# The effectiveness of plants as slope stabilizers

Plants can prevent landslides, but not in all cases: in pastures, for example, intensive grazing and fertilization can interfere with their stabilizing effect.

As well as debris flows, large storms often also cause landslides of varying severity which can damage land and infrastructure. A sound layer of plant cover may help protect against erosion and landslides. Until now, though, it wasn't known to what extent, or which plant combinations should be used. New results have been delivered by WSL's SOSTANAH (SOil STAbility and NAtural Hazards) project, which is a part of the 'Sustainable use of soil as a resource' National Program (NFP 68).

To underpin the slope fortifications with some solid figures, doctoral student Anil Yildiz investigated soil samples from two landslide areas in the laboratory. Using a shearing apparatus, he measured the strength required to cause a slope to start slipping – with and without alder, grass and clover. It emerged that after only six months of growth the plants had greatly strengthened the soil. A real-life slope would therefore remain stable, even with an incline 5° steeper than can be expected from the soil material.

The effect of planting woods was verified by a study on the previously unvegetated erosion and landslide zone of Hexenrübi (NW). Willow trees planted between 2009 and 2011 have created abundant biomass, both above and below ground. The next big storm will show how much the plantings have improved the slope's stability.

The results of the various SOSTANAH sub-projects both confirm and complement existing guidelines for the management of protection forests (NaiS). A few lessons from the projects: slopes should contain as many species, age groups and root structures as possible, intensive grazing and fertilization can interfere with the protective effect, and vertical paths of more than 20 m down the fall line should be avoided if possible.

WSL researchers used statistical methods to investigate the effect of forest structure during landslide events. They used an example from Sachseln (OW), where heavy rainfall caused over 500 landslides in 1997. The calculations indicate that about four fifths of the more than 100 landslides taken into account would not have occurred under optimal management. It is estimated that the corresponding care and maintenance of the affected forest areas would cost only a tenth of total cost of damages. *(bki)*

*www.slf.ch/more/sostanah-en*

NATURAL HAZARDS

# How great is the risk of avalanche fatalities on snow tours?

'Muotathal (SZ), 27 February 2016: Avalanche sweeps ski tourer to his death.' Every winter, we read reports such as this in the press. An average of 23 people lose their lives to avalanches every year in Switzerland. The victims are almost always snow sports enthusiasts who have ventured off piste. We are used to hearing in the wake of an avalanche accident that snow sports enthusiasts run much greater risks than others. Are snow tours particularly dangerous, then? Until now, the lack of solid data meant that all one could do was speculate.

Men aged between 30 and 60 who go on ski tours run the highest risk of dying in an avalanche.

Photo: Corina Lardelli, SLF

## Snow touring risks similar to those of road traffic

The avalanche risk here denotes the likelihood that a tourer might lose their life to an avalanche during a day's touring or over the course of a year. In order to assess the risk of snow touring, the number of fatalities is set against touring activity in its entirety in the mountains during winter. For many years, SLF has been recording the accidents in detail. The number of people heading out in the