Geophysical Research Abstracts
Vol. 15, EGU2013-13634, 2013
EGU General Assembly 2013

A physical approach on flood risk vulnerability

Bruno Mazzorana (1), Sven Fuchs (2), and Margreth Keiler (3)

(1) Autonomous Province of Bolzano-Bozen, Department of Hydraulic Engineering, Italy (bruno.mazzorana@provinz.bz.it), (2) University of Natural Resources and Life Sciences, Institute of Mountain Risk Engineering, Vienna, Austria (sven.fuchs@boku.ac.at), (3) University of Bern, Institute of Geography, Bern, Switzerland (margreth.keiler@giub.unibe.ch)

The design of efficient flood risk mitigation strategies and their subsequent implementation relies on a careful vulnerability analysis of the elements exposed to flood hazard. Recently, extensive research efforts were undertaken to develop and refine empirical relationships linking the structural vulnerability of buildings to the intensity of the impacting water-related hazard processes. These empirical vulnerability functions allow for an estimation of the expected direct losses as a result of the hazard scenario on the basis of a spatially explicit representation of the process patterns and the elements at risk, and improve both risk assessments and cost-benefit analyses of planned mitigation strategies. However, due to the underlying empiricism of such vulnerability functions, the physics of the damage generating mechanisms remain unveiled, and, as such, the applicability of the empirical approach for planning hazard-proof residential buildings is rather limited.
Therefore, we propose a conceptual assessment scheme to close this gap. This assessment scheme comprises distinct analytical steps: (a) modelling the process intensity and (b) the impact on the element at risk exposed, (c) the physical response of the building envelope, (d) the damage accounting and (f) the economic damage valuation. This dynamic assessment
supports all relevant planning activities with respect to a minimisation of flood hazard losses, and can be implemented in the operational risk assessment procedure.