LANDSLIDE ASSESSMENT FOR SPATIAL PLANNING - THE NEW AUSTRIAN ACSP-STANDARDS

INTERPRAEVENT
2016 – Lucerne, Switzerland

Living with natural risks

THE AUSTRIAN PARTNERSHIP ON RISK MANAGEMENT IN SPATIAL PLANNING

Introduction

The Alpine regions in Austria are subject to multiple risks by mass movements and slope processes. Spatial information on hazards related to landslides, rock fall, debris flow, avalanches and erosion is of paramount importance, as well for the safety of existing living space as for future regional development.

The Austrian Concept on Spatial Development (ACSD), which is a strategic instrument for federal policies in regional development, seriously takes into account the challenges by natural hazards and risk. Based on this governmental document a new initiative was started by the Austrian Conference for Spatial Planning (ACSP) establishing strategic partnerships in order to foster the development of policies for key issues in an interdisciplinary forum.

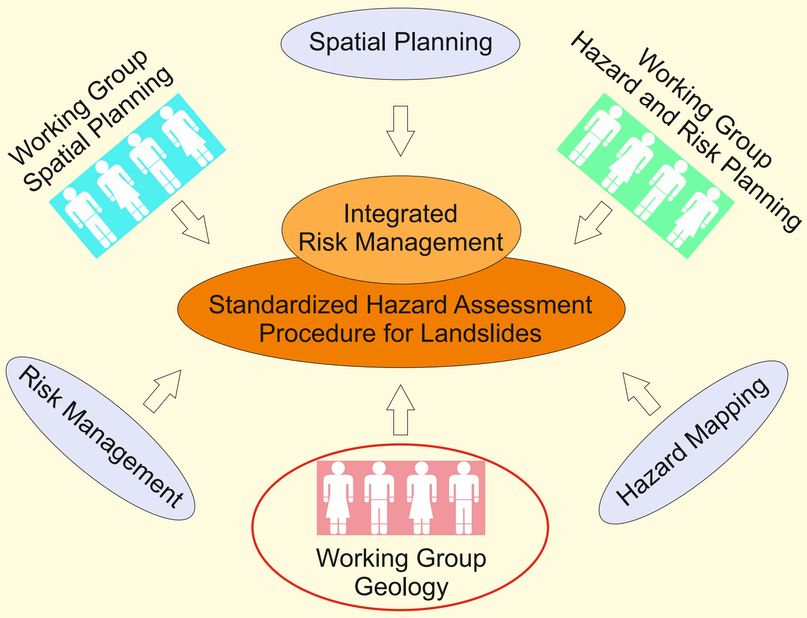

Figure 1: The ACSD-partnership for "Risk management in spatial planning concerning mass movements and slope processes".

ACSD-Partnership for Risk Management in Spatial Planning

The ACSD-partnership for "Risk management in spatial planning concerning mass movements and slope processes" was established in 2012 to bridge the gap between hazard mapping, risk management and spatial planning for these relevant phenomena on Alpine slopes in order to establish an integrated risk management (Fig. 1). Among other targets the partnership was aiming the establishment of an integrated standard procedure for assessment and mapping of hazards related to mass movements and slope processes (rock fall, landslides). Within the partnership the task force "gravitational induced natural hazard processes – working group geology" focussed its work on the evaluation of the existing methods for the calculation of landslide susceptibility (and rock falls) and the affected area in terms of their suitability for areal development.


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Figure 3: Debris avalanches (definition of Hungr et al. 2014); Foto: GBA

Figure 2: The ACSP-Publication No 193: ACSD-partnership for "Risk management for gravitative natural hazards in spatial planning" (2015).

STANDARDIZED HAZARD ASSESSMENT PROCEDURE FOR LANDSLIDES

For susceptibility and run-out assessment regarding shallow landslides and debris avalanches (definition of Hungr et al. 2014; Fig. 3) there is a wide range of modelling methods available, generating different types of maps. The appropriate application and the explanatory power of these models as well as the gained results are strongly depending on

- ⇨ the input data quality,
- ⇨ the analysis scale,
- ⇨ the size and homogeneity of the study area.

In this study for every scale level of spatial planning, recommendations were given for the corresponding modelling method and type of mapping, according to the requirements of spatial planning (Fig. 5). The proposed standards, which require the application of comparable methods, represent a prerequisite in order to obtain comparable results within an administrative unit (e.g. federal states). Further recommendations were also given in terms of the quality assurance, uncertainties, model validation and traceability. The proposed standards and recommendations have been published in the ACSP-Publication No 193 (Fig. 2).

RESULTS & RECOMMENDATIONS

The results presented in this paper are focused on the geological aspects of landslide assessment.

Recommended Modelling Method

Generally for areas with low data information density and quality the application of expert based heuristic methods to generate susceptibility maps for shallow landslides is recommended, while statistic models should be used only when sufficient landslide inventory data in good quality and density are available (Fig. 4).

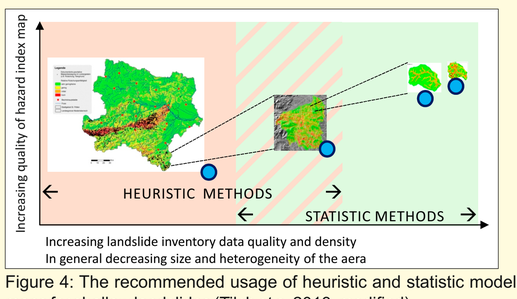

Figure 4: The recommended usage of heuristic and statistic modelling methods for susceptibility maps for shallow landslides (Tilch et a. 2013, modified).

Scale Levels of Spatial Planning

- On the **regional level** the Hazard Index Maps offer a rough estimation of potentially endangered areas, including susceptibility map and run out assessment. According to run out, the reach angle approach is sufficient.
- On the **local level** (refined Hazard Index Maps) it is recommended to identify areas with different "needs for action" (consultation of regional planner /preliminary expert opinion/ expert`s report). For these maps the estimation of the run out needs to be calculated more precisely by the application of process-orientated approaches.
- Only on the **site specific level** a detailed proof of the suitability for building land by means of an expert`s report should be performed. In case of modelling on this level, physically-based methods for the assessment of slope stability should be used. In terms of run out assessment, the estimation of frequency, magnitude and forces must be included (Fig. 5).

Working Level	Relevance	Type of Map	Map Scale
Regional Level / spatial development concept	Rough estimation of potentially endangered areas, areawide	Hazard Index Map (Susceptibility map + rough run out assessment)	≤1:25.000
Local Level / local development concept	Identification of endangered areas and derivation of recommendations for action, extended relevant area	Refined Hazard Index Map (susceptibility map + run out assessment)	1:25.000 - 1: 5.000
Site Specific Level / zoning plan, proceedings according to the building law	Detailed hazard assessment (expert`s report), dimensioning of measure planning, working area	Hazard Map, proof of suitability for building land and risk assessment	>1:5000

Figure 5: Scale levels of spatial planning and the recommended corresponding modelling method and type of mapping.

Minimum Requirements regarding Data Quality and Modelling

Quality assurance for Hazard Index Maps should be undertaken by fulfilling minimum requirements regarding data quality and modelling (Fig. 6). To reach this goal it is also important to perform several types of model validations and plausibility checks (Tilch et al. 2011) and to review the landslide inventory critically regarding to

- representativeness,
- accuracy of process position
- and landslide information.

Up to now, the validation of run out areas can only be performed based on real landslide-events and expert analysis. To ensure the traceability of the results, a detailed documentation of the generation of the map should be carried out.

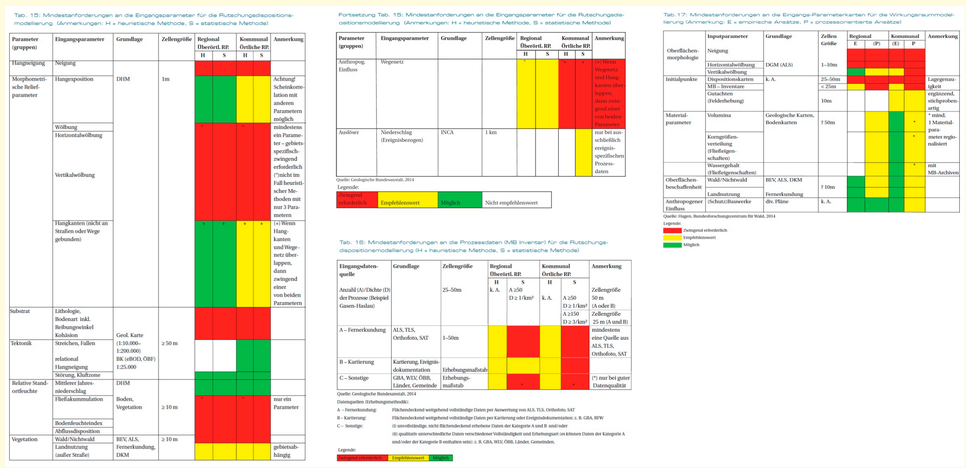

Figure 6: Proposed minimum requirements regarding data quality for parameter maps (susceptibility- & run out modelling) and landslide inventory (for further information see ÖROK 2015).

CONCLUSIONS

The results of the ACSD-partnership, including the standardized methods for hazard assessment and mapping (outlined on this poster) and general technical recommendations were agreed among partners from the federal state, the Austrian provinces and representatives of the municipalities and will enter into force in April 2015. A follow-up process was ordered by the ACSP to elaborate political recommendations for coping with gravitational hazards in areal development, which will be subject to a consecutive stake-holder participation process and provide a new basis for necessary adaptations in risk management policy and legislation.

References

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