

Flood hazard management from a coevolutionary perspective: exposure and policy response in the European Alps

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A coevolutionary perspective is adopted to understand the dynamics of exposure to hydrological hazards in the European Alps. A spatially explicit, object-based temporal assessment of elements at risk to flood hazards (river floods, torrential floods and debris flows) in Austria and Switzerland is presented for the 1919-2012 period. The assessment is based on two different datasets, (a) hazard information adhering to legally binding land use planning restrictions and (b) information on building types combined from different national level spatial data. We discuss these transdisciplinary dynamics and focus on economic, social and institutional interdependencies and interactions between human and physical systems. Exposure changes in the response to multiple drivers, including population growth and land use conflicts. The results show that while some regional assets are associated with a strong increase in exposure to hazards, others are characterized by a below-average level of exposure. The spatiotemporal results indicate relatively stable hot spots in the European Alps. These results coincide with the topography of the countries and with the respective range of economic activities and political settings. Furthermore, the differences between management approaches as a result of multiple institutional settings are discussed. A coevolutionary framework widens the explanatory power of multiple drivers to changes in exposure and risk, and supports a shift from structural, security-based policies towards an integrated, risk-based natural hazard management system.