Modelling human-water systems experiencing drought-to-flood events: is there one model that fits all?

According to future climate projections both droughts and floods are expected to increase in severity and frequency. A lot of research has been done on the adaptation of society and the feedbacks between hazard and society for these individual hazards, while the feedbacks between hazards and society in a system that experiences drought followed by flooding are less well known. In this study we aim to identify common variables and characteristics of different human-water systems that experience drought-to-flood events and use this to inform model development. Through a literature study of a variety of case studies across the world we investigate the hydrological and socio-economic settings and characteristics of each system as well as the underlying processes and adaptation measures that played a role in the events. Drought-to-flood events can have very different drivers and impacts. In some cases the main driver is human adaptation, such as in the case of the Millennium Drought in Australia where flood prevention reservoirs were already full because they were being used to store water to cope with the drought (Van Dijk et al. 2013). In other cases the combination of hydrological drivers plays a more important role, such as in the case of Peru where a drought followed by extreme rainfall resulted in mud-slides (Fraser 2017). The comparison across cases provides an overview of common variables as well as differences between case studies and is used to inform the construction of one socio-hydrological model that fits all or multiple models that capture the specifics of each case. In future work the model(s) will be used for a more in-depth investigation of the behaviour of a selection of human-water systems, using qualitative and quantitative data in combination with the models to investigate possible future pathways and policy interventions.

References

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