



## **An analysis of European riverine flood risk and adaptation measures under projected climate change**

Laurens Bouwer (1), Andreas Burzel (1), Friederike Holz (1,2), Hessel Winsemius (1), and Karind de Bruijn (1)  
(1) Deltares, Delft, Netherlands (laurens.bouwer@deltares.nl), (2) University of Kiel, Germany

There is increasing need to assess costs and benefits of adaptation at scales beyond the river basin. In Europe, such estimates are required at the European scale in order to set priorities for action and financing, for instance in the context of the EU Adaptation Strategy. The goal of this work as part of the FP7 BASE project is to develop a flood impact model that can be applied at Pan-European scale and that is able to project changes in flood risk due to climate change and socio-economic developments, and costs of adaptation.

For this research, we build upon the global flood hazard estimation method developed by Winsemius et al. (Hydrology and Earth System Sciences, 2013), that produces flood inundation maps at different return period, for present day (EU WATCH) and future climate (IPCC scenarios RCP4.5 and 8.5, for five climate models). These maps are used for the assessment of flood impacts. We developed and tested a model for assessing direct economic flood damages by using large scale land use maps. We characterise vulnerable land use functions, in particular residential, commercial, industrial, infrastructure and agriculture, using depth-damage relationships. Furthermore, we apply up to NUTS3 level information on Gross Domestic Product, which is used as a proxy for relative differences in maximum damage values between different areas.

Next, we test two adaptation measures, by adjusting flood protection levels and adjusting damage functions. The results show the projected changes in flood risk in the future. For example, on NUTS2 level, flood risk increases in some regions up to 179% (between the baseline scenario 1960-1999 and time slice 2010-2049). On country level there are increases up to 60% for selected climate models. The conference presentation will show the most relevant improvements in damage modelling on the continental scale, and results of the analysis of adaptation measures. The results will be critically discussed under the aspect of major uncertainties in both future flood hazards as well as damage costs and adaptation effects and costs.