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# Experts point to climate change impact

Glacier retreat, permafrost thaw are projected to decrease the stability of mountain slopes, say reports

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NEW DELHI

A deluge that resulted from a glacial melt on Nanda Devi flooded Rishiganga river in Uttarakhand and washed away at least two hydroelectric power projects – the 13.2 MW Rishiganga hydroelectric power project and the Tapovan project on Dhauliganga river, a tributary of the Alakananda.

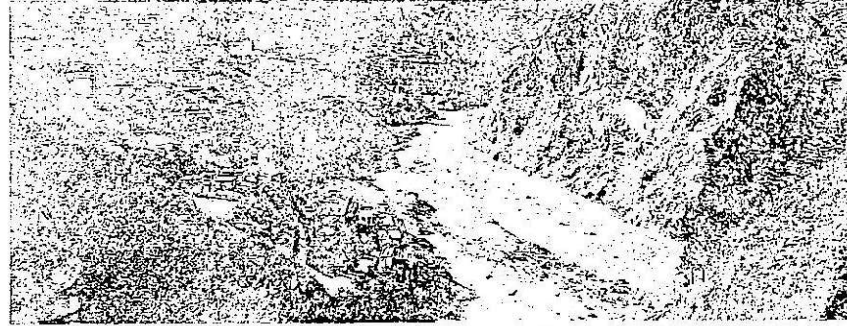
There were also concerns that the excess water would further travel downstream to river Alaknanda and threaten villages as well as hydro projects on the river.

However, the India Meteorological Department said that no rain is forecast.

Officials of the Central Water Commission, meanwhile, said the flooding from the glacial burst had been contained.

Environmental experts attributed the Nanda Devi glacial melt to global warming. Glacier retreat and permafrost thaw are projected to decrease the stability of the mountain slopes and increase the number and area

**When the hills shake** Major natural disasters in the region over the past three decades:



Nature's fury: Part of a glacier broke off in Joshimath in Uttarakhand's Chamoli district on Sunday, causing a massive flood in the Dhaulti Ganga river. • PTI

**1991: Uttarkashi earthquake** – An earthquake of 6.8 magnitude hit the undivided state of Uttar Pradesh in October 1991. At least 768 people were killed and thousands of homes destroyed

**1998: Malpa landslide** – The small village of Malpa was wiped out in a landslide in which nearly 255 people, including 55 Kailash Mansarovar pilgrims, were killed. The resulting debris partially blocked Sharda river

**1999: Chamoli earthquake** – An earthquake of 6.8 magnitude hit Chamoli district killing over 100 people. The adjoining Rudraprayag district was also heavily affected. Several ground deformations were reported as a result of the earthquake, and landslips and changes in water flow were recorded. Cracks were observed on roads and on the ground

**2013: North India floods** – In June 2013, a multi-day cloudburst in Uttarakhand caused devastating floods and landslips. According to the State government, more than 5,700 people were presumed dead in the disaster. As bridges and roads were destroyed, more than 3 lakh people were trapped in the Valleys leading to the Char Dham pilgrimage sites

of glacier lakes, according to the latest assessment reports of the UN Intergovernmental Panel on Climate Change.

There is also high confidence that the number and area of glacier lakes will continue to increase in most regions in the coming decades, and new lakes will develop closer to steep and potential-

ly unstable mountain walls, where lake outbursts can be more easily triggered.

Farooq Azam, assistant professor, Glaciology and Hydrology division, IIT Indore, said such a glacial burst was an "extremely rare event". "Satellite and Google Earth images do not show a glacial lake near the region,

but there's a possibility that there may be a water pocket in the region. Water pockets are lakes inside glaciers, which may have erupted leading to this event. We need further analysis, weather reports and data to confirm if this indeed was the case," he said.

Climate change has driven

erratic weather patterns like increased snowfall and rainfall, and warmer winters had led to the melting of a lot of snow. The thermal profile of ice, said experts, was increasing. Earlier the temperature of ice ranged from -6 to -20 degree Celsius; it is now -2 making it more susceptible to melting.