Exploiting the current flood of global datasets: How do humans impact and respond to hydrological extremes?

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Hydrological studies have widely investigated human impacts on drought and flood events, while conversely social studies have explored human responses to hydrological extremes. However, the phenomena emerging from their interplay, i.e. both impacts and responses, are still poorly understood. Thus, state-of-the-art methods fail in assessing future change in hydrological risk and, as a result, while risk reduction strategies built on these methods can work in the shorter term (2-5 years), they often lead to unintended consequences in the longer term (20-30 years). In this context, this paper discusses the opportunities offered by the current proliferation of worldwide archives and datasets for uncovering dominant patterns of human impacts on, and responses to, drought and flood events. They include global hydrological models, worldwide databases of losses and fatalities, satellite data as proxies of economic activity and population distribution, global land-use maps, datasets of irrigation, information about flood protection standards in different countries as well as worldwide archives of dams and reservoirs. Initial efforts to exploit this ongoing flood of global data and unravel the way in which societies shape, while being shaped, hydrological extremes are reviewed. Then, the paper discusses the potential of these global studies in advancing our understanding of where, how and why hydrological risk changes over time, thereby supporting the development of policies and strategies to reduce the negative impacts of droughts and floods, such as fatalities and economic losses, while maintaining the ecological benefits of hydrological variability.

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