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**“Proyecto Glaciares 513”: an integrated assessment of high mountain hazards and related risk reduction in the Peruvian Andes.**

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The ice covered Peruvian Cordilleras are often seriously affected by high mountain hazards such as ice and rock avalanches, glacier lake outbursts, floods and debris flows. In the past, thousands of people have been killed in such disasters (Carey, 2005). More recently in 2010, massive floods in the Cusco Region and an outburst flood from glacier lake “Laguna 513” in the Cordillera Blanca (Ancash Region) drew the attention of the public, policy and science (Carey et al., 2012).

As a follow up of the Laguna 513 event in 2010 and corresponding to assessments by international experts (Haerberli et al., 2010), an integrative and international project was initiated in 2011, funded by the Swiss Agency for Development and Cooperation (SDC) and executed by the University of Zurich (UZH) and CARE-Perú. This project, “Proyecto Glaciares 513”, aims at sustainably enhance climate change adaptation and to reduce high-mountain risks in the Peruvian Cordilleras. Thus it combines three components. First, a local level with detailed case studies including the implementation of a monitoring and early warning system for ice/rock avalanches and glacier lake outburst floods downstream from Laguna 513 (Ancash), and a risk management system for rain-triggered mass movements in the region of Santa Teresa, Cusco. Secondly, an academic level to strengthen local capacities in glaciology, high-mountain processes, climate change and risk management. Finally, an institutional level to strengthen glaciology in Peru on a national and international level.

Here we focus on the risk management system for rain-triggered mass movements in the region of Santa Teresa, Department of Cusco, close to the Machu Picchu Inca City. Research about glacier and high-mountain hazards in the southern Peruvian Cordilleras of Cusco is still sparse although some of the largest debris flows worldwide affected this region in recent years (Frey et al. 2012, Huggel et al., 2003). In fact, very little is known about the nature, origin and dimensions of mass movements in this area, and long-term climatic records are neither available. In the framework of the “Proyecto Glaciares 513” a risk management system is being designed for the Distrito de Santa Teresa and its subcatchments. This system is structured through three components: technical, institutional, and social. Within the technical component (i.e. monitoring and communication) the origin, trigger and characteristics of potential hazards (Fig. 1) are analyzed with the final goal of generating a risk map for each community. This work is based on satellite images, field work, available meteorological data, and numerical modelling. A radio-communication system is currently being implemented to allow communication and interaction amongst the communities in case of an event. Furthermore a climatic and hydrological monitoring network is also being established and led by locals, with the support of the Local Water Authority (ALA) and the National Meteorological and Hydrological Service (SENAMHI). It includes both manual and automatic instruments to measure precipitation, temperature and relative humidity, as well as water levels in rivers.

In summary, the risk management system for the Distrito de Santa Teresa is already in a preliminary phase and takes into account not only the complex geomorphodynamics of such high-mountain environment under climate change but also the socio-economic and institutional characteristics of the region.

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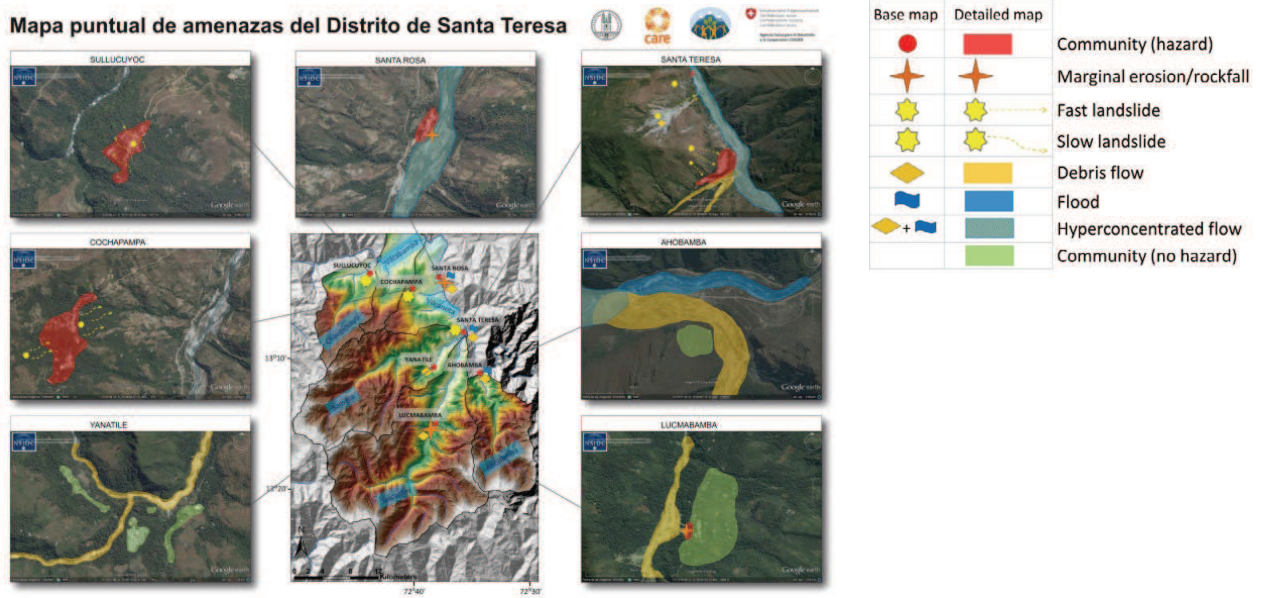


Figure 1. Hazard map for Santa Teresa, Cusco. It identifies the most significant geomorphodynamic processes that constitute a potential hazard for the most populated communities.