

## **Scientific Expedition to Understand the Crucial Issues of Rapid Lake Expansion and Moraine Dam Instability Phenomena to Justify the Lake Lowering Effort of Imja Lake, Khumbu Region of Sagarmatha, Nepal**

**Authors :** R. C. Tiwari, N. P. Bhandary, D. B. Thapa Chhetri, R. Yatabe

**Abstract :** The research enlightens the various issues of lake expansion and stability of the moraine dam of Imja lake. The Imja lake considered that the world highest altitude lake (5010m from m.s.l.), located in the Khumbu, Sagarmatha region of Nepal (27.90 N and 86.90 E) was reported as one of the fast growing glacier lakes in the Nepal Himalaya. The research explores a common phenomenon of lake expansion and stability issues of moraine dam to justify the necessity of lake lowering efforts if any in future in other glacier lakes in Nepal Himalaya. For this, we have explored the root causes of rapid lake expansion along with crucial factors responsible for the stability of moraine mass. This research helps to understand the structure of moraine dam and the ice, water and moraine interactions to the strength of moraine dam. The nature of permafrost layer and its effects on moraine dam stability is also studied here. The detail Geo-Technical properties of moraine mass of Imja lake gives a clear picture of the strength of the moraine material and their interactions. The stability analysis of the moraine dam under the consideration of strong ground motion of 7.8Mw 2015 Barpak-Gorkha and its major aftershock 7.3Mw Kodari, Sindhupalchowk-Dolakha border, Nepal earthquakes have also been carried out here to understand the necessity of lake lowering efforts. The lake lowering effort was recently done by Nepal Army by constructing an open channel and lowered 3m. And, it is believed that the entire region is now safe due to continuous draining of lake water by 3m. But, this option does not seem adequate to offer a significant risk reduction to downstream communities in this much amount of volume and depth, lowering as in the 75 million cubic meter water impounded with an average depth of 148.9m.

**Keywords :** finite element method, glacier, moraine, stability

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