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ABSTRACT

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Understanding the Growing Threat of Glacial Lake Outburst Floods in the Himalaya

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ABSTRACT

Glacial Lake Outburst Floods (GLOFs) are emerging as a major hazard in the Himalaya due to climate-change-driven glacier retreat and rapid glacial lake expansion. In the Indian Himalaya, particularly across Jammu and Kashmir, Ladakh, Himachal Pradesh, and Uttarakhand, expanding high-altitude lakes increasingly threaten downstream communities and infrastructure. This study examines the growing GLOF risk and evaluates potential mitigation strategies under changing climatic and socio-economic conditions. A case study of Dulung Glacier reveals a reduction in glacier area from 12.35 to 10.6 km^2 between 1977 and 2020, while the associated Dulung Lake expanded from 0.1 to 0.5 km^2 during the same period, representing a 400% increase in lake area. These findings highlight rapid cryospheric transformation and escalating potential for GLOF events in the region. The study emphasises the need for integrated risk-reduction strategies, including continuous monitoring, early-warning systems, and climate-resilient infrastructure planning, to enhance the resilience of vulnerable Himalayan communities.

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