PRIORITISATION IN THE PLANNING OF PERMANENT PROTECTION STRUCTURES AGAINST FLOODS AND DEBRIS FLOWS ON THE REGIONAL SCALE IN THE AUTONOMOUS PROVINCE OF BOLZANO – SOUTH TYROL

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INTRODUCTION

Hitherto, in the Autonomous Province of Bolzano - South Tyrol, Italy mitigation measures often have been planned after catastrophic events with related damages. Dealing with natural hazards was based on hydrogeological expertises for single basins of torrents. The extent of potential damages due to hazardous processes has not been taken into account. Now, the planning of mitigation measures is based more frequently on risk analyses and cost-benefit analyses due to the limited financial resources of the public administration. For the best possible allocation of the limited financial resources, the Department of Hydraulic Engineering of the Autonomous Province of Bolzano - South Tyrol decided to develop a procedure for setting priorities in the long-term planning of mitigation measures and permanent protection structures against floods and debris flows on the regional scale.

METHODS

As a first step, all needed information about floods and debris flows for the preparatory works are compiled in a database. It has been developed an information system for the identification and localization of the settlement areas and infrastructures endangered by floods and debris flows. For the identification and delimitation of potential debris flow and overbank sedimentation processes, a combination of different GIS-based process models developed by geo7 was used. The triggering areas were completely delineated from the digital elevation model and other GIS-databases. The run out areas of the dangerous processes were calculated by the use of combined empirical and physical models. As a basis for the identification and delimitation of flood processes a procedure for the determination of potential weak points for overflow and potential dam break failures has been developed. Starting from these localized weak points, a simplified 2D-simulation describing the worst case–scenario was made for the delimitation of potential endangered areas. As a second step, every building was characterized by the main function, the number of residential persons and its monetary value. The buildings were extracted from the digital cadastre dataset. The functionality of buildings was classified by overlaying the buildings with the local land use plans and the regional land use dataset. The mean number of residents per building was extracted from population census statistics on the community-level. The mean values for the assessment of the monetary values of buildings were extracted from a literature review. For each process area, the number of potentially endangered persons and probable monetary damage val-

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ues were summarized (probable maximum loss). All process areas affecting settlements were listed and sorted by the number of endangered persons and monetary values.

RESULTS

Within a few months needed for the elaboration, an overview of the risks due to floods and debris flows could be given in the whole region (7000 square kilometres). The principal outcome of this procedure was the knowledge about those areas where risk reduction activities are needed and about the priority with which these activities have to be considered. The priority is given by sorting the potential process areas of floods and debris flows by the summarized number of affected people and the monetary values of probable damages.

CONCLUSIONS

With the summarisation of potential affected people and the monetary values of probable damages for each process area, the uncertainties related to a region-wide analysis of existing data without specific information about the single object itself could be minimised as possible. The prioritization of the endangered areas leads to a useful basis for decision-making at regional level, although the procedure is based on worst case scenarios without given return period. Firstly, the identification of areas where risk reduction activities are needed leads to an anticipatory and strategic proceeding in the planning process. Secondly, after an event when immediate measures are requested by the public and politicians, the regional authority will be able to show a long-term action plan on the basis of priorities and the existing annual budgets available for risk reduction measures. Thirdly, the maintenance works on existing flood protection works could also be prioritized on a regional level. With these resulting conveniences, the procedure provides important information for the planning of risk reduction and mitigation measures. Thus, the strategy for coping with natural hazards and risk becomes more transparent and efficient and less event-driven than in former periods.

Keywords: Flood, Debris Flow, Risk-Prevention, Prioritization