A socio-hydrological model for the Elbe

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Long-term feedbacks between humans and floods may lead to complex phenomena such as coping strategies, levee effects, call effects, adaptation effects, and poverty traps. Dynamic coupled human-flood models are a promising tool to represent such phenomena and the feedbacks leading to them. So far the socio-hydrological flood models that have been developed are mostly generic and have not been developed and calibrated to represent a specific case study. We believe that applying and calibrating these type of models to real world case studies can help us further develop our understanding about the phenomena that occur in these systems.

We investigate the case of Dresden where the 2002 flood, which was preceded by a period without floods, but was less severe, resulted in a higher damage than the 2013 flood, which was preceded by the 2002 flood. The lower damage in 2013 may be explained by the fact that society has become aware of the flood risk and has adapted to it. We develop a socio-hydrological flood model that relates society's awareness and preparedness to flood losses. With Bayesian inference we estimate the parameters of this model using empirical data for Dresden. The model quantifies the effect of preparedness on losses in the case of Dresden and provides an explanation for the fact that damages were lower in 2013.