



Assessment of indirect losses and costs of emergency for project planning of alpine hazard mitigation

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By virtue of augmented settling in hazardous areas and increased asset values, natural disasters such as floods, landslides and rockfalls cause high economic losses in Alpine lateral valleys. Especially in small municipalities, indirect losses, mainly stemming from a breakdown of transport networks, and costs of emergency can reach critical levels. A quantification of these losses is necessary to estimate the worthiness of mitigation measures, to determine the appropriate level of disaster assistance and to improve risk management strategies. There are comprehensive approaches available for assessing direct losses. However, indirect losses and costs of emergency are widely not assessed and the empirical basis for estimating these costs is weak.

To address the resulting uncertainties of project appraisals, a standardized methodology has been developed dealing with issues of local economic effects and emergency efforts needed. In our approach, the cost-benefit-analysis for technical mitigation of the Austrian Torrent and Avalanche Control (TAC) will be optimized and extended using the 2005-debris flow as a design event, which struggled a small town in the upper Inn valley in southwest Tyrol (Austria). Thereby, 84 buildings were affected, 430 people were evacuated and due to this, the TAC implemented protection measures for 3.75 million Euros. Upgrading the method of the TAC and analyzing to what extent the cost-benefit-ratio is about to change, is one of the main objectives of this study. For estimating short-run indirect effects and costs of emergency on the local level, data was collected via questionnaires, field mapping, guided interviews, as well as intense literature research. According to this, up-to-date calculation methods were evolved and the cost-benefit-analysis of TAC was recalculated with these new-implemented results. The cost-benefit-ratio will be more precise and specific and hence, the decision, which mitigation alternative will be carried out. Based on this, the worthiness of the mitigation measures can be determined in more detail and the proper level of emergency assistance can be calculated more adequately. By dint of this study, a better data basis will be created evaluating technical and non-technical mitigation measures, which is useful for government agencies, insurance companies and research.