

Enhancement of global flood damage assessments using building material based vulnerability curves

Johanna Englhardt, Marleen de Ruiter, Hans de Moel, and Jeroen Aerts
VU Universtiy Amsterdam, Netherlands (johanna.englhardt@vu.nl)

This study discusses the development of an enhanced approach for flood damage and risk assessments using vulnerability curves that are based on building material information. The approach draws upon common practices in earthquake vulnerability assessments, and is an alternative for land-use or building occupancy approach in flood risk assessment models. The approach is of particular importance for studies where there is a large variation in building material, such as large scale studies or studies in developing countries. A case study of Ethiopia is used to demonstrate the impact of the different methodological approaches on direct damage assessments due to flooding.

Generally, flood damage assessments use damage curves for different land-use or occupancy types (i.e. urban or residential and commercial classes). However, these categories do not necessarily relate directly to vulnerability of damage by flood waters. For this, the construction type and building material may be more important, as is used in earthquake risk assessments. For this study, we use building material classification data of the PAGER¹ project to define new building material based vulnerability classes for flood damage. This approach will be compared to the widely applied land-use based vulnerability curves such as used by De Moel et al. (2011). The case of Ethiopia demonstrates and compares the feasibility of this novel flood vulnerability method on a country level which holds the potential to be scaled up to a global level.

The study shows that flood vulnerability based on building material also allows for better differentiation between flood damage in urban and rural settings, opening doors to better link to poverty studies when such exposure data is available. Furthermore, this new approach paves the road to the enhancement of multi-risk assessments as the method enables the comparison of vulnerability across different natural hazard types that also use material-based vulnerability curves. Finally, this approach allows for more accuracy in estimating losses as a result of direct damages.

¹ <http://earthquake.usgs.gov/data/pager/>