FLOOD RISK ASSESSMENT IN A CHANGING ENVIRONMENT

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Abstract – Despite substantial investments in flood protection measures the reported flood damages have increased tremendously in most regions of the world over the last decades. Although changes in flood frequency and magnitude cannot be excluded the main cause is seen in the land use changes in flood prone regions transforming agricultural land into industrial and residential areas and this process will very likely continue.

To account for this development the EU Flood Risk Directive (directive 2007/60/EC) requires every six years updated flood hazard maps and flood risk maps and flood risk management plans, respectively. But still the assessment procedure is based on data describing past land use patterns and flood magnitudes mostly disregarding future development. To be able to account for these changes an anticipatory flood risk assessment is required to identify at an early stage emerging hot spots of flood damage.

This paper presents an assessment procedure considering potential land use development plans and possible impacts of climate change on flood damages. In a first step the status quo has to be assessed by identifying those areas which are already exposed today to flooding. Second, projections about local and regional development together with demographic changes have to be analysed to identify emerging flood risk regions. The second step can be based on regional development plans and demographic trends. Further, changes in flood frequency have to be considered, either due to substantial land use changes and/or due to climate impacts. A scenario type approach is discussed that may help to learn about the flood risk sensitivity.

At all these steps various sources of uncertainties have to be considered starting with estimation of the flood magnitude, the delineation of inundation maps, the assessment of the damage potential and finally in estimating impacts due to global change. The benefit of the proposed approach is seen in the outlook to learn about future risks. A sensitivity analysis may help to learn about the consequences of the inherent uncertainties on flood risk assessment. Several case studies will be used to explain and to demonstrate the approach. The results clearly indicate that the consideration of potential land use development scenarios is needed to enable comprehensive and anticipatory flood risk assessment providing a reliable basis for adequate flood risk management strategies in mid- and long term.

The Flood Risk Directive asks for a basin wide approach and emphasizes non-structural flood mitigation measures. As demonstrated by this paper the main measures for flood risk mitigation are seen in harmonising land use management with hazard maps. With respect to the legal and administrative framework, which is different in each EU member state, two quite different domains have to be harmonized.

The achievements since 2007 are assessed and the governance structure is analysed, together with the identification of remaining deficits in the management approach.