

FOREST PLANNING FOR THE PREVENTION OF NATURAL HAZARDS – A CASE STUDY FROM THE BAVARIAN ALPS

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At present nearly a tenth of the protection forests in the Bavarian Alps are no more able to protect against natural hazards. Additionally, in the future the protective functions of over-mature stands will be endangered by a lack of regeneration. This situation is aggravated by the increasing societies demand for protection against natural hazards. The importance of protection forests will further increase due to weather phenomena caused by climate change. Protection forest management and protection forest restoration are very expensive. Therefore limited public funds have to be used effectively.

The investigation, which was financed by the EU³, had the following goals:

- sustainable improvement and preservation of the protective functions of alpine mountain forests as a contribution to inter-disciplinary risk management systems
- optimal distribution of public funds for protection forest management and restoration of protection forests
- international coordination for the development of guidelines for protection forest management
- dissemination of research results through reference manuals

Based on possible natural hazard processes and the site potential, optimal goal structures for protection forests were deduced and profiles developed, which describe the biological requirements of a fully functional protection forest. The comparison of ideal profiles with the actual condition of a protection forest stand using of aerial photos reveals, whether or not a protection forest is able to protect against natural hazards. These findings can be translated into management guidelines.

For the first time maps from other technical departments, which show the occurrence of natural hazards, were digitally combined and analysed for protection forest management.

The following tools and procedures were used and developed (for illustration see flow diagram in German language, figure 1):

1. Integrated natural hazard analysis and the map of planning units
With the help of maps indicating the occurrence of natural hazards, the potential of hazard and of damage can be assessed. The result is a map of planning units, which informs about natural hazards and protective requirements. This is important for the silvicultural planning. following up.

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2. Modelling the map of natural forest vegetation
The map of natural forest vegetation generates the assessment of the site potential. This map can be modelled rather inexpensively by combining digital elevation models, soil maps and expert knowledge.
3. Combination of site/natural hazard information and the map of silvicultural goal types
The combination of the map of planning units and the map of natural forest vegetation indicates areas with the same processes of natural hazards and site potential, which should have uniform silvicultural goal structures. This will be shown in the map of silvicultural goal types.
4. Description of stands with protective profiles for aerial photos and field survey
These profiles contain detailed decisive criteria to judge the protective function of the forest.
5. GIS supported interpretation of aerial photos and field survey
In the different goal types the protective effectiveness will be ascertained by means of GIS supported aerial photo interpretation and corresponding request profile. Protective effectiveness and protection requirement will be combined and provide information about the urgency of a ground field survey to examine the protective function. Thus, expensive field survey, can be focused on hot spots.
6. Field survey and planning of silvicultural measures
At the hot spots the forest planner has to judge with the help of request profiles the actual and future protective effectiveness of the protection forest and has to plan feasible treatments. The urgency of silvicultural measures is a result of protective requirements, actual protective effectiveness and the effectiveness of measures. This information for the local manager will be summarized in maps called protective effectiveness and follow up measures.

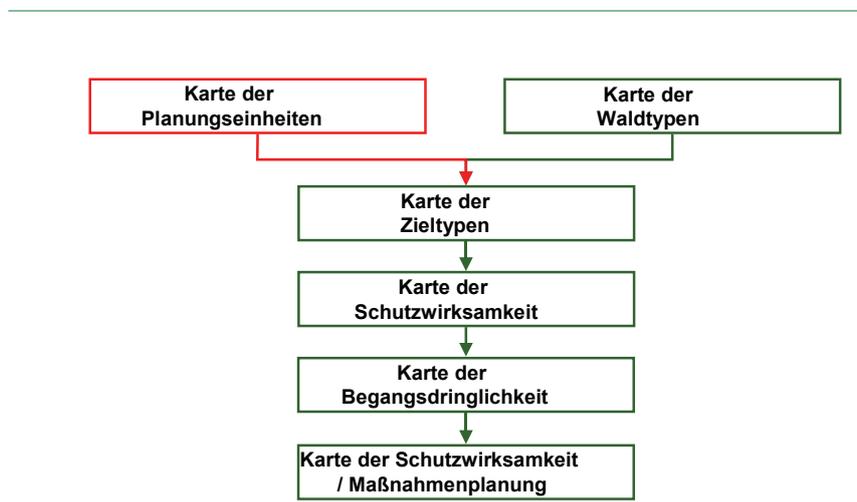


Figure 1: flow diagram of the forest planning for the prevention of natural hazards

Keywords: Protection forest management, natural hazards, GIS, aerial photos