

Landslide monitoring and early warning from manual method to automatic early warning system; A case study of Mayoan Landslide, Hunza

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Abstract

Landslides are considered one of the most devastating natural hazards in the Himalayan Karakorum and Hindu-Kush mountain ranges and district Hunza is susceptible to landslide hazards. Mayoan is located on the right bank of Hunza River and is one of the most active landslides in the region. Most recently the western portion became active and bulging occurred in August 2012 due to the percolation of water from irrigation channel in winter and tensional cracks extended towards eastern end increased risk for the downstream population. Considering the risk the vulnerable households were evacuated to safer areas.

After assessing the hazard situation of landslide area, most basic methodology was adopted at that time for the community based monitoring of the landslide with the local government; this primitive method includes four wooden pegs installed on the either sides of tensional crack to monitor actual “crack width” “Slip, heave and throw” and “diagonal distance from alternate pegs”. Watch group was then made and trained on data collection, who visited the stations on initially weekly and then monthly basis. Analyses on data received at regional office revealed movement in the stations that were installed just above the settlement posing threat to 10 houses and school.

In collaboration with National Centre of Excellence in Geology, University of Peshawar (NCEG) conducted geophysical, geotechnical and topographic survey which revealed extent and profile of cracks, physical properties of rock formations and regolith and proposed recommendations considering the findings of field studies. One of the suggestions of the study was installation of the extensometers for the real time monitoring of the hazard and timely early warning.

Improvised early warning system comprised of extensometers at four locations on the slope and automatic weather station is now installed and functional, thresholds have been set for both the rate of slope movement and precipitation, it not only executes alerts directly to village; it also sends data to regional and head offices in Gilgit and Islamabad. Through online connectivity, it enables us to access the system remotely and set threshold accordingly. This system has enhanced the accuracy in measurement of displacement along the tensional cracks and ample time for the evacuation of the risk population. The early warning system has been installed in close collaboration with local government and GBDMA, this project has been initiated as pilot and will be a guide line for other vulnerable landslide across the region and a way forward for GBDMA, local government and other agencies.