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A socio-hydrological model to explore the role of social inequality on human-flood interactions

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In several developing cities flooding has become an annual occurrence which threatens lives, livelihoods and homes. However, the exposure of urban populations to climate risks such as flooding is highly heterogeneous, with the effects of climate variability felt disproportionately by the poor. Rapid urbanisation and population growth, combined with systemic factors such as complex land tenure arrangements, inadequate transportation and weak governance, has led to the proliferation of unplanned urban settlements which lack basic infrastructure and are frequently situated on marginal, flood-prone land. While the immediate effects of floods can cause physical, economic and social devastation, floods also have multiple long-lasting effects which may increase vulnerability and exacerbate inequalities. Here, we adapt an existing socio-hydrological model of human-flood interactions (Di Baldassarre et al. 2013; Viglione et al. 2014) to explicitly account for a stratified society consisting of the “haves”, who reside in planned settlements with some degree of flood protection, and the “have-nots”, who live in unplanned, informal settlements which are more vulnerable to flooding. Initially, we conduct a sensitivity analysis to identify the parameters in the original model which may be influenced by social inequality. We then introduce a new state variable to represent the transfer of wealth from the “haves” to the “have-nots”, and use this setup to investigate the effects of wealth redistribution on the co-evolution of the coupled system.

References:

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