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Increasing resilience through participative flood risk map design

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In recent years, an increasing number of flood hazards has shown to the European Commission and the Member States of the European Union the importance of flood risk management strategies in order to reduce losses and to protect the environment and the citizens. Exposure to floods as well as flood vulnerability might increase across Europe due to the ongoing economic development in many EU countries. Thus even without taking climate change into account an increase of flood disasters in Europe might be foreseeable. These circumstances have produced a reaction in the European Commission, and a Directive on the Assessment and Management of Flood Risks was issued as one of the three components of the European Action Programme on Flood Risk Management. Floods have the potential to jeopardise economic development, above all due to an increase of human activities in floodplains and the reduction of natural water retention by land use activities. As a result, an increase in the likelihood and adverse impacts of flood events is expected. Therefore, concentrated action is needed at the European level to avoid severe impacts on human life and property. In order to have an effective tool available for gathering information, as well as a valuable basis for priority setting and further technical, financial and political decisions regarding flood risk mitigation and management, it is necessary to provide for the establishment of flood risk maps which show the potential adverse consequences associated with different flood scenarios.

So far, hazard and risk maps are compiled in terms of a top-down linear approach: planning authorities take the responsibility to create and implement these maps on different national and local scales, and the general public will only be informed about the outcomes (EU Floods Directive, Article 10). For the flood risk management plans, however, an "active involvement of interested parties" is required, which means at least some kind of multilateral consultation on the management plans that allows stakeholders to discuss relevant issues and to contribute to arguments and propositions put forward by the stakeholders. Through a wider stakeholder participation and more effective communication, awareness of flood risks should be raised.

With the term participation diverse voluntary and informal forms of inclusion are summarized (in contrast to legal forms of participation like the status as a party). When discussing the theoretical and practical implications of participation in flood risk management, it is important to make a clear distinction between public and stakeholder participation. The broad public is "everybody" and refers to the participation by non-organised individuals as members of the general public, and specifically to individuals whose profession is not connected to flood risk management. As such, they have to be regarded as lay persons, which, nevertheless, does not mean that these individuals do not have any idea about the hazard they are exposed to or can contribute to the quality of an decision making process. In contrast to professionally interested parties, this group is typically comprised of individuals with different individual perspectives on flood risk management. It is argued that including practical knowledge and perceptions (reflecting values and preferences) into the flood risk management process is – apart from professional assessments (as systematic knowledge) – a milestone towards adequate governance structures in any institutional process with political legitimacy. Neither normative concepts like sustainable development or "Good Governance" nor the European Water Framework Directive 2000/60/EC do specify what public participation or the participation of user means in detail. As also scientific literature offers no consistent definition of public participation and stakeholder participation we developed an innovative approach used in the pilot project Krems, Austria. The most innovative step regarding participation was not the methods used for participation but the involvement of concerned lay persons not only in the design of the hazard and risk maps or the risk assessments itself but the cooperative elaboration of the risk assessment approach especially for the harbour area.

Following these principles, flood risk maps were created in the underlying EU-project DANUBE FLOODRISK. In this ETC SEE project "DANUBE FLOODRISK – Stakeholder Oriented Assessment of the Danube Floodplains" (2009-2012), hazard and risk maps harmonized across borders for the Danube main stream were produced. This way the overall DANUBE FLOODRISK project contributed to Article 6 of the EU Floods Directive, the hazard and risk maps for international river basins, and provides with the involvement of the national and regional stakeholders the first step to the implementation of Article 7, the Flood Risk Management Plans.

By testing the involvement of the broad public and local stakeholders, first exemplary steps were taken for local flood risk management planning. 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. Moreover, both, hazard scenarios with and without a second line of defence 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.

Insights on stakeholder-oriented risk communication were gained with respect to the design and the layout of the maps. Specific elements of semiology for the cartographic representation were deduced. The pilot initiative discussed in this paper is brought added value to all involved parties so far. All participants brought in knowledge, data and time resources. The project team was involved in a social learning process and gained additional know-how about adequate stakeholder involvement and communication as well as about risk assessment methods and mapping. It could be shown that it is possible to involve lay persons in topics such as risk assessments so far only defined by technical experts. Stakeholders from the harbour area were not only involved in the risk assessment but also in the development of the methods for this risk assessment. Such approaches may be increasingly used to develop a better understanding of flood risk within affected communities, and thus increase flood resilience.