

PRACTICAL RISK ASSESSMENT FOR FLOOD PROCESSES

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INTRODUCTION

The management of natural hazards and induced risks has a long tradition in Austria. But, the rapid spread of settlements, traffic axes, and infrastructures towards endangered areas on the one hand and the further limitation of financial resources on the other hand require a permanent optimization of risk management practice. Since 2007, the EU Flood Directive requires a discussion about natural hazards induced risks. The new challenge in the frame of the EU Flood Directive is an area-wide risk analysis, whereas therefore GIS (geographic information system) data basically are most suitable. The main question for this work was to elaborate a method for analysing risks induced by the flood processes on the regional level. This comparative analysis should provide the basis for pointing out the hot spots of flood risk in the Region of Carinthia, Austria. The developed procedure should be scalable and useable on different administrative levels. The method should provide the basis for a controlling system that is observing periodically if the effects of flood protected measures decrease the risk situation. Another goal of this study was to elaborate a method for the visualization of the results of risk analysis for decision makers and the wider public.

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METHODOLOGY OF THE COMPERATIVE RISK ASSESSMENT

The first step towards an integrated risk analysis was the definition of a common method and of a common dataset of object categories to be considered in exposure and risk analysis. The second step was the elaboration of an area-wide dataset for the flood processes. On the basis of the catalogue of values and goods that are worth to be protected and the damage maps, a risk analysis for the flood process has been made. Finally, the results of this comparative analysis have been prepared for visualization and for using the basis for communicating risks. In Carinthia there exists a variety of different datasets that provide the data bases to be used within a GIS-based analysis of the objects and goods exposed to flood hazards. The compilation of a database of the values and goods from many different datasets requires a lot of time. The standardisation of the procedure and the implementation of it into a software package guaranteed a standardisation of the procedures and saved time resources. The result of this work was a commonly accepted catalogue of object categories that have to be considered in the exposure and risk analyses of all flood processes. The catalogue of values and goods resort to land wide GIS data, which constantly will be updated by several public departments of the Carinthian government. This approach guaranteed the actuality of the used data.

For flood hazards on the primary rivers, there exist the hazard zone maps, elaborated after the guidelines of BMFLUW (Federal Water Engineering Administration). The older maps show two classes of intensity of a flood event with a return period of 100 years. The newer maps differentiate between the flood events of a return period of 30, 100, and 300 years. In the areas where hazard zone maps are not existing, there exist a nation-wide map of flood events of a return period of 30, 100, 200

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years (HORA, see <http://www.wassernet.at/article/articleview/74694/1/13524/>). For a few areas where no flood maps existed, a simplified modelling procedure was used to map the extent of potential flood areas. In a further step, the dataset of the damage potential and the flood hazard maps had been overlaid and the damages had been calculated for the different intensity classes and return periods of 30, 100, 300 years. The risk analysis of flood hazards has been made following the guidelines of BMLFUW. These guidelines contain functions for the estimation of the vulnerabilities of endangered objects against the considered flood processes and for the estimation of the induced damages. The results of the risk analysis had been summarized at communal and regional administrative level.

RESULTS AND DISCUSSION

The result of the above mentioned approach is a database with the information about the expected damages for the process flood with different intensity classes and return periods. The information is query able either on local level (hazard zone), on communal or on regional administrative level. The database gives an overview about the expected damages. It allows the aggregation of the data on different levels and provides the basis for a comparative risk analysis.

The comparative risk analysis showed the spatial distribution of the potential damages within the region of Carinthia and therefore it pointed out the municipalities with the most relevant risks. In total, more than 51'000 inhabitants are potentially affected by a flood event with a return period of 100 years (Fig. 1).

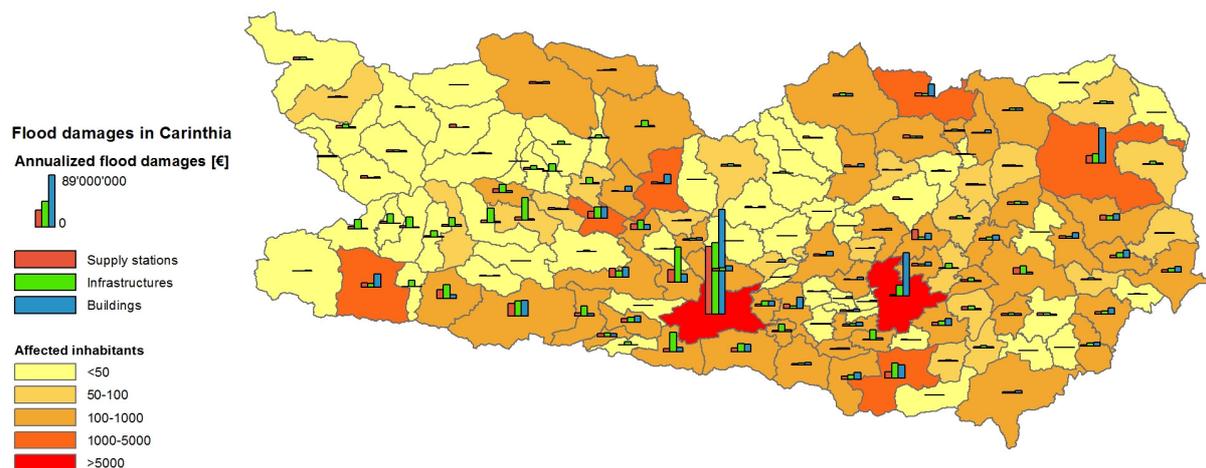


Fig. 1 Annualized flood damages on buildings in the municipalities of Carinthia. The damages are calculated for a flood event with a return period of 100 years and are aggregated on municipality level.

The comparative analysis of the spatial distribution of flood risks on a regional level is suited for pointing out the hot spots in the region. Therefore, the priorities for planning risk reduction measures could be defined. The differentiation between damages of different object categories allows analysing which type of stakeholders could also contribute to risk management, such as insurance companies or the owners of houses. In this sense, the information basis provides a tool for communicating risks and therefore for improving self responsibility in a long-term time scale. For each local administration (municipality) has been prepared a factsheet with the most relevant information. The fact sheets on municipality level summarize and visualize the results in a comprehensible form and were aggregated at communal level. These results help the official authorities by communicating of the results of risk assessment to decision makers and the wider public and lead to a larger acceptance of realized flood protection measures. The number and units of exposed object categories and the expected damages are values that are used in every day management tasks and routines. The results of comparative risk analysis were aggregated at communal level.

Keywords: risk assessment, risk analysis, flood, object categories, geographic information system