

Forgetting the flood: the risk of prolonged flood-poor periods

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River flooding is one of the largest natural hazards that affect human settlements, and yet people tend to occupy flood plains and flood prone areas, as they offer a clear advantage for agriculture, trade and economics in general. When an extraordinary flood occurs, human lives may be lost and infrastructure is severely damaged, so the benefits in economic development are also associated with a risk. It's not unusual to see in the flood records flood-poor and flood-rich periods, where the extreme floods do not seem to arrive randomly but cluster in time. In these situations, what can have a bigger impact in the settlement? An extended flood-poor or flood-rich period?

For this work, a socio-hydrology model is used to show that the impact of an extraordinary flood event after a long flood-poor period may be more dangerous than flood-rich periods themselves. This fact, maybe counter-intuitive, can be explained by a memory effect proposed in the model, describing how populations co-evolve with flood risk. The most important feedbacks between the economic, political, technological and hydrological processes of the evolution of that community are represented in the model. The community evolves, and makes choices like moving away/into the floodplain or investing in flood protection measures. Continuous occurrence of floods tends to increase peoples' awareness about the flooding risks and are one of the main reasons why flood coping actions are taken. The model shows examples where frequent flood events result in moderate damages, as they ensure that both perception of risk and people preparedness remains high. Conversely, long periods without extraordinary floods reduces awareness, leading communities to take risks than may end up in larger impacts by an extreme event.