Modelling direct flood losses: what can we learn from the July 2021 flood in the Meuse basin (Belgium)?

Autors: Daniela Rodriguez Castro, Solène Roucour, Pierre Archambeau, Mario Cools, Sébastien Erpicum, Imane Habchi, Joris Hardy, Michel Pirotton, Anus Muhammad, Lucie Weber, Jacques Teller, Benjamin Dewals.

ABSTRACT

Performing flood risk assessment requires flood damage models which guide the development of flood risk reduction strategies. Despite increasing efforts on damage models development, spatial transferability and validation remain challenging due to a lack of reliable empirical data as well as the heterogeneity of possibly affected assets and economic context. (Scorzini, et al. 2022)

In July 2021, Belgium suffered an extreme flood event, with about three months of precipitation volume experienced just in two days, in the Eastern part of the country. The event caused severe damage to residential buildings, industries, and infrastructure such as railways and roads, with an estimated total cost above EUR 3 billion. A research initiative was started to collect damage data as well as hazard and vulnerability features in different municipalities along the Vesdre river, one of the most impacted sub-catchments. The resulting database should allow the analysis of flood damage mechanisms and endure the calibration and validation of a flood damage model for the region.

A large-scale field survey has been designed and is being conducted at residential buildings level. Currently, buildings along the Vesdre river, which experience water depth between 0.5 and 3.5 m, according to the water management authority (SPW), have been approached. The participation rate is close to 50% for the current sample of 93 loss cases. Based on this data, 90% of the houses have experienced water depth greater than or equal to 1.5m, with an estimated mean damage per building of 85k €. The systems (i.e., electric, heating, and plumbing) are the most expensive damage component.

The surveys have also revealed that the population has a low emergency preparedness and response to cope with this type of disaster. Even though the country and the region have flood early warning systems, 99% of the population received no formal warning, and less than 50% implemented mitigation measures.

Increasing the sample size will allow us to continue extracting information regarding the damage mechanisms and the variables that influence them and will enable the calibration and validation of a flood damage model. Additionally, the collected data will provide socio-economic characteristics of the exposed population which plays an important role in the implementation of risk reduction strategies.

References

Scorzini, A. R., Dewals, B., Rodriguez Castro, D., Archambeau, P., and Molinari, D.: INSYDE-BE: adaptation of the INSYDE model to the Walloon region (Belgium), Nat. Hazards Earth Syst. Sci., 22, 1743–1761, https://doi.org/10.5194/nhess-22-1743-2022, 2022.