



## **Analysing uncertainties associated with flood hazard assessment**

Clemens Neuhold, Philipp Stanzel, and Hans-Peter Nachtnebel

Institute of Water Management, Hydrology and Hydraulic Engineering; University of Natural Resources and Applied Life Sciences, Vienna, Austria (clemens.neuhold@boku.ac.at)

Risk zonation maps are mostly derived from design floods which propagate through the study area. The respective delineation of inundated flood plains is a fundamental input for the flood risk assessment of exposed objects. It is implicitly assumed that the river morphology will not vary, even though it is obvious that the river bed elevation can quickly and drastically change during flood events.

The objectives of this study were (1) to integrate river bed dynamics into flood risk assessment and (2) to quantify uncertainties associated to flood hazard modelling by means of

- (i) hydrology (input hydrographs)
- (ii) sediment transport (torrential input, river bed elevation)
- (iii) hydrodynamics (water surface levels)

The proposed concept was applied to the River Ill in the Western Austrian Alps. In total, 138 flood and associated sediment transport scenarios were considered, simulated and illustrated for the main river stem. The calculated morphological changes of the river bed during peak flow provided a basis to estimate the variability of possible water surface levels and inundated areas, necessary for flood hazard assessment.

The applied multi-scenario approach was compared to the normatively defined design flood event to account for the uncertainty of flood risk management decisions based on a few scenarios. Due to the incorporation of river morphological changes and variations in rainfall characteristics into flood hazard assessment, for 12 % of considered cross sections inundations were calculated where safety was expected.