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The KULTURisk Regional Risk Assessment methodology for flood risk: the case of Sihl river in Zurich

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In recent years, the frequency of catastrophes induced by natural hazard has increased and flood events in particular have been recognized as one of the most threatening water-related disasters. Severe floods have occurred in Europe over the last decade causing loss of life, displacement of people and heavy economic losses. Flood disasters are growing as a consequence of many factors both climatic and non-climatic. Indeed, the current increase of water-related disasters can be mainly attributed to the increase of exposure (elements potentially at risk in floodplains area) and vulnerability (i.e. economic, social, geographic, cultural, and physical/environmental characteristics of the exposure). Besides these factors, the strong effect of climate change is projected to radically modify the usual pattern of the hydrological cycle by intensifying the frequency and severity of flood events both at local, regional and global scale. Within this context, it is necessary to develop effective and pro-active strategies, tools and actions which allow to assess and (possibly) to reduce the risk of floods. In light of the recent European Flood Directive (FD), the KULTURisk-FP7 Project developed a state-of-the-art Regional Risk Assessment (RRA) methodology for assessing the risk imposed by floods events. The KULTURisk RRA methodology is based on the concept of risk being function of hazard, exposure and vulnerability. It is a flexible that can be adapted to different case studies (i.e. large rivers, alpine/mountain catchments, urban areas and coastal areas) and spatial scales (i.e. from the large river to the urban scale) that integrates the outputs of various hydrodynamics models (hazard) with sito-specific geophysical and socio-economic indicators (exposure and vulnerability factors such as land cover, slope, soil permeability, population density, economic activities, etc.). The main outputs of the methodology are GIS-based risk maps that identify and prioritize relative hot-spot areas and targets at risk (i.e. people, buildings, infrastructures, agriculture, natural and semi-natural systems, cultural heritages) in the considered region by comparing the baseline scenario with alternative scenarios, where different structural and/or non-structural mitigation measures are planned. Risk maps, along with related statistics, provide crucial information about flood risk pattern, and allow the development of relevant and strategic mitigation and prevention measures to minimizing flood risk in urban areas.

The present study applied and validated the KULTURisk RRA methodology to the Sihl river case study in Zurich (Switzerland). Through a tuning process of the methodology to the site-specific context and features, flood related risks have been assessed for different receptors lying on the Sihl river valley, which represents a typical case of river flooding in urban area.

The total risk maps obtained under a 300 years return period scenario (selected as the reference one) have highlighted that the area is associated with the lower class of risk. Moreover, the relative risk is higher in Zurich city centre, in the few residential areas around the city centre and within the districts that rely just beside to the Sihl river course.