A DECISION GUIDANCE FOR THE IMPLEMENTATION OF SOIL BIOENGINEERING TECHNIQUES

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OBJECTIVES

Soil bioengineering techniques are becoming more and more state of the art for stabilising shallow slope failures and surface erosion. Living plants and auxiliary material are used to solve engineering problems. Plants are selected for criteria such as pioneer plant character, dense and deep rooting system, potential of adventitious rooting system and fast and simple propagation.
The selection of techniques is based on an assessment of processes on the site. Slope processes have to be considered as complex interactions between vegetation types, soil and geomorphologic parameters. These interactions require an interdisciplinary approach to optimize the practical implementation of soil bioengineering techniques. Several steps of engineering procedure must be taken into account.

The single steps of the procedure (detection, assessment, measures and monitoring) for soil bioengineering projects were investigated and applied in the frame of the research project "Biogenous Safety Standards against Natural Hazards" under the coordinaton of the Department of Natural Hazards Management of the Austrian Federal Railways. For the necessary field studies different slopes have been selected in the catchment area of the Trattenbach, Salzburg.

METHODS

Within the planning procedure of soil bioengineering measures, investigations were used for the detection and the assessment of characteristic shallow slope failures. Geomorphologic, vegetation and soil parameters were recorded and analysed for a general soil bioengineering approach (s. Table 1).

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Tab. 1: Recorded and analysed parameters

geomorphology	soil	vegetation
indicator for active or past slope instabilities	texture	vegetation pattern
unsettled geomorphology	soil structure	tilted trees
ruptures	failure layer	indicator plants
eroded and accumulation zones	root penetration	pioneer plants

RESULTS AND CONCLUSIONS

Results were used for the assessment of the slope and to generate a slope instability inventory. The inventory was categorized on the basis of the predefined general objectives. In a further step suitable soil bioengineering techniques were selected. Finally both, the slope instability inventory and the selected measures correspond with the general objectives.

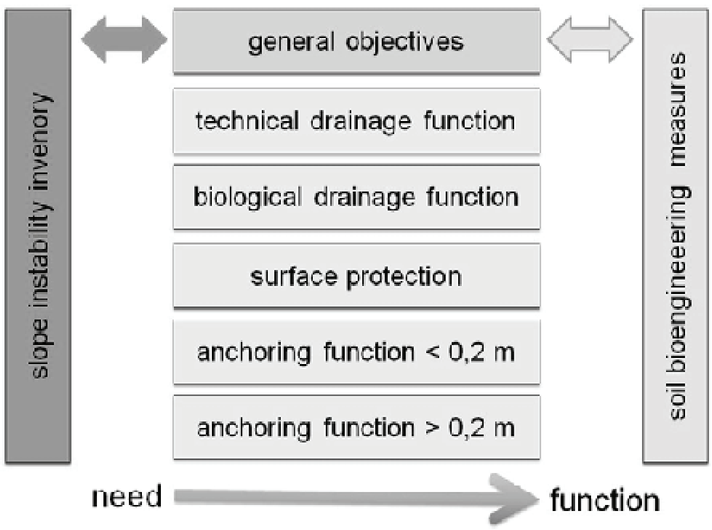

Fig. 1: Interrelationship of slope instability inventory and selected soil bioengineering measures

The presentation shows several case studies which were carried out at characteristic slope sites within the torrent catchment area of the Trattenbach (Salzburg, Austria). The procedure of detection, analyses, measures and monitoring of selected slope failure sites will be introduced. Advantages and disadvantages of technical support tools for the planning procedure of soil bioengineering techniques will be discussed and compiled in a catalogue of methods. All results were incorporated into a decision matrix for a successful and optimised application of soil bioengineering measures.

Keywords: slope failure, slope stabilisation, soil bioengineering