

# **MINIMAL STANDARDS FOR RECORDING PROTECTION EFFECTS OF FORESTS FOR THE PURPOSE OF DOCUMENTATION EFFORT-EFFECTS IN PROTECTION FOREST TENDING**

## **AQUIREMENT OF GUIDE-LINES TO ESTIMATE PROTECTION EFFECTS OF FORESTS FOR ISDW-PROGRAMME**

Frank Perzl<sup>1</sup>

### **MOTIVATION**

Effectiveness of public promoted actions intending improvements of protection effects of forests is interrogated more and more. Till now in Austria evaluations of such measures focused on descriptions of activity amounts and on some silvicultural issues like stand regeneration incomparably on different spatial scales. Documentation of condition and alternation of protection forests by measures occurred in the single Austrian federal states very differently. Only in the federal states Tyrol and Carinthia uniform project-related protection forest controlling based on random samples is carried out, examining extensively the effects of measures due to achieved protection effects too. Austrian national forest inventory is not yet able to deliver required information because of spatial accuracy and for lake of models. One problem in evaluation of measures in protection forests is the lake of suitable and valid models for practical assessment of protection effects. Costs of representative data acquisition systems are considerable. While in Switzerland guide-lines for assessment of protection effects and their sustainability exist since 1996, in Austria no comparable tools were available. In the frame of the ISDW-Programme for promotion protection effects of forests on infrastructures a simple system for assessment of these effects und for data acquisition was developed.

### **MODEL**

In order to detect changing of protection forest conditions by silvicultural measures it is necessary to ascertain and review the following items:

- The hazard trigger (or impact) potential on forest site (without forest stand) for each type of natural hazard.
- The protection effects of existing forest stand with respect to the significant natural hazards and their intensities before and after silvicultural activities.
- Stability of protection forest and respectively criterions/indicators of sustainability of protection effects before and after silvicultural activities.
- Temporal sequence of carried out measures, manner and quantity of measures.
- External interference and complication factors, which handicapped operations and attainment of objectives.

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<sup>1</sup> DI Frank Perzl, Bundesforschungs- und Ausbildungszentrum für Wald, Landschaft und Naturgefahren  
Institut für Naturgefahren und Waldgrenzregionen  
Rennweg 1, A-6020 Innsbruck

For measurement of hazard trigger potential, protection effects and stability of forest no practically applicable physical and statistical models are available. These issues are complex multi-criterion questions. The only possibilities are either expert descriptions or qualitative rankings.

Therefore a system for assessment by indicators was developed. Indicators are organised in preference matrices by logical combination. Simple, in the outdoors assessable characteristics of forest site and stand are inputs of these matrices. An output of four ordinal numbers indicates hazard trigger potentials and protection effects.

## **HAZARD TRIGGER POTENTIAL**

The combination of characteristics of site factors shows the hazard trigger potential for avalanche triggering, rock fall (transit and deposition zone), land slides and water runoff to instable slopes. These types of natural hazards endanger properties directly. It is possible to decrease their frequency and intensity efficiently by silvicultural activities.

## **PROTECTION EFFECTS**

Other matrices combine the trigger potential of each natural hazard type to structural characteristics of the forest. This way the protection effect of the forest stand against the natural hazard is derived. Unlike similar systems estimations of protection effects are made depending on the hazard potential. So matrices fulfil twin function: they define optimal forest structure as a guide-line for forest management depending on natural hazard types and they are tools for assessment of protection effects.

## **TOTAL EVALUATION**

Activities in protection forests are not only necessary, when protection effects decrease. Sufficient protection effects require measures too, if stability of forest and sustainable growth are threatened. Therefore the success of measures have to be estimated due to the stability of forests. For this purpose an evaluation matrix combines minimal protection effect against one of the hazard types with indicators of forest stability respectively sustainability endangering. For total evaluation of success and steering requirements external interferences and level of site difficulty also have to be considered.

## **APPLICATION**

For the time being use for evaluation of forest tending areas of the ISDW-Programme is intended. The ISDW-Programme is an Austrian initiative aiming on protection forest improvement by silvicultural measures only and low planning efforts. The system is suited on simply practical realization. This is an objective ever to the debit of data reliability. First experiences show medium to high reliability of characteristics estimation. Methods are to be understood not for the purposes of a quantitative assessment of hazard potentials and protection effects of forest, but are thought as guidance. They primary serve for minimal standard of documentation and unification of assessments to the purpose of efficiency review. Indicators and valuations were derived by studies of literature and experts interrogation. Further evaluations of system validity for improvement are projected.

**Keywords:** protection forest, natural hazards, efficiency review.