



DAILY EDITORIAL ANALYSIS

TOPIC

**BHOTEKOSHI FLASH FLOOD IN
NEPAL: A HIMALAYAN TRAGEDY**

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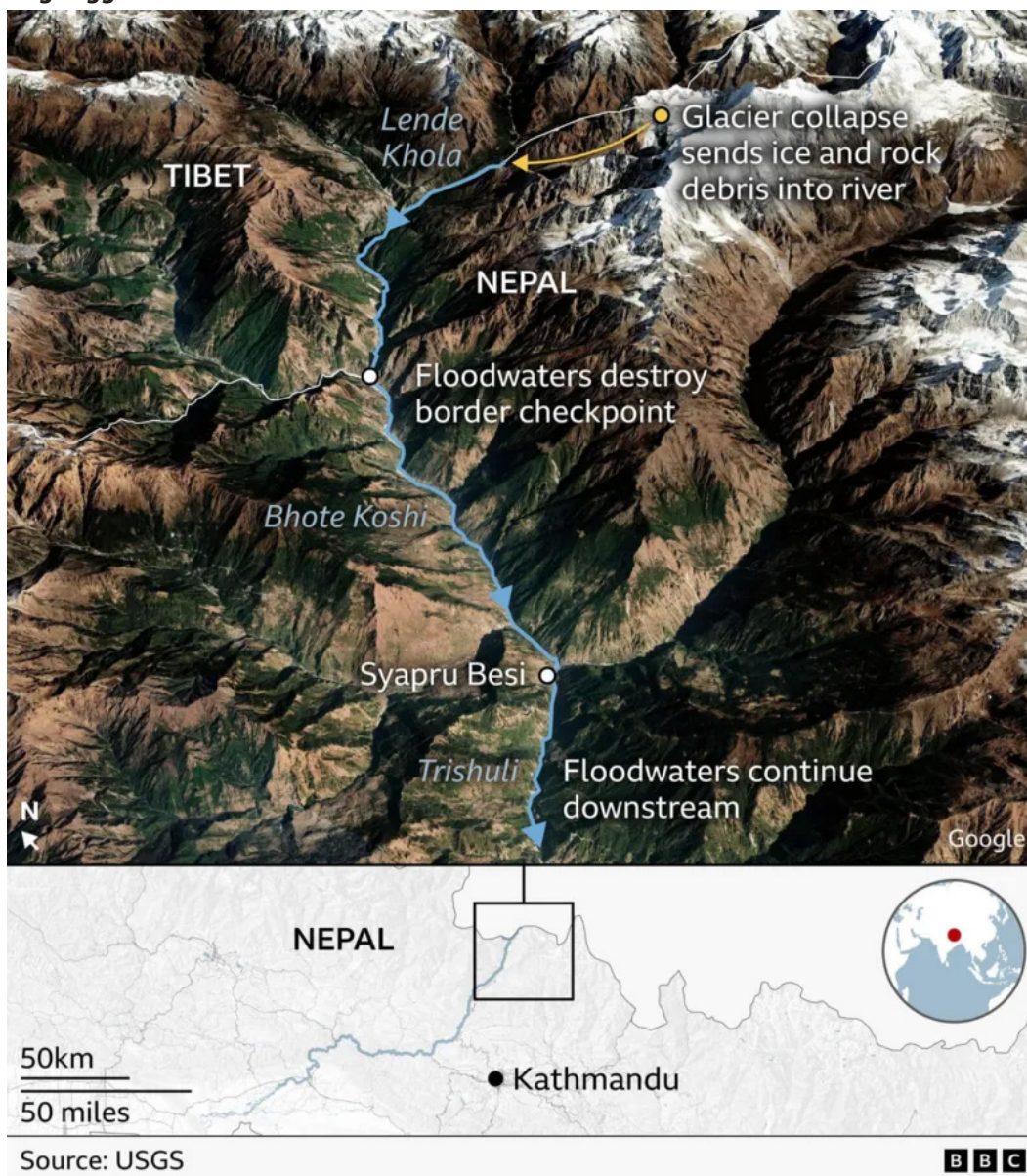
BHOTEKOSHI FLASH FLOOD IN NEPAL: A HIMALAYAN TRAGEDY

Context

- Recently, a devastating flash flood in Nepal's **Bhotekoshi River system** caused widespread destruction across **Rasuwa, Nuwakot and Dhading**.
- The affected **Rasuwagadhi–Bhotekoshi–Trishuli corridor** is strategically important because it connects Nepal with Tibet and carries substantial cross-border trade and pilgrimage traffic.

About Bhotekoshi Flash Flood and the Himalayan Flood Phenomenon

- Satellite observations indicate a **complex interaction** involving an **ice avalanche, permafrost movement and rockslide**.
- Scientists have described the triggering mass movement as a **sturzstrom** (a catastrophic rock avalanche capable of travelling rapidly over long distances).
- When rock mixes with ice, snow, frozen soil and water, friction and resistance may decline, allowing the mass to accelerate and transform downstream into a **debris flow and flood**.
- It is **distinct from a conventional monsoon flood** and illustrates why Himalayan disasters can have **multiple interacting triggers**.



Link with the Wider Himalayan Crisis

- The Himalayas are increasingly experiencing compound hazards: **glacial lake outburst floods (GLOFs), landslides, avalanches, cloudbursts, debris flows and extreme rainfall.**
- The Chamoli disaster in Uttarakhand (2021) similarly involved a massive rock-and-ice avalanche that transformed into a destructive debris flow.
- The **Bhotekoshi event** also follows earlier flood episodes in the same river system, demonstrating the vulnerability of Himalayan valleys to sudden high-altitude disturbances.

Key Reasons for Floods in Himalayan Regions

- **Glacier & Permafrost Instability:** Rising temperatures accelerate glacier retreat and thaw permafrost, weakening mountain slopes.
- **Glacial Lake Outburst Floods (GLOFs):** Rapidly expanding glacial lakes can breach their natural dams and release enormous volumes of water.
- **Extreme precipitation:** Climate change can intensify short-duration, high-intensity rainfall and cloudbursts.
- **Steep topography:** Large elevation gradients convert slope failures into high-velocity debris flows.
- **Seismic and geological fragility:** Young, tectonically active mountains are naturally prone to landslides and rockfalls.
- **Unplanned infrastructure:** Roads, hydropower projects and settlements can disturb unstable slopes and river channels.
- **Transboundary river systems:** Hazards originating in one country can rapidly affect downstream communities in another.

Impacts of Himalayan Floods

- **Human and Economic Costs:** Floods cause deaths, displacement, destruction of homes, agricultural losses and disruption of livelihoods.
 - ♦ Remote mountain communities are particularly vulnerable because damaged roads and bridges can isolate them from relief.
- **Infrastructure and Connectivity:** Hydropower installations, roads, bridges and border trade infrastructure face severe risks.
 - ♦ Damage to the **Rasuwagadhi crossing** can affect Nepal-China commerce and regional connectivity.
- **Ecological Impacts:** Floods and landslides accelerate soil erosion, destroy habitats and destabilise river ecosystems.
 - ♦ Repeated disturbances can reduce the resilience of fragile mountain ecosystems.
- **Strategic and Regional Implications:** Because Himalayan rivers cross national boundaries, disaster management requires **India-Nepal-China cooperation**, particularly for information sharing, satellite monitoring and downstream warnings.

Efforts and Initiatives: Global and Indian

- India has progressively strengthened its disaster-management architecture through the **Disaster Management Act, 2005, NDMA, National Disaster Response Force (NDRF)** and **Central Water Commission (CWC)** flood forecasting mechanisms.
- Important measures include:
 - ♦ **Early Warning Systems (EWS)** and real-time hydrometeorological monitoring.
 - ♦ **GLOF risk assessment and glacial-lake monitoring.**
 - ♦ **InSAR and satellite-based landslide surveillance.**

- ♦ Hazard zonation and climate-resilient infrastructure.
- ♦ Community-based disaster preparedness and evacuation drills.
- ♦ Improved coordination between **IMD, CWC, ISRO, NDMA and state authorities**.
- At the international level, the **Sendai Framework for Disaster Risk Reduction (2015–2030)** promotes understanding disaster risk, strengthening governance, investing in resilience and improving preparedness.
- The **UN Early Warnings for All initiative** seeks universal access to effective early-warning systems, while the **World Bank** supports disaster-risk financing, resilient infrastructure and climate adaptation in vulnerable countries.
 - ♦ The **World Bank and International Finance Corporation (IFC)** reports show that **investing in climate resilience** delivers **high returns**, typically yielding **\$4 to up to \$8.60** in protected value or net benefits for every **\$1 invested**.

Flood-Resilient, Sustainable Himalayas

- **Climate change should not automatically be treated as the sole cause of every Himalayan disaster.**
 - ♦ In the Bhotekoshi case, scientists have identified several interacting geological and climatic factors.
- The Bhotekoshi tragedy highlights a crucial limitation: **an early warning is useful only when there is sufficient time to act.**
 - ♦ Extremely rapid events such as sturzstroms can overwhelm conventional warning systems.

Way Forward

- A sustainable Himalayan strategy should therefore focus on:
 - ♦ **Multi-hazard early-warning systems**, rather than flood-only systems.
 - ♦ Continuous monitoring of glaciers, glacial lakes, permafrost and unstable slopes.
 - ♦ **Risk-sensitive land-use planning** and prohibition of construction in high-risk zones.
 - ♦ Climate-resilient roads, bridges and hydropower infrastructure.
 - ♦ Restoration of mountain wetlands, forests and natural drainage systems.
 - ♦ Stronger **transboundary data sharing** among Himalayan countries.
 - ♦ Local communities as the first responders through training and evacuation planning.
 - ♦ Greater emphasis on **disaster prevention and risk reduction**, rather than post-disaster relief alone.

Conclusion

- The Bhotekoshi flash flood is a reminder that the Himalayan disaster landscape is evolving from **predictable seasonal flooding towards complex, compound and potentially extremely rapid hazards**.
- The goal should not merely be to rebuild what has been destroyed, but to determine **where rebuilding is safe and sustainable**.
- A flood-resilient Himalayas will require the integration of geology, glaciology, climate science, technology, ecological conservation and regional cooperation.

Source: IE

Daily Mains Practice Question

- [Q] **Discuss the geological, climatic and anthropogenic factors behind Himalayan floods. Examine their implications for India and other Himalayan countries, and suggest measures for building a flood-resilient and sustainable Himalayas.**

