Dissecting risk: what explains patterns in global flood losses?

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Reported economic losses from river flooding have been shown to increase globally as a result of changes in hazard (i.e. the chance and characteristics of the flood event), exposure (i.e. the population and assets subject to flooding) and vulnerability (i.e. the capacity of the society to deal with the event). However, the contribution of the individual parts of the risk chain to trends in global losses is still largely unknown due to the traditionally limited data availability on a global scale. Recent work on the spatial modelling of global flood hazard and exposure offers new opportunities for the understanding of global risk. In this paper we present an analysis of reported flood losses in 15 world regions from Munich Re's NatCatSERVICE database for the period 1980 – 2010. We combine the loss statistics with spatial 1km2 resolution flood hazard data from the GLOFRIS global inundation model and data on global population exposure, to identify trends and drivers of risk. Our results show that long term trends in risk are mainly explained by an increase in exposed population and assets, while inter-annual variations are driven by variability in hazard intensity. The analysis indicates that regional differences in vulnerability can be identified as the degree to which trends in flood losses respond to increases in hazard and exposure. These results can be valuable in the understanding of past trends in flood risk and the development of future projections for different regions. The findings are important for scholars, policy makers, re-insurance agencies and international development organisations working on issues related to risk, natural hazards and climate change.