

Towards a robust methodology to assess coastal impacts and adaptation policies for Europe

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The present contribution aims to present preliminary results from efforts towards (i) the development of the integrated risk assessment tool LISCoAsT for Europe (Large scale Integrated Sea-level and Coastal Assessment Tool); (ii) the assessment of coastal risk along the European coastline in view of climate change; and (iii) the development and application of a robust methodology to evaluate adaptation options for the European coastline under climate change scenarios. The overall approach builds on the disaster risk methodology proposed by the IPCC SREX (2012) report, defining risk as the combination of hazard, exposure and vulnerability. Substantial effort has been put in all the individual components of the risk assessment chain, including: (1) the development of dynamic scenarios of catastrophic coastal hazards (e.g., storm surges, sea-level rise) in view of climate change; (2) quantification, mapping and forecasting exposure and vulnerability in coastal areas; (3) carrying out a bottom-up, highly disaggregated assessment of climate impacts on coastal areas in Europe in view of global warming; (4) estimating the costs and assessing the effectiveness of different adaptation options.

Projections indicate that, by the end of this century, sea levels in Europe will rise on average between 45 and 70 cm; while projections of coastal hazard showed that for some European regions, the increased storminess can be an additional significant driver of further risk. Projections of increasing extreme storm surge levels (SSL) were even more pronounced under the business-as-usual RCP8.5 concentration pathway, in particular along the Northern Europe coastline.

The above are also reflected in the coastal impact projections, which show a significant increase in the expected annual damage (EAD) from coastal flooding. The present EAD for Europe of 800 million €/year is projected to increase up to 2.4 and 3.2 billion €/year by 2040 under RCP 4.5 and 8.5, respectively, and to 11.2 and 18.3 billion €/year by 2100 under RCP 4.5 and 8.5, respectively (values correspond to a medium ice-sheet behavior scenario). The projected Expected Annual Number of People forced to relocate because of RSLR by the year 2100 is 22,000 and 35,000 for RCP4.5 and RCP8.5, respectively. Finally, the expected annual number of people affected by coastal flooding in Europe is projected to increase from presently 27,000 to 67,000 and 197,000 under RCP 4.5 and 8.5, respectively by 2040, and to 81,000 and 295,000 under RCP 4.5 and 8.5, respectively by 2100.

Apart from improving the impact assessment approach, the main current priority is to advance further towards the evaluation of coastal adaptation and risk reduction strategies.