

Flood risk analysis in Wallonia: a micro-scale approach

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Flood risk analysis has been undertaken in Wallonia in the framework of several national and international research projects. The analysis relies on a micro-scale procedure, which involves

- hazard modelling by means of detailed 2D inundation modelling
- as well as processing of high resolution topographic and land use database for vulnerability modelling.

The inundation modelling is conducted using the fully dynamic flow model WOLF 2D, entirely developed at the University of Liege. The model is run on a highly accurate DEM resulting from the combination of laser altimetry and, when available, sonar bathymetry. The typical grid spacing for the simulations is kept as low as 2m, which is definitely fine enough to represent the complex flows occurring at the scale of individual buildings and streets in urbanized floodplains. In this way, both the static and dynamic impacts of the flow may be characterized for all affected assets. This approach has been extensively applied since 2003 to issue inundation maps throughout the Walloon region based on detailed 2D flow modelling.

Consequently, the outcomes of such detailed inundation modelling constitute suitable inputs for the subsequent exposure analysis, performed at a micro-scale using detailed land use maps and geographic database. Eventually, based on a multidisciplinary work, the procedure may incorporate social flood impact analysis and evaluation of direct economic damage to different categories of buildings and land types.

Besides detailing the characteristics and performance of the hazard modelling, the presentation will describe the flow of data within the overall risk analysis procedure and will demonstrate its applicability by means of a case study, for which three different flood protection measures have been evaluated. These include rehabilitation of an old canal, recalibration of a floodplain as well as heightening of a protection wall by means of mobile dikes. The risk-oriented analysis of these flood protection measures has lead to findings which would not have arisen from a more standard hydraulic study such as based on a design flood.

The flood risk analysis procedure is now readily available for large scale applications throughout the hydrographic basins in Wallonia and, in the near future, it will be combined with catchment modelling (accounting for climate change projections) to evaluate upstream flood mitigation measures as well as for the fine tuning of reservoir management rules in the framework of adaptation strategies to climate change.

References

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