

Rasuwa Bhotekoshi Flood 2026: Reconstruction of the Event and Rapid Damage and Needs Assessment

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Abstract: On 26 August 2026, a rock-ice avalanche in the upper Bhotekoshi watershed near the Nepal–China border triggered a devastating debris flow that travelled over 180 km along the Bhotekoshi–Trishuli river corridor, reaching Devghat within six and a half hours. This study reconstructs the event using satellite imagery, seismic records, hydrological data, drone surveys and field observations. The findings identify a rock-ice avalanche as the primary trigger, ruling out earlier assumptions of a glacial lake or landslide dam outburst. Flood heights reached approximately 32 m at Betrawati and 12 m at Darshantar, causing extensive sediment deposition, landslide reactivation and riverbank erosion. The disaster affected five districts, damaging approximately 7,570 buildings and impacting 8,317 households. The Rapid Damage and Needs Assessment estimated total disaster effects at US\$2.70 billion and recovery needs at US\$4.77 billion, with hydropower, roads and housing among the most affected sectors. The event demonstrates how interconnected geological and hydrological hazards can rapidly escalate into large-scale disasters. Climate-related glacier retreat may have contributed to slope instability, highlighting the need for integrated multi-hazard risk assessment, improved monitoring, early warning systems and risk-informed reconstruction to strengthen resilience in vulnerable Himalayan communities.

Keywords: *Rock-ice avalanche, Debris flow, Multi-hazard, Rapid Damage and Needs Assessment (RDNA), Bhotekoshi–Trishuli*

Introduction

The Himalayan region is highly vulnerable to natural disasters due to its steep terrain, fragile geology and changing climatic conditions. Hazards such as landslides, rock avalanches, glacial floods and debris flows can occur together, creating cascading effects that cause severe damage to communities and infrastructure.

On 26 August 2026, a major rock-ice avalanche in the upper Bhotekoshi watershed near the Nepal–China border triggered a destructive debris flow that travelled over 180 km along the Bhotekoshi–Trishuli river corridor. The disaster caused extensive sediment deposition, riverbank erosion, landslide reactivation and infrastructure damage across five districts. Total disaster effects were estimated at US\$2.70 billion, with recovery needs reaching US\$4.77 billion.

This study examines the causes, impacts and interconnected hazards associated with the disaster. It

also highlights the possible influence of climate change on slope instability and emphasizes the importance of integrated multi-hazard risk assessment, early warning systems and resilient reconstruction in the Himalayan region.

Causes and cascading impacts of the disaster

The 26 August 2026 Bhotekoshi–Trishuli disaster began with a massive rock-ice avalanche in the upper Bhotekoshi watershed near the Nepal–China border. As the collapsed rock and ice moved downslope, it mixed with water and loose sediments, forming a powerful debris flow that travelled more than 180 km downstream. Satellite imagery and field investigations confirmed that the event was not caused by a glacial lake outburst or landslide dam failure, as initially suspected. The rapid movement of debris and water caused severe riverbank erosion, sediment deposition and further slope instability. Flood heights reached approximately 32 m at Betrawati and 12 m at Darshantar, while sediment deposits were up to 15 m thick in some locations. The flood also reactivated the Krishnabhir landslide by eroding its base. Climate change may have indirectly contributed to the disaster through glacier retreat and the weakening of mountain slopes, although its exact role remains uncertain. This event demonstrates how one natural hazard can trigger several others, creating cascading and compounding impacts across an entire river system.

Damage assessment and recovery needs

The disaster caused widespread damage across five districts of Nepal: Rasuwa, Nuwakot, Dhading, Gorkha and Chitwan. According to the Rapid Damage and Needs Assessment (RDNA), conducted by the National Planning Commission in coordination with the National Disaster Risk Reduction and Management Authority (NDRRMA) and other government agencies, approximately 7,570 buildings and 8,317 households were affected. The total economic effects of the disaster were estimated at US\$2.70 billion, with infrastructure accounting for 46.6% of the total. Hydropower facilities, roads and private housing were among the most severely affected sectors. The estimated recovery and

reconstruction needs reached US\$4.77 billion, of which 75.3% was allocated to infrastructure. Around US\$58 million was required for immediate recovery within the first six months, while approximately US\$630 million was identified for cross-cutting recovery needs, primarily disaster risk reduction. These findings highlight the need for safer infrastructure planning, improved early warning systems, continuous monitoring of unstable mountain slopes and risk-informed reconstruction. Rather than simply rebuilding damaged structures, recovery efforts should focus on reducing future vulnerabilities and strengthening the resilience of communities living along Himalayan River corridors.

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Disaster risk reduction and future preparedness

The Bhotekoshi–Trishuli disaster highlights the importance of improving disaster preparedness in the Himalayan region. Since hazards such as rock avalanches, landslides and debris flows can occur together, traditional single-hazard assessments may not be sufficient. Regular monitoring of glaciers, unstable slopes and river conditions using satellite imagery, seismic instruments and field investigations can help identify potential risks. Strengthening early warning systems and improving communication with downstream communities are also essential for reducing future losses. Infrastructure such as hydropower plants, roads and bridges should be planned and reconstructed by considering multiple hazards and possible cascading effects. In addition, community awareness, evacuation planning and coordination between government agencies can improve emergency response. These measures can help reduce future disaster risks and strengthen the long-term resilience of vulnerable mountain communities.

Conclusion

The 26 August 2026 Bhotekoshi–Trishuli disaster highlights how a single rock-ice avalanche can trigger multiple hazards, resulting in widespread environmental, social and economic damage. The event demonstrated the interconnected nature of landslides, debris flows, riverbank erosion and sediment movement in the Himalayan region. Although climate change may have contributed to slope instability, geological conditions also played an important role. The extensive damage to infrastructure and settlements emphasizes the need for better disaster preparedness, continuous monitoring and effective early warning systems. The disaster also highlights the importance of adopting a multi-hazard approach rather than assessing natural hazards separately. Future recovery and reconstruction efforts should focus not only on rebuilding damaged infrastructure but also on reducing