



Long-term dynamics emerging in floodplains and deltas from the interactions between hydrology and society in a changing climate

Giuliano Di Baldassarre (1), Alberto Viglione (2), Kun Yan (1), Luigia Brandimarte (1), and Günter Blöschl (2)
(1) UNESCO-IHE Institute for Water Education, Delft, Netherlands, (2) Vienna University of Technology, Vienna, Austria

Economic losses and fatalities associated to flood events have increased dramatically over the past decades. This situation might worsen in the near future because of rapid urbanization of many floodplains and deltas, along with enhancement of flood water levels as a result of human interventions, climate variability or sea level rise.

To explore future dynamics, we developed a novel approach, which takes into account the dynamic nature of flood risk by an explicit treatment of the interactions and feedbacks between the hydrological and social components of flood risk (i.e. probability of flooding, and potential adverse consequences). In particular, we developed a socio-hydrological model that allows considering how the frequency and magnitude of flooding shapes the evolution of societies, while, at the same time, dynamic societies shape the frequency and magnitude of flooding. We then use this model to simulate long-term dynamics of different types of societies under hydrological change, e.g. increasing flood frequency.

Based on the study of long-term dynamics of different floodplains and deltas around the world (e.g. Netherlands, Bangladesh), we identify two main typologies of flood-shaped societies: i) techno-societies, which "fight floods", and typically deal with risk by building and strengthening flood protection structures, such as levees or dikes; and ii) green-societies, which "lives with floods", and mainly cope with risk via adaptation measures, such as resettling out of flood prone areas. The outcomes of this study are relevant for the management of deltas and floodplains as they allow a comparison of long-term dynamics between diverse types of societies in terms of robustness to hydrological change.