

GLACIAL LAKE OUTBURST FLOOD MODELLING OF KHURDOPIN GLACIER ICE DAMMED LAKE USING HEC-RAS

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Abstract

Hydro meteorological hazards like flood, flash flood, snow avalanches and glacial lake outburst flood (GLOF) which caused loss of lives, damages to the properties and infrastructure yearly in northern area of Pakistan especially in the region of Hunza river basin particularly in Shimshal valley. Advancement of glaciers and damming of the rivers and streams is common phenomena in glaciated region of world, particularly Himalayas, Karakoram and Hindu Kush ranges. Region wise Karakoram glaciers are well known to create glacial lakes due to glacier surges which lead to trigger glacial lake outburst floods. Khurdopin glacier is located in upper reaches of Shimshal valley in Hunza district is one of the notorious for triggering GLOFs as it surges in cyclic manner. Due to exponential surging of glacier it reaches adjacent valley, thus blocking the Shimshal River and creating lake upstream. Historical data shows that it advances roughly in every two decades, i.e. 1960, 1980, 1999 and most recently in May 2017. Initially the lake size grew up to 700 meters in May 2017, which later drained gradually in August 2017 that damaged 10 kilometers of road section, 2 bridges and developed land. Although hazard was eased for time being, but surging did not stop. A much larger lake was spotted on 31 October 2017 on Satellite image, which posed much larger threat to the communities living downstream in form of GLOF. In this study we used high resolution (2 meter) Digital Terrain Model (DTM) and field data of critical sites acquired through Total Station and GPS. The GLOF zones were delineated using HEC-RAS. The results of modelling were verified from field and as well as with pre and post GLOF event imagery through change detection techniques. The proper mapping and monitoring of these hazards generate early warning mechanism for future is critical to increase the resilience of vulnerable communities living in low lying areas and sustainable development in hazard prone site of Shimshal valley.