

Modelling the interaction between flooding events and economic growth

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Recently socio-hydrology models have been proposed to analyse the interplay of community risk-coping culture, flooding damage and economic growth.

These models descriptively explain the feedbacks between socio-economic development and natural disasters such as floods. Complementary to these descriptive models, we develop a dynamic optimization model, where the inter-temporal decision of an economic agent interacts with the hydrological system. We assume a standard macro-economic growth model where agents derive utility from consumption and output depends on physical capital that can be accumulated through investment. To this framework we add the occurrence of flooding events which will destroy part of the capital.

We identify two specific periodic long term solutions and denote them rich and poor economies. Whereas rich economies can afford to invest in flood defence and therefore avoid flood damage and develop high living standards, poor economies prefer consumption instead of investing in flood defence capital and end up facing flood damages every time the water level rises. Nevertheless, they manage to sustain at least a low level of physical capital. We identify optimal investment strategies and compare simulations with more frequent and more intense high water level events.