Flood Risk Mapping At The Local Scale: Concepts and Challenges

Maps give a more direct and stronger impression of the spatial distribution of the flood risk than other forms of presentation (verbal description, diagrams). Thus, maps are valuable for presenting and assessing the local flood situation, and they provide information for many applications in flood defense and disaster management. In Europe, there are no standardized nomenclature or agreed practices for flood mapping. The paper reviews the concepts of flood risk mapping at the local scale, discusses the challenges and proposes a systematic presentation of flood hazards, vulnerabilities and flood risks, spanning from flood danger maps to damage risk maps

INTRODUCTION

Widespread flooding with dramatic damages in Central Europe in August 2002 have again shown the importance of flood risk management. One of the cornerstones of flood risk management is the information of people at risk and of the authorities and agencies responsible for flood management. Only if the people and decision makers are aware of the flood risk, and only if they are able to evaluate the risk, they can be expected to adequately respond to this thread. The basis of effective and efficient risk reduction measures are risk analyses which take into account the different aspects of the flood risk, e.g. hydrological, hydraulic, economic, social and ecological aspects. To communicate the results of risk analyses and to sensitise people at risk and decision makers, the spatial description of the risk plays an important role. The flood risk may be described at different scales, ranging from the global to the local scale. Examples for approaches at the global scale are the analyses of Lehner & Döll, (2001) with maps concerning the flood situation in Europe under climate change, and the world map of natural hazards (Berz et al., 2001), showing, among others, areas threatened by floods due to storm surges and severe rainfall. Most flood risk mapping approaches concern the local scale. Such maps allow to assess the flood situation for single land parcels and objects like buildings and infrastructure. They are the basis for local flood defence measures. Usually, maps at the local scale have a scale of 1:2000 to 1:20000. Hitherto, there are different approaches for flood risk mapping. Table 1 compares flood mapping procedures in Italy, Norway and Spain and exemplarily shows the heterogeneity of flood mapping in Europe. In many countries, e.g. United Kingdom, Germany, Spain, France, USA, Canada and New Zealand, the area affected by a 100-year flood plays an essential role for flood mitigation (Marco, 1994,Watt, 2000). As a consequence of the floods in 2002, some federal states in Germany have accelerated the activities for flood mapping. They use the 100-year flooded area as representation of the flood hazard. Additionally, some states identify (a) the area which would be flooded for the 100-year scenario if the flood defence failed, and/or (b) flood areas for larger return periods, e.g. 200-year flood. Some countries have adopted nation-wide initiatives for flood risk mapping. For example, the UK Environment Agency currently offers the ‘Indicative Floodplain Map’ for England and Wales online. In summer 2003, the agency produced a flood mapping strategy initiating a five-year programme of further flood mapping work, which will improve and increase information on flood risk over time (Environment Agency, 2004). In the Netherlands, the long-term project FLORIS (Flood Risk and Safety in The Netherlands) aims at estimating and mapping the probabilities and consequences of flooding for all 53 dike rings in The Netherlands (TAW, 2004). In Spain, planning of flood areas is included in the Water Act and some of its regulations (Menendez, 2000). There are four zones, for which restriction in land use are given: the “channel” (10-year flood zone), a restricted-use area, i.e. a five meter buffer on either side of the channel, a surveillance zone, i.e. a 100 m wide strip on either side of the channel and a flood risk zone, i.e. theoretical levels during floods with a return period of 500 years. In the first three zones authorisation is required for any kind of construction. Switzerland heavily engages in mapping activities to identify zones which are prone to natural hazards (BUWAL, 1998). The cantons are obliged to provide hazard maps and to consider these maps in land-use planning (BWW-BRP-BUWAL, 1997). These maps contain information about the intensity of a dangerous process and about its exceedance probability. The intensity and the exceedance probability are combined to quantify the hazard, expressed in hazard levels. Figure 1 shows the intensity-probability matrix and the different hazard levels.