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Extreme flood events and spatial adaptation: the Swiss approach

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The number of severe inland floods in Europe has been increasing since the 1980s. While there is not conclusive evidence that climate change has already contributed to this trend (Kundzewicz et al. 2013), some European-scale studies project an overall tendency towards increasing large floods for parts of Central Europe (EEA 2016; Hall et al. 2014). In combination with land development and the continuous accumulation of damage potential in floodplains these shifts in the extremes are likely to be the major cost drivers for the adaptation of infrastructure (OECD 2013) and thus pose the biggest challenge for the adjustment to changing flood risk (IPCC 2012).
This contribution examines flood management strategies in Switzerland - a country severely affected by extreme flooding, most notably in 1987 and 2005 - to adapt the spatial patterns of land use as a means of mitigating future flood losses. Switzerland pioneered integrated approaches in (flood) risk management involving land-related risk prevention measures and in recent years stepped up policy efforts to develop adaptation strategies for extreme flood events (BAFU 2016).
Within the Swiss climate change adaptation programme two spatial adaptation approaches to extreme flood events and overload scenarios were recently implemented respectively tested in selected Swiss cantons. The first approach concerns spatial planning measures to secure flood corridors and limit the encroachment of settlements. These areas are activated in extreme flood events due to the systematic consideration of overload scenarios and the design of flood spillways in hydraulic engineering in order to prevent the failure of flood defences (BAFU 2017). Secondly, federal planning authorities are promoting risk-based spatial planning as a means to develop flood-adapted land uses in low-probability hazard areas, which exhibit a particular high concentration of damage potential (PLANAT 2014).
This contribution presents findings from two Swiss cantons (Nidwalden and St. Gallen) where the above spatial adaption measures were implemented. Based on documentary analysis and eleven in-depth interviews with scientific experts, planners as well as federal and cantonal decision-makers we discuss the associated opportunities and limitations. Findings show that (i) both measures are highly effective approaches to mitigate future flood damage in flood-prone areas, (ii) designing a cascade of flood spillways and corresponding runoff corridors along a river section provides a robust adaptation option that delivers large benefits under different future climate conditions, (iii) conflicting land use interests in runoff corridors and the costs of wet flood-proofing measures in low hazard areas inhibit the implementation of spatial adaptation approaches to extreme flood events.