

Scientific exchange to Switzerland promotes learning from common climate adaptation challenges

The Indian Himalayas Climate Adaptation Programme (IHCAP) is a project under the Global Programme Climate Change (GPCC) of the Swiss Agency for Development and Cooperation (SDC). The overall goal of the programme is to ensure that the resilience of vulnerable communities in the Indian Himalayan states is strengthened and knowledge and capacities of research institutions, communities, and decision-makers are connected and enhanced.

It is within this context that Indian and Swiss scientists have joined forces to collaborate on an integrated climate vulnerability, hazards and risk assessment for Kullu district, Himachal Pradesh. The collaborative research recognises that both countries, India and Switzerland, share many common challenges and experiences relating to climate change, melting of the cryosphere, and adverse impacts in steep high mountain environments. Under the joint research program a consortium¹ of Indian and Swiss scientists have been working together on wide-ranging studies considering both physical and social dimensions of climate related vulnerability, hazards and risk in Kullu. A highlight of the joint-research program included a knowledge-exchange visit to Switzerland in June 2015 by Indian researchers and scientists. This followed from previous visits of the Swiss scientists to Kullu. The approximate two week exchange to Switzerland involved a combination of seminars, field visits, and desk-based research relating to the Kullu studies. The field visits were a particularly valuable component, exposing the participants to situations in the Swiss Alps where there is long-standing experience investigating, living with, and adapting to the challenges of climate change.



Common adaptation challenges: Switzerland, like India, faces challenges protecting vital road infrastructure in exposed high mountain areas. Images on the left show Furka and Grimsel pass roads visited during the scientific exchange in Switzerland, June 2015. On the right, in the region of Dhundi and Rohtang Pass, where Swiss and Indian colleagues visited in October 2014. (photos from S. Allen, B. Saklani, P. Bahdwaj)

In the heavily touristic and populated Zermatt Valley the scientists learnt of the challenge of protecting communities while maintaining road, rail and other vital infrastructure within an environment exposed to rockfall, snow and ice avalanches, debris flows and flash floods. Such challenges are of course

known also to Kullu, for example in the Parvati Valley, and concerning the major transport route and tourist region north of Manali. The scientists travelled on a high mountain train system to Gornergrat (3090 m a.s.l), overlooking the Findel and Gorner glaciers. Here measurement and monitoring of the glaciers date back more than 50 years, and several Swiss scientists from who are also involved in IHCAP remain actively engaged in annual monitoring programs in Switzerland. The need for such consistent and long-term glacier monitoring has been highlighted as a fundamental baseline requirement for Kullu, building on existing programs established by the Himachal Pradesh State Centre on Climate Change in Sangla, Kinnaur district.

The Rhone glacier in Switzerland has become something of a symbol of climate change owing to the well documented retreat that can be traced through historical photos, artwork, postcards, and other documentation. Here the scientists could see a truly unique example of climate change adaptation in Switzerland, with the terminus area of the glacier being covered by white sheeting to increase albedo and prevent further melting, thereby maintaining tourist activities in the area. While not practical as a large-scale or long-term solution, it provides a useful example of what can be achieved with adaptation solutions targeted to address specific problems.



Scientific exchange in the field: Indian and Swiss scientists share knowledge and common experiences during field visits into the Swiss Alps. (photos from B. Saklani)

One of the most exciting components emerging from the joint research studies under IHCAP are first results concerning the possible extent and relevance of permafrost distribution in Kullu. Permafrost (or

permanently frozen ground) refers to any ground material that remains at or below 0°C for at least two consecutive years. In response to global climate change, permafrost is known to be thawing in many high mountain regions with potential impacts relating to destabilisation of steep slopes, changes in sub-surface hydrology, and increased sediment load in rivers. During the exchange visit to Switzerland such impacts were well demonstrated with a visit to the village of Guttannen. Here thawing of permafrost on the mountain slopes high above the village led to rockfall and build-up of sediment in 2009. Subsequently the sediment became mobilised in a series of devastating debris flows which travelled down the mountain-side and damaged the national highway and major transnational gas pipeline in the valley bottom. As a consequence, the pipeline has been redirected, and a sophisticated early warning system now ensures the safety of the highway. Permafrost, related impacts and potential adaptation responses have so far received very little research attention in the Himalaya. However, the first results from the joint-studies in Kullu clearly demonstrate that permafrost is indeed a significant component of the local cryosphere, and together with the experiences gained in Switzerland, a strong basis now exists to expand research approaches across the broader Himalayan region and for designing adaptation projects in Kullu.

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