



Application of the marginal cost approach for planning of avalanche risk reduction measures

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The key element of integral avalanche protection is the combination of technical measures (e.g. avalanche structures), organisational measures (e.g. closure of roads), biological measures (e.g. protection forest) and land-use planning (e.g. hazard zone maps) to achieve an optimal risk reduction strategy. While during the past decades planning of counter measures has been dominated by hazard oriented decisions, nowadays risk, defined as the product of probability of occurrence, vulnerability and value at risk, is considered as more appropriate. The second criteria are the costs of measures. The goal of measure planning is to find a combination of measures which reduces risk at a reasonable ratio of cost and risk reduction.

In this paper we present the application of the risk concept which has been used in the technical field to determine the optimal risk reduction strategy at the Dorfberg avalanche site in Davos, Switzerland.

The results indicate the important role of organisational measures like blocking of endangered areas or evacuation of buildings which play a dominant role in risk reduction. The combination of technical measures with organisational measures proved to be the combination which fulfils the goals of the Swiss national strategy for the protection against natural hazards.

The analysis showed the sensitivity of initial assumptions on final results. We conclude that results of risk analyses and valuation by cost-efficiency criteria must be critically interpreted in this context. However, carefully applied, the proposed method constitute a valuable basis for natural hazards planning decisions.