## REDUCING POTENTIAL FLASH FLOOD RISK FROM GEPANG GATH LAKE, HIMACHAL PRADESH

Glacier lake outburst floods (GLOFs) occur when a large amount of water is catastrophically released from a glacial lake. They can be triggered by various events such as ice avalanches, hillslope landslides, extreme rainfall, earthquakes, or GLOFs in high multiple factors. mountain areas are difficult to predict and often pose severe downstream societal threats including infrastructure damage and human losses. In a rapidly warming climate, the risks of GLOFs have increased over the past few decades due to glacier melt and lake expansion. Moreover, climate change is causing a rise in the occurrence of intense rainfall episodes, along with a heightened risk of slope failures like avalanches and landslides. This trend is amplifying the exposure of mountain societies to these hazardous **GLOF** occurrences. mitigation is increasingly important in such contexts to reduce flood risk and protect vulnerable mountain communities.

Therefore, a study was conducted at Gepang Gath Lake, Western Himalaya, and its impact at a downstream settlement. We consider ground surface temperature and

topography to define avalanche source zones located in areas of potentially degrading permafrost. GLOF process chains in current and future scenarios. The study demonstrates the efficiencv of engineered lake lowering as an effective option for GLOF mitigation. Results show that a larger future lake does not necessarily produce larger GLOF events in Sissu, depending, among other factors, on the location from where the triggering avalanche initiates and strikes the lake. Ten meters of lowering lakes can reduce the high-intensity zone by 54%. However, it will affect Sissu village and the surrounding infrastructure. The approach can be extended to other glacial lakes to demonstrate the efficiency of lake lowering as an option for GLOF mitigation and enable a robust GLOF hazard and risk assessment.

*Reference:* Ashim Sattar, et al., 2023, Modeling Potential Glacial Lake Outburst Flood Process Chains and Effects From Artificial Lake-Level Lowering at Gepang Gath Lake, Indian Himalaya, Journal of Geophysical Research: Earth Surface 128(3)



**Figure 1:** (a) Schematic summarizing different scenarios of glacial lake outburst flood process chains modeled in the present study; the avalanche scenarios (GLOF triggers) include present and future avalanches (SC-1 to SC-6) with varied ice-rock ratios (the size of the pie charts represents the avalanche volume for scenario comparison); lake-lowering scenarios are given as L0, L10, and L30 for no lowering, 10 m lowering, and 30 m lowering, respectively.



**Figure 1:** (b) Reduction in the downstream inundation in modeled lake lowering of Gepang Gath, under the small, medium, and largemagnitude scenarios as given in Fig. a.



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