

Impact of Climate Change on Glacial Lake and Numerical Approach to Predict Glacial Lake Outburst Flood

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The Himalayan glaciers are rapidly melting due to climate change, which results the formation or rapid development of the glacial lakes. The rapid development of glacial lake may cause the outburst of the lake at any time. The field assessment of Tsho Rolpa Glacial Lake of Nepal has been discussed. The Tsho Rolpa glacial lake is the largest and most potentially dangerous glacial lake of Nepal. In addition, a numerical approach to predict glacial lake outburst flood due to moraine dam failure by seepage and overtopping has been presented.

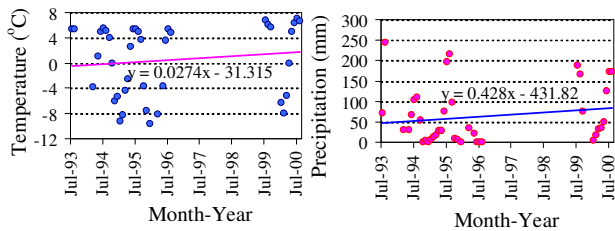


Fig.1 Trend of temperature and precipitation change at Tsho Rolpa Lake, Nepal.

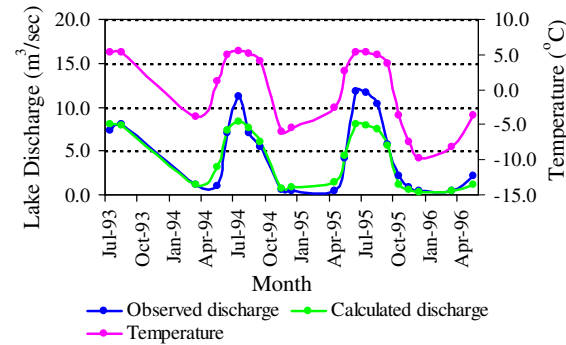


Fig.2 Relation of temperature and lake outlet discharge at Tsho Rolpa Lake.

Fig.1 shows the trend of temperature and precipitation at Tsho Rolpa Lake. The relationship of temperature and lake outlet discharge is shown in **Fig.2**. The calculated discharge based on regression analysis is also shown in the figure.

The glacial lake outburst due to moraine dam failure

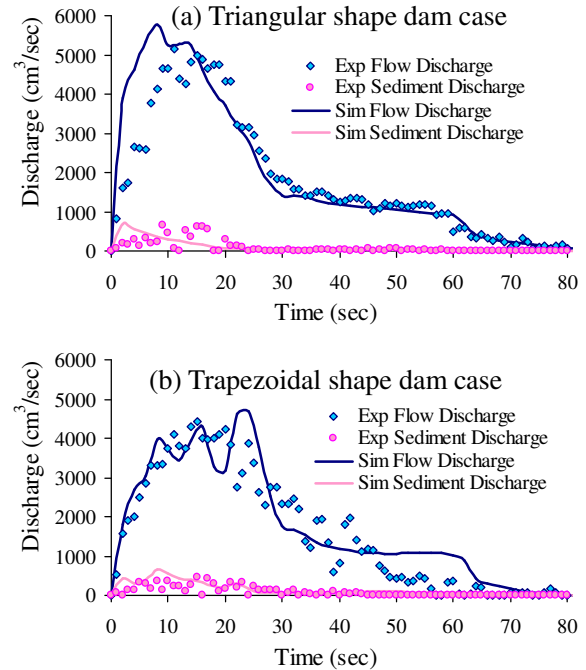


Fig.3 Numerical and experimental results of lake outburst discharge.

has been investigated through numerical model and flume experiments. The numerical analysis of moraine dam failure by seepage and overtopping has been performed. To compute the pore water pressure in the moraine dam and slope stability of the dam, a seepage flow model and a slope stability model are incorporated into a numerical model of flow and dam surface erosion. **Fig.3** shows the simulated and experimental results of the outburst discharge due to moraine dam failure by water overtopping. The peak discharge is higher in the case of triangular shape dam than trapezoidal shape. The sudden release of outburst discharge from the lake may cause the catastrophic disasters and flooding in downstream. The proposed numerical approach can be used to investigate the glacial lake outburst due to moraine dam failure by seepage and overtopping.