



Reducing flood vulnerability and risk under changing socio-economic conditions – A qualitative case study in Upper Austria

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Within the last decades severe flooding events occurred in many parts of Europe. Especially in 2002, Upper Austria was seriously affected. Beside the natural variability of precipitation events the increase of losses is strongly connected with socio-economic developments. Especially the increase of settlement areas and the specific values of such modern settlement areas in flood prone areas induced this increase of losses.

The presented case study was initiated to analyse different consequences of the currently observed socio-economic trend and further socio-economic projections within the watershed of the so-called Ottnanger Redl in Upper Austria, a watershed which was affected by the event in 2002. The temporal dimension of this change in damage potential is analysed for the 1990s, current conditions and future scenarios (Statistics Austria). Beside the socio-economic development the common structural vulnerability but also the positive effect of legislation and standards concerning flood-adapted constructions are considered.

The hydrological-hydraulic is realized based on a scaled scenario approach. Therefore, documented precipitation events at rain gauges are considered for precipitation run-off simulations. To include further events the gauged events are scaled in their intensity. The hydrological loads of these scenarios are considered within different 2D hydraulic simulations; representation of past, current and future settlement structure.

Based on the current settlement structure and its transfer in an asset value database, the past structure of the 1990s is reconstructed with remote sensing methods. The future structure (different pragmatic scenarios) in contrast is estimated on the basis of the current situation, socio-economic projections of Statistics Austria, land-use planes and local development concepts of the individual communities and in cooperation with the Regional Government of Upper Austria.

The monetary evaluation is conducted with visualized verified building footprints, high resolved building characteristics on address level, building cross cubature analyses based on LiDAR data and monetary evaluation guidelines for different sectors and building functionalities of the Oberösterreichische Versicherung (regional insurance companies). Furthermore, this monetary evaluation approach is crosschecked with further approaches.

First, to analyse the flood risk situation under past, current and future socio-economic situations for the different hydraulic loads without any measures to reduce current vulnerability, common flood vulnerability approaches (loss ratio) are considered. In a next step, the introduced legislation and standards in Upper Austria concerning flood adapted constructions is implemented within the applied vulnerability approaches. Thus, the effect of flood adapted construction measures as well as different settlement scenarios on the risk situation can be analysed. The stochastic nature of flood events is furthermore considered within a Monte-Carlo based evaluation routine.

The results of the study show exemplarily the positive effect of object-based measures to reduce the susceptibility of the elements at risk and, furthermore, demonstrate the consequences of different settlement scenarios on the flood risk situation within the study area.

As the project is still in progress, the contribution will introduce the general framework and highlight some first results.