



## **Regional-scale flood risk modelling: an integrated hydrological and hydraulic approach applied over the Po river**

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Identification of flood risk areas has potential for a wide number of applications, ranging from engineering to climate change studies, and provides essential information for planning effective emergency responses. Due to the lack of large consistent data sets only a few flood-risk information is available and with a relatively coarse grid resolution. In this work we describe an integrated hydrological and hydraulic modeling approach for the risk assessment of flood-prone areas and we present the first results obtained over the Po river (Northern Italy) at 90m resolution. River discharges are obtained through the hydrological model CHyM starting from rainfall data observed from the ACQWA project. These are then used to obtain Synthetic Design Hydrographs (SDHs) for different return periods along the river network. Flood hydrographs are subsequently processed by the LISFLOOD-FP hydraulic model, which is specifically designed to simulate floodplain inundations in a computationally efficient manner over complex topography. Modeled hydrographs and SDHs are compared with those obtained from observed data for a choice of gauging stations, showing an overall good performance of CHyM model. Produced flood hazard maps for return periods of 50, 100, 500 and 1000 years are in good agreement with reference maps suggesting strong potential of this approach for future applications.