Geophysical Research Abstracts
Vol. 17, EGU2015-13131, 2015
EGU General Assembly 2015

Managing glacier related risks in the Chucchún Catchment, Cordillera Blanca, Peru

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On April 11 2010, the city of Carhuaz and settlements in the Chucchún Catchment (Ancash region, Peru) suffered the impact of a glacier lake outburst flood. An avalanche of rock and ice from the Mount Hualcán hit the glacier lake 513, triggering a glacial lake outburst flood (GLOF) of 1 million m3 which destroyed farmland and several infrastructures. Although there was no loss of human life, the event caused panic in the population. In consequence, the Municipality of Carhuaz prioritized GLOF-related risk management.

The Glacier Project, funded by Swiss Agency for Development and Cooperation, and executed by CARE Peru and the University of Zurich, fosters the coordination among public institutions (Glaciological Unit of the National Water Authority, the Ministry of Environment and Municipality) and the population for risk management. In this contribution we present all components of the risk management strategy as well as the lessons learned during the implementation.

Risk management involves managing both glacier hazard as well as the vulnerability of the population. In this framework a glaciological and geomorphological characterization of Mount Hualcán and lake 513 was perfomed in order to model past and potential future outburst floods and to assess the slope stability conditions. Based on three potential GLOF scenarios of different magnitudes, a hazard map was produced for the entire catchment, which served as the basis for the vulnerability and risk assessment as well as for the design and the implementation of an Early Warning System (EWS), including evacuation planning.

The EWS consists of 4 components: 1) knowledge of risk, through hazard and vulnerability characterization; 2) monitoring and alert, through the installation of monitoring stations on lake 513 for detecting avalanches with geophones and cameras; 3) broadcasting and communications, through the implementation of communication protocols between the Municipality of Carhuaz and emergency institutions (police, health centers and schools) and also authorities at higher coordination levels (Regional Government and the National Emergency Operations Center) enabling rapid emergency care; and 4) Responsiveness, through strengthening and training of public and private institutions and local leaders that make up the Civil Defense Platforms, the development of Emergency Operations Plan, and continuous organization of simulations for the population.

As result, the population is aware of the risks they face and knok how to respond in case of a lake outburst event. In addition, the results generated during studies related to the risk analysis are used for land management of the Municipality of Carhuaz. The successful implementation of this risk management strategy was only possible by combining comprehensively scientific and local knowledge.

This EWS represents a pilot experience in Peru and the Andes, and contributes to relatively scarce international experience with GLOF EWS. An important lesson is that these processes require active leadership of local authorities and continuous learning by the population. The mere existence of technology does not ensure the success of the risk reduction measures; this can only be attained by the internalization of processes and by taking responsibility against the existing hazard by each resident, authority and institution.