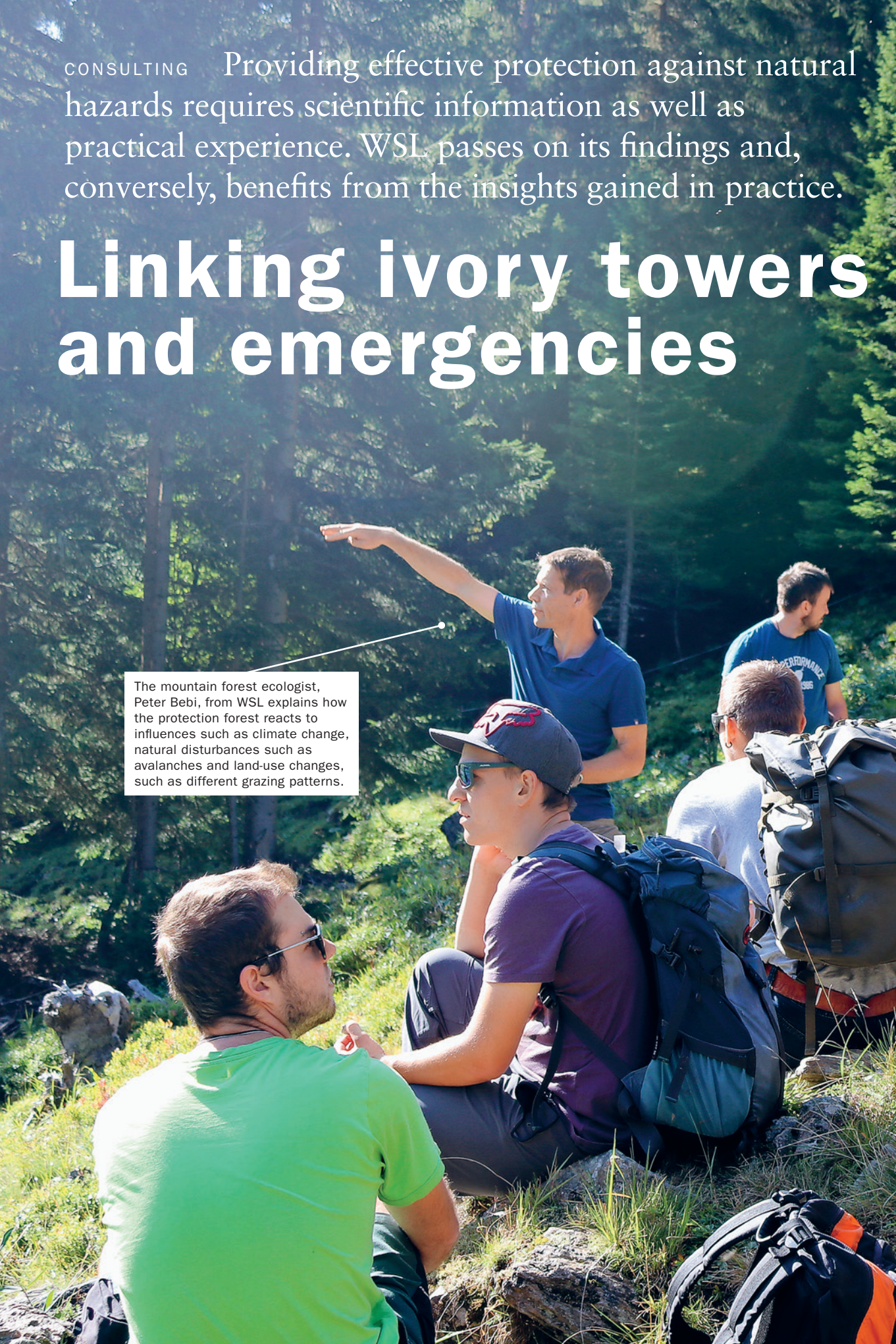


CONSULTING Providing effective protection against natural hazards requires scientific information as well as practical experience. WSL passes on its findings and, conversely, benefits from the insights gained in practice.

# Linking ivory towers and emergencies



The mountain forest ecologist, Peter Bebi, from WSL explains how the protection forest reacts to influences such as climate change, natural disturbances such as avalanches and land-use changes, such as different grazing patterns.





Trainee foresters from the forestry schools in Maienfeld and Lyss on a field trip to learn about the forest structure of an avalanche course and the forestry measures being taken to maintain the long-term protection function of the forest.

Dischmatal near Davos (Canton Grisons)

Photo: Herbert Schnyder

The storm ‘Vaia’ swept through Switzerland for barely two hours in the night from 29 to 30 October 2018. Afterwards the Albula Valley, the Upper Engadine and Puschlav were a sad sight: trees had been bent like toothpicks and large areas looked as if they had been mown down. The storm, with wind peaks of up to 210 km/h, quickly destroyed over a hundred hectares of protection forest in Canton Grisons, i.e. of forest managed to protect settlements from avalanches, landslides and rockfall. The notorious storm ‘Burglind’ had destroyed a similar area of protection forest not long previously on 3 January 2018.

The foresters were faced with urgent questions. Should they clear the storm timber, which is very dangerous work, or leave it lying on the ground? Is the area still protected against natural hazards? Is a bark beetle infestation imminent? The regional forest engineer, Claudia Bieler, from the Grisons Office for Forests and Natural Hazards was confident WSL could provide answers to these questions. She therefore asked for on-site advice. “I wanted to ensure that all foresters involved were up to date and had the latest information,” Claudia explains.

When nature strikes with full force and flattens forests or sends entire mountainsides thundering down to the valley, the practical knowhow of the practitioners reaches its limits. Researchers’ specialist knowledge is especially in demand after extreme events such as storms, floods like those in 2005, or landslides such as in Bondo in 2017. “We have a complete overview of the topic, as well as more time and opportunities for comparisons with other countries and regions,” says Peter Bebi, a

protection forest expert at SLF. Researchers can draw on international experience with, for example, uncleared storm areas.

Creating concrete scientific information bases for practical use has been one of WSL's core missions since it was founded in 1885, when it was called the 'Central Station for Experimental Forestry'. At that time, the focus was on, among other things, how forest experts could make the heavily overused forests fit enough again to provide protection against natural hazards. Experts from WSL and SLF today still carry out workshops and training courses for government authorities and engineering offices on request, provide expert opinions or support safety officers on site with risk analyses. They make their research findings available for practical use through guidelines, leaflets and reports. In particular, their event analyses, i.e. the comprehensive retrospective evaluation of what happened during a natural disaster, provide local authorities with valuable information to prepare for similar events in future.

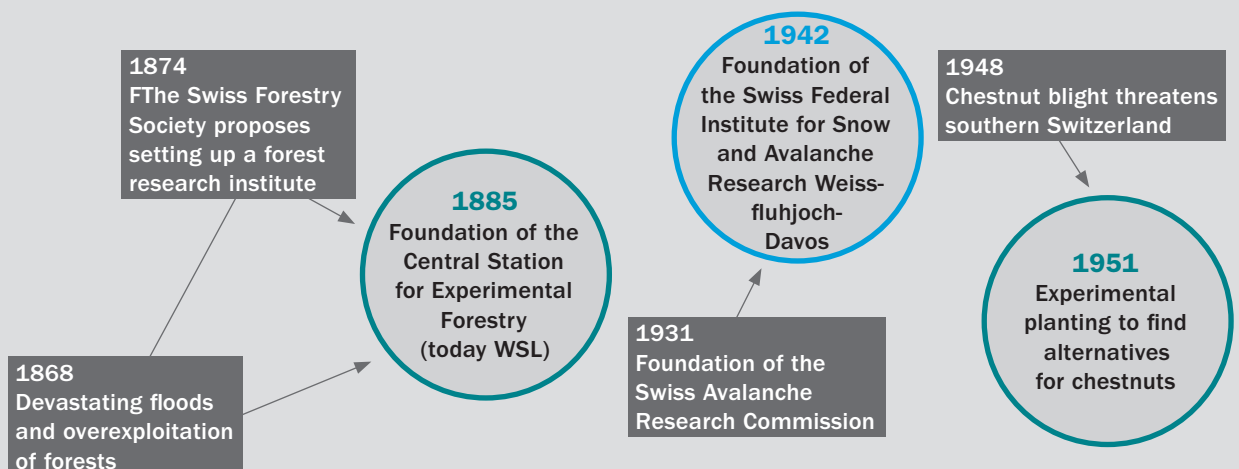
For further information on protection forests, see:  
[www.slf.ch/protectionforest](http://www.slf.ch/protectionforest)

### Sharing experiences

In the case of the storm 'Vaia', Peter Bebi, together with other WSL researchers, tramped through windthrow areas with the foresters several times during the winter 2018/19. "We were able to tell the foresters directly about our experiences with the storms Vivian in 1990 and Lothar in 1999," he says. "From a scientific point of view, there are many reasons for leaving storm wood lying." The uprooted root plates and tree stems frequently provide sufficient protection against avalanches and rockfall. This natural protection can therefore be relied on more often in places where the risks of bark beetle outbreaks are clearly within acceptable limits. Published material on this is available, but "during inspections together, foresters can ask questions directly and receive the latest information first-hand," says Claudia, the forest engineer, who used to work at SLF herself and therefore has good contacts with researchers.

Peter Bebi, head of the Mountain Ecosystems Group at SLF since 2006, has already led dozens of excursions and inspections like this in mountain forests. He is not only an experienced mountain forest ecologist, but also a member of the Mountain Forest Conservation Group (GWG/GSM). In this group, forest experts and scientists have been working together since 1986 to ensure the best management of protection forests. There is also a corresponding

## How WSL and SLF have responded to developments in society and the environment







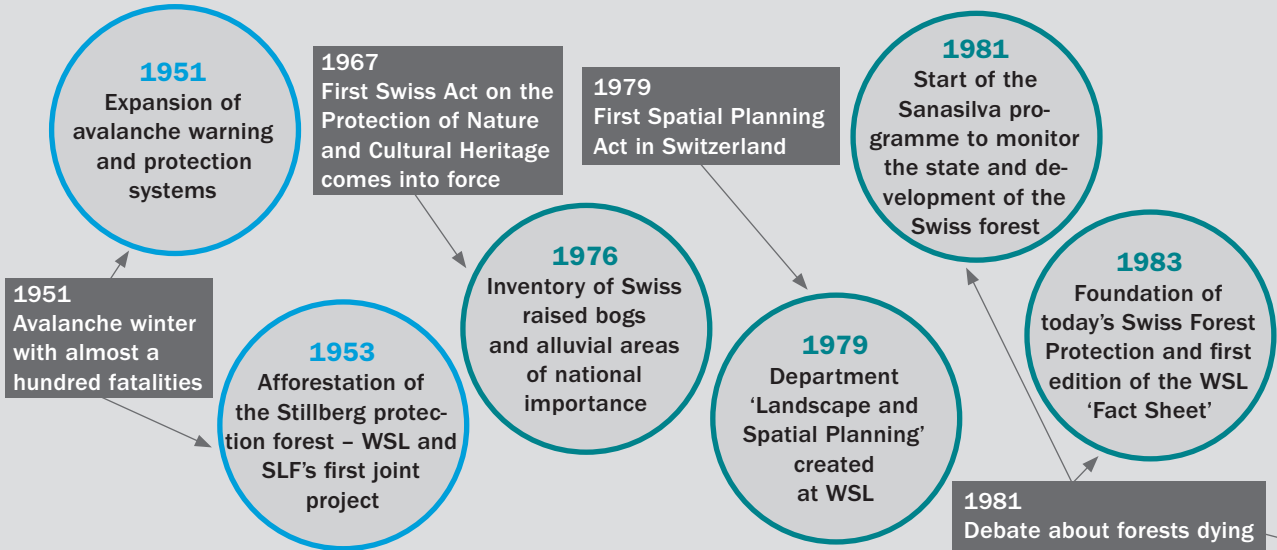
After the storm ‘Vaia’ in 2018 severely damaged the protection forest in Canton Grisons, WSL researchers advised foresters on how to treat the storm-damaged areas.

group for natural hazards in general, Natural Hazards Experts Switzerland (FAN), in which the federal government, cantons, private individuals, researchers and insurance companies are represented. The president is the WSL geomorphologist Christoph Graf. Both groups offer their members regular further training and promote lively dialogues between research and practice.

Dealing with extreme events

Practitioners usually come to WSL when a specific event, such as the storm ‘Vaia’, occurs or if they have unsolved problems. Canton Grisons, for example, wanted to have clearer procedures for recording on hazard maps areas where sliding snow avalanches could be a risk. “In such cases, we write directly to a scientist with a lot of experience in the area,” says Christian Wilhelm, Head of

Photo: Office for Forest and Natural Hazards, Canton Grisons



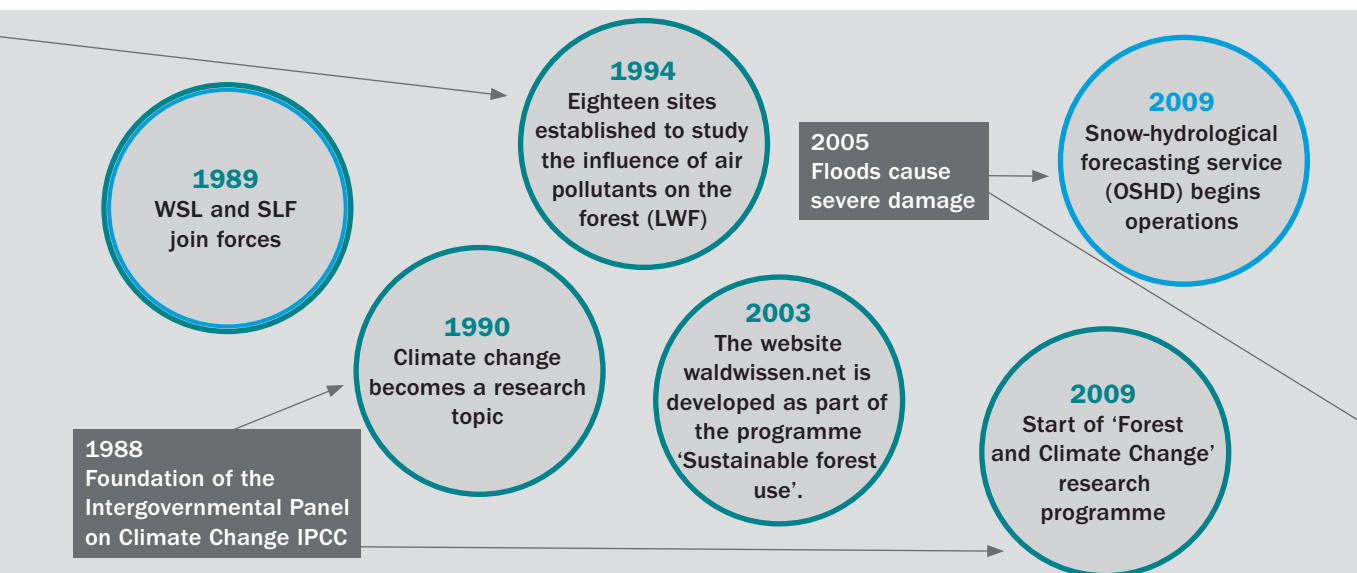
Natural Hazards and Protection Structures at the Grisons Office for Forest and Natural Hazards. One of the by-products of the assignment was a WSL report with guidelines for practical use.

Private engineering firms are also keen to cooperate with the scientific community. “We deliberately maintain close relations with researchers,” says Daniel Tobler from Geotest, a company in the field of environmental and geo-engineering, who is also a member of FAN. For example, they were able to learn from the researchers how to use the latest techniques and equipment, such as monitoring rock movements with radar or lasers. “When dealing with large, complex projects or natural hazard events, support from research is essential.” Keeping up to date with state-of-the-art methods and the latest findings is beyond the capacities of private individuals. Conversely, WSL employees frequently contact his company, for example when they are looking for a suitable site for a particular project.

### Suggestions for research projects

The SLF researcher, Peter Bebi, also emphasises that both sides benefit from close contact: “We learn a lot from practitioners.” Many questions from experts ‘in the front line’ lead to smaller or larger research projects. An uncleared ‘Vaia’ area in Val Tuors near Bergün is today still a research area, so that Bebi and his colleagues can study the extent to which the remaining stands after the storm can hold back avalanches. A question posed by a forester in the Engadine has also been addressed directly in a master’s thesis at WSL, namely when would interventions in single-layer, dense spruce stands be beneficial?

In addition to these ‘bottom-up’ suggestions, WSL also receives commissions from ‘the very top’, i.e. from cantons and the federal government. These include four legally mandated tasks: maintaining an avalanche warning service, long-term forest monitoring (National Forest Inventory, Sanasilva, LWF, natural forest reserves), monitoring forest health and supervising scientific and technical measures against forest pests and diseases. External inputs often lead to long-term cooperations, such as Zurich city’s early warning system for Sihl floods, which was urgently needed when the new underground station was under construction, and is still in use today. Even the Federal Assembly sometimes provides suggestions for new research.



Parliament's call for more research into Switzerland's energy future led to eight research competence centres (SCCERs) being set up, as part of which WSL launched various energy projects.

In principle, the exchange of ideas between research and practice works very well. But WSL is in a field of tension between practice and research because it must also hold its own in top scientific research. According to recent findings, however, such research provides the foundation for practical applications. But new research results are usually first published as scientific articles in scientific journals, mostly in English, rather than primarily as reports for foresters and geo-engineers. Some researchers complain that the time they spend on implementing the results is time they cannot spend on writing papers. Moreover, researchers receive little recognition from the scientific community for implementing their findings.

The pressure to publish is also making itself felt in practice: “New findings from research today tend to be delivered as small appetizers more than previously,” says Christian Wilhelm. “It is sometimes difficult for us to estimate which innovations we should adapt our practice to.” In general, however, new research findings are “very, very important” for practice. “Constantly improved models and methods provide the basis for effective protection against natural hazards.” *(bki)*

