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An overview of glacial hazards in the Himalayas

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Abstract

Glaciers and snowfields can form potential hazards in the Himalayas, and in similarly glacierised regions of the world. Some glaciological phenomena can have significant impacts upon society over a short time scale (minutesâ€“days), such as ice/snow avalanches and glacial floods. Other related hazards can be equally serious but less obvious when considered on a much longer time scale (monthsâ€“yearsâ€“decades), such as glacier volume fluctuations leading to water resource problems. Only when humans and their activities become vulnerable to glacier-related processes is there considered to be a hazard risk.

As glaciers recede in response to climatic warming, the number and volume of potentially hazardous moraine-dammed lakes in the Himalayas is increasing. These lakes develop behind unstable ice-cored moraines, and have the potential to burst catastrophically, producing devastating Glacial Lake Outburst Floods (GLOFs). Discharge rates of 30,000Â m^3Â $s^{â^'1}$ and run-out distances in excess of 200Â km have been recorded.

Despite the scale of the risk, it is possible to assess and mitigate hazardous lakes successfully. Hazard assessment using satellite images has been effective for remote areas of Bhutan, and remediation techniques successfully developed in the Peruvian Andes are now being deployed for the first time in Nepal.

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