



## Enhancing Flood Preparedness: Modeling the Shishper glacier's Glacial Lake Outburst Flooding in Pakistan using Satellite Data and 2D Hydraulic Modeling

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The Shishper Glacier in Pakistan has caused multiple incidents of glacier lake outburst flooding (GLOF), including recent events that occurred in consecutive years. The presence of an ice-dammed lake created by the Shishper Glacier poses significant risks to communities, infrastructure, and people's livelihoods downstream. To decrease the likelihood of GLOFs associated with the Shishper Glacier, it is important to implement an early warning system and effectively manage the water release from the glacial lake. This study used satellite imageries from Landsat and Sentinel 2, and ALOS 30 m DEM, to analyze the areal and volumetric expansion of glacial lake, formed by the blockade of Mochuwar Glacier by terminus of Shishper Glacier at the point of confluence. This terminus extends further downstream and has been the cause of several GLOF events in past. The Shishper Glacier has recently had many surges, the most recent of which occurred in 2022, 2020, 2019 and 2018. In this study, HEC-RAS 2D model was used to reproduce the Shishper glacier lake outburst flooding (GLOF2022) and assess its impacts on the areas located downstream. The findings of the study will contribute to proactive measures that can prevent future disasters and ensure the safety of the vulnerable population and critical infrastructure.