

Methods for reducing the risks of melting glaciers

August 20 2019, by Sandrine Perroud



Credit: GLACIARES+

Under a pilot project being spearheaded by the Swiss Agency for Development and Cooperation (SDC), a team of experts—including civil and environmental engineers from EPFL—are studying methods to help protect a region of the Andes Mountains threatened by glacial retreat. The testing phase of the pilot project will conclude at the end of the month. If successful, their methods could be used in other parts of the

world as well.

As glaciers melt, they form glacial lakes which—despite their peaceful appearance—harbor numerous risks. They can empty suddenly and cause flooding, as the Swiss town of Zermatt recently discovered. One solution being studied is the controlled use of water from glacial lakes; that would enable engineers to drain them quickly in the event of an emergency, such as if a large chunk of glacier fell into a lake.

"The main idea here is to explore several ideas at once, because the most effective way to improve the safety of people living in areas affected by [glacial retreat](#) is to deploy not just one but a combination of systems," says Anton Schleiss, an honorary professor of civil engineering at EPFL and former head of EPFL's Platform of Hydraulic Constructions (LCH).

The LCH has teamed up with other Swiss institutions like the University of Zurich and the Center for Research on the Alpine Environment (CREALP) on an eight-year research project on glacial retreat in Peru. Called GLACIARES+, the project is funded by the Swiss Agency for Development and Cooperation (SDC).

Measurement stations

"We're working with the University of Zurich and CREALP to set up systems that will use two glacial lakes as a source of drinking water for local communities as well as for crop irrigation and maybe even for small-scale hydropower generation," says Schleiss. To help achieve that goal, Alain Foehn—one of Schleiss's Ph.D. students—developed a model for making hydrological forecasts. He set up measurement stations at glacial lakes to continuously monitor and predict the flow rate of rainwater as it runs off into catchment areas, along with changes in air temperature and water levels.

EPFL researchers also developed models for predicting the lake swells that would be caused if a piece of large rock or glacier formation suddenly broke off and fell into a [lake](#), triggering impulse waves. Their model can be used to design more effective dikes and other structures.

The GLACIARES+ project is being carried out in association with the NGO Care Peru as well as with a number of Peruvian universities and government agencies. Some 350 people have already received training on how to monitor [glacial lakes](#).

A region under threat

Peru is home to 71 percent of the world's tropical glaciers. These glaciers have been retreating over the past 40 years, creating potentially unsafe conditions for more than 1.5 million local residents. The Lima Call for Climate Action, adopted during the 2014 UN climate change conference in Lima, stressed the urgency of taking concrete measures to limit the risk of natural disasters.

Under GLACIARES+, the Swiss team is taking a holistic approach to managing the risks of glacial retreat and identifying new avenues of research. The testing phase of the [pilot project](#) will run until end-August, and the results could be applied in other countries as well.

Provided by Ecole Polytechnique Federale de Lausanne

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