

Discharge and Risk Assessment for GLOF in Himalayan Region

Toru Koike^{1*}, Shuhei Takenaka¹, Jiro Komori², Jun Umemura³, Kengo Ohashi¹

¹Earth System Science Co.,Ltd., ²Nagoya University (JICA Expert), ³Nihon University

As typified by the 1994 Glacier Lake Outburst Flood (GLOF) in Bhutan, which caused serious damage to the downstream area and killed 21 residents along the river bank, GLOF has been a considerable hazard in Himalayan countries. Recently GLOF risk assessments have been attempted by a number of researchers generally based on glaciological and geotechnical approaches evaluating the in-situ outburst potential.

The actual flood risk at downstream reaches, however, depends on possible flood volume, the positional relation between lakes and protective villages and morphological features of the river channel in addition to the in-situ outburst potential. Those are key factors affecting flood-wave transmission and possible peak discharge to the downstream. Furthermore, we could preliminarily extract high-risk glacier lakes by estimating the critical peak discharge at each protected village. In this study, we conducted an unsteady flow analysis focusing on several glacier lakes in Monde-Chhu river basin in central Bhutan, and evaluated the hazard risk at Bjeezam village.

Consequently, the minimum discharge amount that can inundate Bjeezam village was estimated at 1,700 m³/s, and was triggered by an outburst of more than 15 million m³ in flood volume.

Additionally, we predicted that even a lesser amount of outburst can transmit flood-waves downstream with less-damping of discharge and damage Bjeezam village in case the river course of the valley is enough narrow.

In this year, we extract high-risk glacier lakes in Monde-Chhu river basin from a view point of possible outburst water volume estimated from lake-bed configuration by field survey.

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