



## Long-term behaviour of timber structures in torrent control

Christian Rickli (1) and Frank Graf (2)

(1) Swiss Federal Institute for Forest, Snow and Landscape Research WSL, Birmensdorf, Switzerland (christian.rickli@wsl.ch), (2) WSL Institute for Snow and Avalanche Research SLF, Davos Dorf, Switzerland (graf@slf.ch)

Timber is widely used for protection measures in torrent control. However, life span of woody constructions such as timber check dams is limited due to fungal decay. However, only sparse scientific information is available on the long-term behaviour of timber structures and the colonisation with decay fungi. Related to this, in practice a controversial discussion has been going on if either Norway Spruce (*Picea abies*) or Silver Fir (*Abies alba*) is more enduring and if bark removal increases resistance against fungal decay. In order to go into this matter a series of 15 timber check dams built in 1996 has been monitored. The constructions were alternatively realised with Norway Spruce and Silver Fir, half of them each with remaining and removed bark, respectively. The scientific investigations included the documentation of colonisation with rot fungi and the identification of decayed zones with a simple practical approach as well as based on drilling resistance. Colonisation by decay fungi started three years after construction (e.g. *Gloeophyllum sepiarium*), detecting two years later first parts with reduced wood resistance. Sixteen years after construction decay was found on all check dams but two. Wood quality was markedly better in watered sections compared to the occasionally dry lateral abutment sections. Taking the whole check dams into consideration, slightly more decay was detected in Norway Spruce compared to logs in Silver Fir and both the practical approach and the drilling resistance measurement yielded in more defects on logs without bark. However, due to limited number of replications and fungal data, it was not possible to statistically verify these results. Statistical analysis was restricted to the drilling resistance data and fruit-bodies of decay fungi of the uppermost log of each check dam. Based on this limited analysis significant differences in the effect on the drilling resistance were found for watered sections and lateral abutments, brown and white rot as well as fir with and without bark. Taking further into account that brown rot reduces wood strength faster than white rot, it may be speculated that spruce logs without bark and fir logs with bark are more resistant against fungal decay compared to logs of spruce with and fir without bark, respectively. However, this has to be treated with caution as only the uppermost logs were considered, the observation period was only 15 years and the relative abundance of the most important decay fungi considerably varied between as well as within the check dams.

Consequently, for statistically sound and well-funded recommendations further investigations over a longer period are indispensable.