



## **Regional Risk Assessment for the analysis of the risks related to storm surge extreme events in the coastal area of the North Adriatic Sea.**

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Europe's coast faces a variety of climate change threats from extreme high tides, storm surges and rising sea levels. In particular, it is very likely that mean sea level rise will contribute to upward trends in extreme coastal high water levels, thus posing higher risks to coastal locations currently experiencing coastal erosion and inundation processes. In 2007 the European Commission approved the Flood Directive (2007/60/EC), which has the main purpose to establish a framework for the assessment and management of flood risks for inland and coastal areas, thus reducing the adverse consequences for human health, the environment, cultural heritage and economic activities. Improvements in scientific understanding are thus needed to inform decision-making about the best strategies for mitigating and managing storm surge risks in coastal areas.

The CLIMDAT project is aimed at improving the understanding of the risks related to extreme storm surge events in the coastal area of the North Adriatic Sea (Italy), considering potential climate change scenarios. The project implements a Regional Risk Assessment (RRA) methodology developed in the FP7 KULTURisk project for the assessment of physical/environmental impacts posed by flood hazards and employs the DEcision support SYstem for Coastal climate change impact assessment (DESYCO) for the application of the methodology to the case study area.

The proposed RRA methodology is aimed at the identification and prioritization of targets and areas at risk from water-related natural hazards in the considered region at the meso-scale. To this aim, it integrates information about extreme storm surges with bio-geophysical and socio-economic information (e.g. vegetation cover, slope, soil type, population density) of the analyzed receptors (i.e. people, economic activities, cultural heritages, natural and semi-natural systems). Extreme storm surge hazard scenarios are defined using tide gauge time series coming from 28 tide gauge stations located in the North Adriatic coastal areas from 1989 to 2011. These data, together with the sea-level rise scenarios for the considered future timeframe, represent the input for the application of the Joint Probability method (Pugh and Vassie, 1979), which allows the evaluation of the maximum height of extreme storm surge events with different return period and the number of extreme events per year.

The methodology uses Geographic Information Systems to manage, process, analyse, and visualize data and employs Multi-Criteria Decision Analysis to integrate stakeholders preferences and experts judgments into the analysis in order to obtain a total risk index in the considered region.

The final outputs are represented by GIS-based risk maps which allow the communication of the potential consequences of extreme storm surge to decision makers and stakeholders. Moreover, they can support the establishment of relative priorities for intervention through the identification of suitable areas for human settlements, infrastructures and economic activities. Finally the produced output can represent a basis for definition of storm surge hazard and storm surge risk management plans according to the Floods Directive.

The preliminary results of the RRA application in the CLIMDAT project will be here presented and discussed.