

# MITIGATION OF FLOODS DUE TO GLACIAL LAKE OUTBURST

Most of the glaciers in the Himalayas have been receding during the past 50 years. This has led to the creation of many glacial lakes in the Himalayas. The moraine dammed glacial lakes can lead

to sudden glacial lake outburst floods (GLOF). The south Lhonak glacier in Sikkim, had a lake with a large volume and hence posed a serious threat to the villagers living downstream of the lake.



Glacial lake in Sikkim

The risk of GLOF can be modelled if information of lake area, volume, nature of moraines, topography and geography of the region is known. Therefore investigation using remote sensing and field data was carried out by multi agency team to assess potential hazard. Satellite images were used to map changes in lake extent from year 1976 to 2015. Then, field and model investigations were used to map glacier depth and extent of ice at the core of terminal moraines. Investigations have shown continuous growth in the aerial extent of the lake from 21 to 126 Hectare between years 1976 and 2015. The volume of lake water was estimated to be 53 million m<sup>3</sup> in the year 2014 and this was expected to increase to 90 million m<sup>3</sup> in the future due to further expansion. Resistivity survey has also shown the presence of ice at the core of terminal moraine. Therefore, GLOF simulation was carried out using flood models. This has provided information

on flood level and flood arrival time at different locations in the valley, indicating vulnerability of human life and property in the region.

The Department of Science and Technology requested Prof. Anil Kulkarni to call a one-day meeting of the experts at Divecha Centre for Climate Change to discuss various ways to mitigate the threat of GLOF. This meeting was held on 21<sup>st</sup> February 2015 at Divecha Centre for Climate Change. After a detailed discussion the experts concluded that a siphon system should be installed to decant the water slowly from the lake behind the moraine dam. This decision was communicated to the Sikkim government which has installed the siphon system. The photographs provide a glimpse of the events that led to the installation of the siphon.

Contributed by: Anil Kulkarni



Installation of siphon system



Siphon System after installation



Decantation of water from the lake