

THE SILVICULTURAL GUIDE FOR MANAGING PROTECTION FORESTS IN THE FRENCH ALPS

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Within the framework of the INTERREG project "Sustainable management of mountain forests" (a European project with French, Italian and Swiss partners), the Cemagref, the ONF (French National Forest Service) and the organisation of the private forest owners in the Rhône-Alpes region undertook the writing of a silvicultural guide for mountain forests in the northern part of the French Alps (GSM - Guide des Sylvicultures de Montagne).

This guide focuses at Norway spruce, Silver fir and European beech based stands, both in mixed as in pure stands. The guide itself consists of three main parts based on a logical train of thought. The first part deals successively with a) the occurring natural hazards (avalanches, rockfall, landslides, debris flows in torrential streams) at the forest stand site, b) harvesting conditions and possible difficulties at the site, c) the ecological context of the site and finally d) a forest stand type classification. The second part provides recommendations for silvicultural management adapted for either a protection forest stand or a production forest stand. The recommendations are based on descriptions made in the first parts. The third part of the guide provides additional thematic information on various issues such as forest stand dynamics and regeneration, the interaction between natural hazards and forest stands, silvicultural interventions and timber marking, the linkages between forests and biodiversity or landscapes. This paper focuses particularly on the criteria and indicators that have been published for optimising snow avalanche and rockfall protection forests.

The main two parts that deal with avalanches and rockfall in the guide are the diagnostic part and the thematic part. In the diagnostic part the guide helps the reader to determine whether the forest plays a protective role against natural hazards. By providing a key in which he or she answers questions step by step. Examples of such questions are: "are there assets (residential area, traffic ways) below the forest cover? If this is not the case, evidently, the forest does not play a protective role. The following question orients the reader towards existing risk maps and risk prevention plans. If these do not exist, the reader can use the guide to search for indicators of natural hazards. In the case of rockfall these indicators are as follows:

- are there rock faces in the or above the forest with varying colours indicating recent detachment of rocks
- dead lying wood with rock impacts lying in line with the slope gradient
- trees with rock impacts at the upslope side
- impact traces on the slope surface (craters)
- rocks deposited on the slope surface, behind trees, stumps or trunks
- presence of rockfall protective structures (fences, dams)
- ...

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Subsequently, the reader can use a key to determine if the forest has a protective function against rockfall, which is presented in Fig. 1. A similar scheme exists for avalanche protection forests.

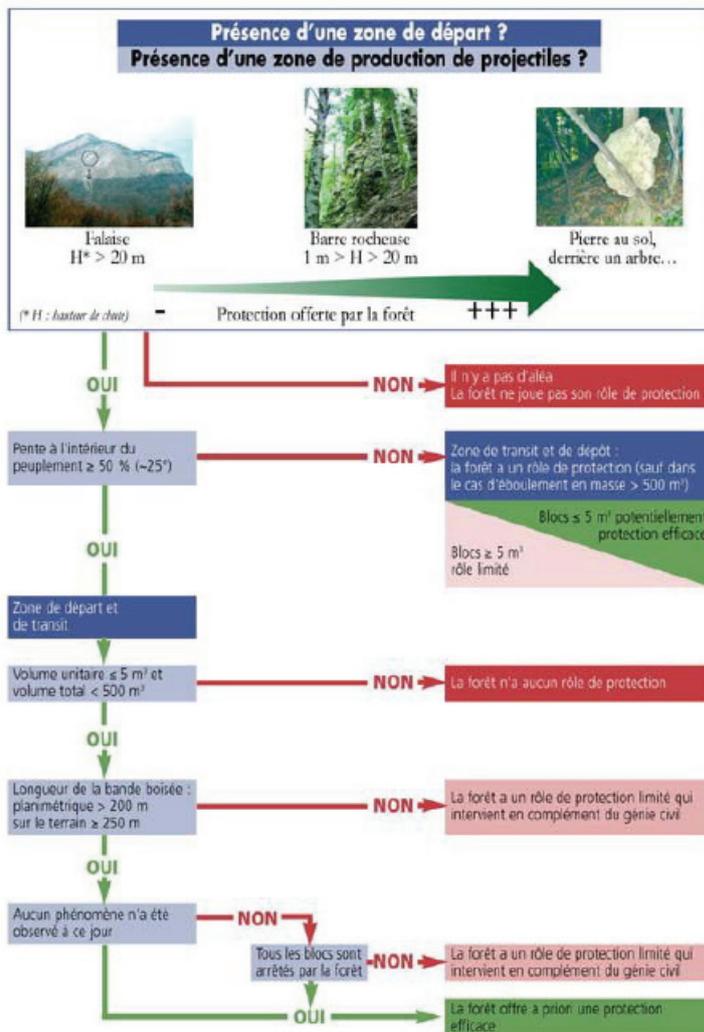


Fig. 1 The key of the GSM for determining rockfall protection forests

In the thematic part, the GSM provides silvicultural actions to be taken in the source, transit and stopping zone of a rockfall protection forest. Key values are presented that serve as future targets for optimising the protection forest stand. Examples are: maximal length of gaps in the forest in the direction of the mean slope gradient should be smaller than 20 m in the source area; in the transit and stopping area these should be smaller than 40 m in mature forests and smaller than 20 m in coppice stands. The minimal total length of the forested slope should be 200 m. All such target values and actions are presented in graphical tables. We aim at presenting these in detail in our paper. Finally, it will always be the expert who has to decide: intervene or not? When and how? Such guides will, however, point him or her in one of the possible right directions.