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IAN REPORT 146

DANUBE FLOODRISK – Unterstützungsarbeiten bei WP7.2 Österreichisches Pilotprojekt Krems Erstellung von Risikokarten für die Donau unter Öffentlichkeits-beteiligung

Im Auftrag:

Umweltbundesamt / BMLFUW

im Rahmen von DANUBE FLOODRISK

mit Unterstützung der Stadt Krems

Wien, Mai 2012

Report 146: DANUBE FLOODRISK Unterstützungsarbeiten bei WP7.2 Österreichisches Pilotprojekt Krems

Im Auftrag von: Umweltbundesamt

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8 Summary

Within the framework of the FP7-project DANUBE FLOODRISK risk maps were compiled for the Austrian city of Krems located adjacent to the Danube river.

A first set of maps was created for an underlying hazard scenario of a 1-in-100 year flood affecting the city of Krems assuming a failure of the temporal flood protection due to the impact of a ship in the area of the pier located in Krems Stein. Moreover, both, hazard scenarios with and without a second line of defence located at Steiner Landstrasse were visualised. The set of maps includes (a) an evaluative risk map showing the risk qualitatively aggregated for each building exposed and the number of affected citizens, (b) an evaluative risk map showing the risk qualitatively aggregated per square footage for each building exposed and the number of affected citizens, (c) an evaluative risk map showing the risk quantitatively in monetary units per square footage for each building exposed and the number of affected citizens, and (d) as well as (e) risk maps according to (a) and (b) without the second line of defence in order to communicate the effectiveness of temporal flood protection.

For the harbour of Krems, a risk map was compiled based on a self-evaluation of the effects of flooding by the harbour companies. This risk map was based on the assumption of a failure of the harbour gate during a flood event. The self-evaluation was undertaken based on a developed risk matrix which includes significant adverse impacts on human health, the environment, cultural heritage and economic activity.

The risk maps were created based on a functional relation between the hazard, the elements at risk exposed, and their vulnerability. In the perspective of natural sciences, this relationship is expressed by the risk equation (Equation 1), which with respect to flood hazards is conceptualised by a quantifying function of the probability of occurrence of a hazard scenario (p_{Si}) and the related consequences on objects exposed (c_{Oj}).

$$R_{i,j} = f(p_{Si}, c_{Oj}) \quad (1)$$

The consequences were further quantified by the elements at risk and their extent of damage, and specified by the individual value of objects *j* at risk (A_{Oj}), the related

vulnerability in dependence on scenario *i* ($v_{Oj,\ Si}$), and the probability of exposure ($p_{Oj,\ Si}$) of objects *j* to scenario *i* (Equation 2).

$$R_{i,j} = f(p_{Si}, A_{Oj}, v_{Oj,Si}, p_{Oj,Si}) \quad (2)$$

Insights on stakeholder-oriented risk communication from two ERA-Net CRUE projects was used with respect to the design and the layout of the maps (Fuchs et al. 2008; Mayer et al. 2012). Specific elements of semiology for the cartographic representation of risk include:

- A map background in bright colour in order to increase the contrast to informative elements and to avoid an overload of information;
- A sufficiently large legend, preferably on the right side of the central element of the map, with a conservative amount of information (five classes of discretisation) comprised from one range in colour and arranged in decreasing values;
- A sufficiently large scale such that the elements of the map are easily recognisable.