



Socio-hydrological modelling of floods: investigating community resilience, adaptation capacity and risk

Alessio Ciullo (1,2), Alberto Viglione (1), and Attilio Castellarin (2)

(1) Institute of Hydraulic Engineering and Water Resources Management. Vienna University of Technology. Austria, (2) Department of Civil, Chemical, Environmental, and Materials Engineering. University of Bologna. Italy

Changes in flood risk occur because of changes in climate and hydrology, and in societal exposure and vulnerability. Research on change in flood risk has demonstrated that the mutual interactions and continuous feedbacks between floods and societies has to be taken into account in flood risk management. The present work builds on an existing conceptual model of an hypothetical city located in the proximity of a river, along whose floodplains the community evolves over time. The model reproduces the dynamic co-evolution of four variables: flooding, population density of the floodplain, amount of structural protection measures and memory of floods. These variables are then combined in a way to mimic the temporal change of community resilience, defined as the (inverse of the) amount of time for the community to recover from a shock, and adaptation capacity, defined as ratio between damages due to subsequent events. Also, temporal changing exposure, vulnerability and probability of flooding are also modelled, which results in a dynamically varying flood-risk. Examples are provided that show how factors such as collective memory and risk taking attitude influence the dynamics of community resilience, adaptation capacity and risk.