water Authority: hydrology and lagoon hydrodynamic, lagoon morphology, littoral dynamic, water quality, biodiversity and habitat, and urban system; climate change impacts on areas adjacent to the lagoon were also evaluated. Adaptation options were identified through the analysis of international case studies and networks on climate change adaptation in coastal cities and wetland, being also based on the outcome of an international conference on climate change adaptation in urban coastal regions organised within the Plan elaboration and held in Venice in September 2011.

Previous phases’ results were then used to elaborate the adaptation Plan, which includes the description of: (i) the existing planning and legal framework, (ii) the area of intervention, (iii) the “Venice model” to climate change adaptation based on the concepts of co-evolution and building with nature, (iv) the seven adaptation strategies identified, (v) the specific measures that were designed to give concrete implementation to the Plan’s objectives and strategies. The adaptation strategies proposed by the Plan were conceptually evaluated through the MEA approach, based on the analysis of ecosystem services. Finally, the Plan defines the criteria for its monitoring and progressive updating, according to the adaptive management approach. The whole study was supervised by an international panel of experts that periodically met to orientate the Plan elaboration towards most recent methodologies and approaches.

Presenter

Name: Emiliano Ramieri

Email: emiliano.ramieri@thetis.it

ID N°: [110]

Title: ADAPTATION OF COASTAL PROTECTION IN BELGIAN COASTAL TOWNS

Authors: Toon Verwaest¹

Institutions: ¹Flanders Hydraulics Research

Alternative strategies for adaptation of the coastal protection along the Belgian coastline were evaluated. Possible measures to adapt sea dikes in coastal towns as well as dunes and beaches being the natural coastal defences of the sandy Belgian coastal zone were developed for scenarios of climate change with a time horizon until 2100. The different adaptation measures were evaluated by a combination of risk calculations (functional assessment) and MCA (multi-criteria analysis including a simple CBA).

It was shown that a wide range of direct and indirect secondary effects of climate change related to coastal protection can be identified. Further it was clearly demonstrated that the flood risk calculations are an excellent tool to assess the impact of the most important secondary effects of climate change (damages and victims). The most important primary effects of climate change that increase flood risks are sea level rise and increased storminess (higher wind speed and higher wave conditions).

One concluded that the most effective measure to maintain coastal safety in Belgium consists of strengthening the existing coastal defence line of dunes, dikes and beaches. Investing in strengthening the existing coastal defence line can provide a solution avoiding an increase of the flood risks due to climate change, but additional research into non-structural measures could lead to an increase of efficiency and thus contribute to, along with investments in strengthening the existing coastal defence line, in a most efficient mix of measures of coastal flood risk management. Non-structural measures one proposes to further investigate are the development of specific contingency plans for flooding by overtopping waves, the strengthening of buildings so they remain structurally stable under the hydraulic impact of overtopping waves and the adaptation of licensing procedures with respect to coastal safety against overtopping.

The conclusion of the research supports the current policy of the Flemish Government to 'grow with the sea' by mainly nourishing beaches and other measures to strengthen the existing coastal defence line, as implemented in the Master Plan Coastal Safety 2050. The research results showed that this adaptation policy is feasible to implement even in the case of an extreme climate change scenario of 2 m sea level rise until 2100. However, an improved adaptation strategy for the Flemish coastal protection would be to combine 1) strengthening the coastal defence line with 2) non-structural measures to reduce the consequences in terms of damages and casualties caused by a coastal flooding by overtopping waves.

Presenter

Name: Renaat De Sutter

Email: Renaat.deSutter@anteagroup.com

Institution: AnteaGroup

ID N°: [107]

Title: CLIMATE CHANGE VULNERABILITY IN THE COASTAL PROTECTED AREAS OF CATALONIA (SPAIN): THE CASES OF EBRO DELTA AND AIGUAMOLLS DE L'EMPORDÀ

Authors: Sandra Fatoric¹

Institutions: ¹Department of Geography, Autonomous University of Barcelona

Mediterranean is located at the crossroad of three continents and is one of the richest eco-regions and one of the most vulnerable natural environments in the world. Moreover, climate change is one of the most important environmental, political, and economic long term challenges facing societies, because it deals with the global sustainability dimension. Coastal protected areas such as Ebro Delta and Aiguamolls de l'Empordà have high social, economic and environmental significance. Climate change is widely recognised as a serious threat especially to the Mediterranean natural areas therefore their ongoing protection is of great concern.

Both areas were previously susceptible to climate change risks mainly because of their topography but over the last four decades, the quality of the environment of both areas has been increasingly degraded by rapid urbanisation, littoralisation and various human activities, especially agriculture and tourism. These pressures have generated major environmental problems expected to be exacerbated by climate change.

The environment and livelihoods in Aiguamolls de l'Empordà and Ebro Delta are facing several pressures that make them highly vulnerable, and affecting their capacities to cope with the effects of climate change. They are particularly vulnerable to four aspects of climate change: a) alterations in the magnitude, timing and frequency of rainfall, b) sea level rise, c) altered frequency and severity of extreme weather events, d) major changes in sea temperature. In addition, increasing coastal erosion, intensification of floods, saltwater intrusion and coastal erosion are of particular concern for both areas.

Aims of this presentation are to identify, describe, and explain the concepts of vulnerability to climate change and to provide a more holistic picture of the environmental and socioeconomic stresses, individual actions and decision making processes gained from stakeholders in both coastal protected areas. Moreover, this presentation aims to support the position that any vulnerability analysis must be participatory and must include social, cultural, environmental, economic, and political dimensions, thereby allowing for building up a better understanding of vulnerability and adaptation in the changing climate with the aim of reducing vulnerability and maintaining or increasing the opportunities for sustainable development in both study cases.

Presenter

Name: Sandra Fatoric

Email: sandra.fatoric@gmail.com

ID N°: [257]

Title: COASTAL HAZARD MAPPING AS A PLANNING TOOL IN CLIMATE CHANGE ADAPTATION - THE CASE OF FONTE DA TELHA, PORTUGAL

Authors: Rui Taborda¹; Tanya M. Silveira²; Catarina Freitas³; Nuno Lopes³; César Andrade²; Maria C. Freitas²; Ana N. Silva¹; Cristina Lira¹; Patrícia Silva³; Sara Dionísio³

Institutions: ¹Instituto Dom Luiz, University of Lisbon; ²Centro de Geologia, University of Lisbon; ³Divisão de Estudos e Gestão Ambiental e Departamento de Estratégia e Gestão Ambiental Sustentável, Câmara Municipal de Almada

The rapid intensification in coastal development since the middle of the 20th century increased the pressure in the littoral zone, and consequently raised the risks associated with marine erosion and inundation. The demand for coastal occupation and use requires measures of management and planning that are able to minimize the risk. A number of national-scale policies emerged to control the pattern of occupation of the coastal fringe and regulate land-uses, which included the development of setback lines. However, in many cases, in Portugal and elsewhere, occupation took place prior to the definition and implementation of these regulations, which led to intense urbanization in risk-prone areas. *Fonte da Telha*, in the Municipality of Almada (MA), some 30 km south of Lisbon, is one of such places. The original fishing village and fishing huts gave place to a nucleus of ill-planned and unauthorized housing, lacking adequate infrastructures but hosting about 300 families, together with a number of commercial facilities; beach concessions, roads and car-parks, that occupied and destroyed both the natural beach-foredune system and the dune ridges that extended landwards from the shoreline.

This work presents a case study on how the MA resorted to the scientific knowledge to inform a land use planning process that will include the relocation of part of the existing occupation.

The coastal hazard zone (CHZ) characterization and delimitation was done based on meteorological, morphological, and sedimentary data acquired through field surveying, combined with numerical modeling of coastal processes, yielding a robust methodology for determination of areas prone to marine inundation and erosion.

Definition of the CHZ considered the Precautionary Principle, through the computation of both maximum distances of coastal retreat and extreme water levels that may affect the studied coastal zone over the next 50 and 100 years, including the likely impacts of climate change on sea level. It involved the summation of both single-event-driven and long-term physical processes acting upon the coast and their effect on the beach profile, including: 1) storm erosion, in relation to short-term beach profile readjustment; 2) coastal overwash, leading to inundation of low-lying areas; 3) sea-level rise, promoting long-term beach profile readjustment; and 4) sedimentary budget, promoting long-term shoreline change.

Based on the mapping of the CHZ, the occupation model changed and a cross-cutting approach was defined by the MA, combining measures to retreat from the risk areas, to accommodate sea level rise and to protect the new urban settlement by a restored dune system. Adaptation measures, such as demolition of illegal housing, definition of a new construction base level, revision of the urban design, promotion of dune stabilization and natural restoration were incorporated in the Plan to reduce the risk exposure and to increase the resilience in this region.

Presenter

Name: Rui Taborda

Email: rtaborda@fc.ul.pt