

# Austria – Montafon Valley case study

**Case study forest area: 6470 ha**

**Ownership: 100% public**

**Forest goods and services:**

Timber and fuel wood for local citizens, wood processing and biomass heating plants. Protection against avalanches, rock fall, landslides and erosion. Grazing, hunting, tourism.

**Special local conditions:** There is a long tradition of public land-use in the Montafon region. The inhabitants of the Montafon valleys have had the chartered right to use the non-private forests in their valleys as a source for timber and fuel wood since 1601.

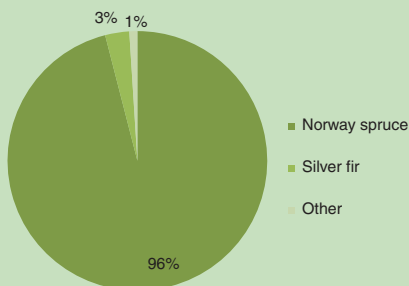
## Stakeholders

Stand Montafon Forstfonds (owner), local citizens, hunters, local farmers, tourism, federal service for torrent and avalanche control, wood processing industry, hydropower companies.

## Management and governance issues

Stand Montafon Forstfonds (SMF) is the largest forest owner in the Province of Vorarlberg. The management objective of the SMF is for the well-planned, sustainable and economic use of forest resources for all possible demands of society. Most notably this involves the protection of the (cultural) habitat Montafon (biological as well as social), the fulfilment of services and the sustainable production of timber.

## Proportion of Species of Montafon



A limestone rock retained by beech trees.

Photo: Rupert Seidl.



## Climate change challenge

Due to the high share of Norway spruce in the Montafon forests, timber production, as well as protection against gravitational hazards are likely to be negatively affected by an increase in disturbances, particularly from bark beetles.

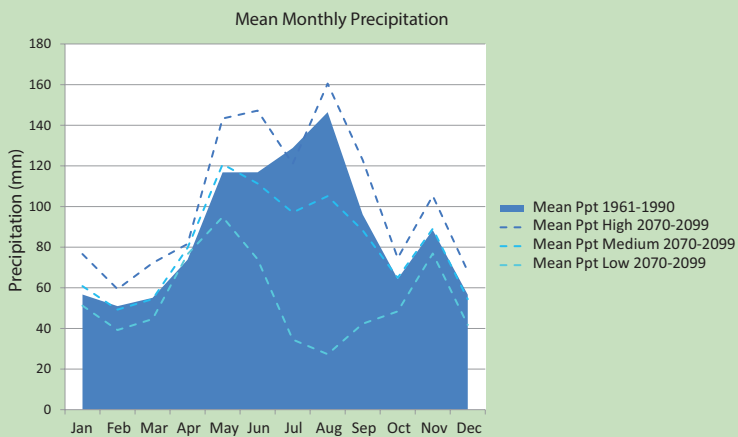
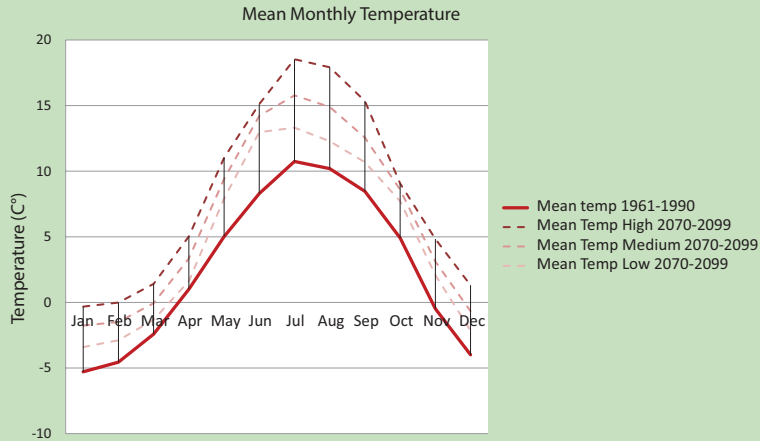




Photo:  
Stand Montafon Forstfonds.

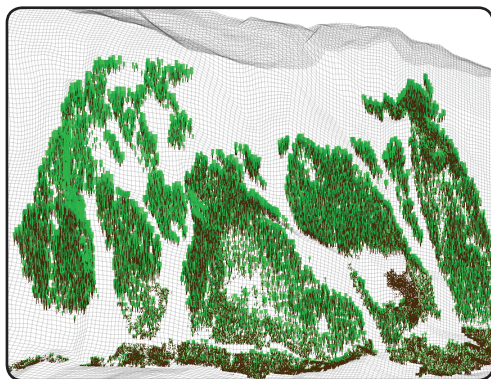
For Norway spruce the risk of bark beetle (*Ips typographus*) infestations will increase substantially due to better development conditions for poikilothermic insects. Especially during the second half of the 21<sup>st</sup> century a strong increase in bark beetle induced mortality can be expected for Norway spruce.

All tree species in the region will physiologically benefit from a warmer climate because water supply on most sites is not a limiting factor (current precipitation levels exceed 1100 mm/year and only minor changes are expected for the future). Tree growth and reproduction will be facilitated because of more favorable growing conditions and longer growing seasons.



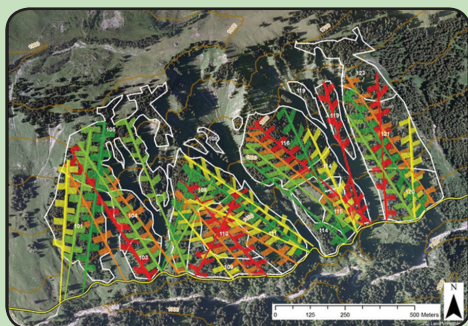
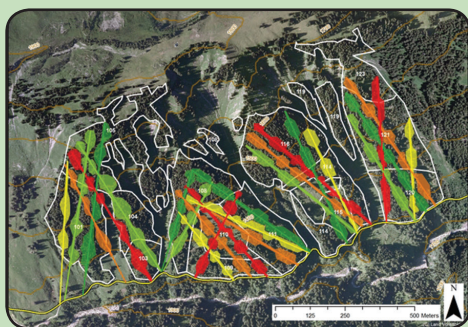
Due to the large proportion of Norway spruce in the Montafon region, timber production as well as protection against gravitational hazards are likely to be negatively affected by bark beetles. The need for salvage operations will increase in a warmer climate which will negatively affect the harvesting costs. However, due to a higher share of standing deadwood caused by bark beetles the habitat and biodiversity functions for different vertebrate (e.g. woodpeckers) and invertebrate (e.g. longicorn beetles) species are expected to improve.

Photo: Manfred J. Lexer



Visualization of 70 ha forest on a slope in the Rellstal Valley.

Continuation of current management results in increasing timber stocks, which increases susceptibility to bark beetle infestations and may also increase damage levels. Clumped tree mortality will negatively affect protective functionalities. As an adaptive measure it is recommended to increase the annual cuttings by increasing the number of skyline tracks and modifying the cutting pattern. To keep gaps in slope direction small, a horizontal slit cut approach is recommended. Furthermore other species than Norway spruce should be facilitated and game management intensified to reduce browsing.



On the left: Slit cuts as performed under current management for a forest compartment of ca. 70 ha (stands in white, forest road in yellow). The colors of the slit cuts indicate 20 year periods from green to red (2010 to 2110). This approach results in a virtual rotation period of 250 years. On the right: Fishbone shaped slit cuts as proposed as an adaptation measure for the same period and area. This approach results in a faster turnover of tree generations by 20%, reducing susceptibilities to bark beetle damages and improving protective functionalities.

## Conclusion

In order to sustain the long-term provision of demanded ecosystem services under a changing climate it is recommended to combine adaptation measures (species composition, spatial structure of silvicultural measures, management intensity and game management).