

A spatiotemporal multi-hazard exposure assessment based on property data

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The paper presents a nation-wide spatially explicit object-based assessment of buildings and citizens exposed to natural hazards in Austria, including river flooding, torrential flooding, and snow avalanches. The assessment was based on two different datasets, (a) hazard information providing input to the exposure of elements at risk, and (b) information on the building stock combined from different spatial data available on the national level. Hazard information was compiled from two different sources. For torrential flooding and snow avalanches available local-scale hazard maps were used, and for river flooding the results of the countrywide flood modelling eHORA were available. Information on the building stock contained information on the location and size of each building, as well as on the building category and the construction period. Additional information related to the individual floors, such as their height and net area, main purpose and configuration, was included for each property. Moreover, this dataset has an interface to the population register and allowed therefore retrieving the number of primary residents for each building. With the exception of sacral buildings, an economic module was used to compute the monetary value of buildings using (a) the information of the building register such as building type, number of storeys and utilisation, and (b) regionally averaged construction costs.

It is shown that the repeatedly-stated assumption of increasing exposure due to continued population growth and related increase in assets has to be carefully evaluated by the local development of building stock. While some regions have shown a clearly above-average increase in assets, other regions were characterised by a below-average development. This mirrors the topography of the country, but also the different economic activities. While hotels and hostels are extraordinary prone to torrential flooding, commercial buildings as well as buildings used for recreation purpose are considerably exposed to river flooding. Residential buildings have shown an average exposure, compared to the number of buildings of this type in the overall building stock. In sum, around 5 % of all buildings are exposed to torrential flooding, and around 9 % to river flooding, with around 1 % of the buildings stock being multi-exposed. The temporal assessment of exposure has shown considerable differences in the dynamics of exposure to different hazard categories in comparison to the overall property stock. In conclusion, the presented object-based assessment is an important and suitable tool for nation-wide exposure assessment and may be used in operational risk management.

Reference:

Fuchs, S.; Keiler, M. & A. Zischg (2015): A spatiotemporal multi-hazard exposure assessment based on property data. *Natural Hazards and Earth System Sciences* 15 (9). p. 2127-2142