



KAMARAJ IAS ACADEMY
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BOLSTERING HIMALAYAS DISASTER MANAGEMENT

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Introduction to Indian Himalayan Region

Location

The Indian Himalayan Region extends across thirteen states and union territories, encompassing Ladakh, Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Sikkim, West Bengal, along with parts of the northeastern states. This vast expanse highlights the region's complexity and diversity.

Geographical Divisions

The Himalayas are broadly categorised into three principal geographical entities:

Himadri (Greater Himalaya): The innermost and highest range, known for its towering snow-capped peaks.

Himachal (Lesser Himalaya): Located south of the Himadri, this range features lower altitudes and is characterised by deep valleys.

Siwalik (Outer Himalaya): The outermost range, consisting of foothills and lower elevations.

Additionally, the Trans-Himalayan Ranges form the northernmost belt, including the Karakoram Mountains. The Zaskar and Ladakh ranges are situated to the south of the Karakoram.

Major Rivers

This region hosts several major rivers, such as the Indus, Sutlej, Kali, Kosi, and Brahmaputra. These rivers are primarily glacier-fed and carve out steep gorges as they flow through the Himalayan terrain, eventually reaching the Great Plains.

Significance

The Himalayan region is vital for providing water to a significant portion of the Indian subcontinent. It also supports a rich variety of flora and fauna, contributing to the ecological diversity and environmental balance of the area.

Why Himalayas are prone to high-risk disaster?

1 Young & Unstable Mountain System

The Himalayas are geologically young fold mountains formed by the collision of the Indian and Eurasian plates. Their rocks are weak, fragile, and prone to weathering and landslides.

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o**Example:** The **2024 Chamoli disaster in Uttarakhand** (glacier burst + landslide) killed many people, largely due to the unstable geology.

2Seismic Vulnerability (Earthquakes)

oThe Himalayas lie in **Seismic Zones IV & V**, making them highly prone to devastating earthquakes. The continued tectonic movement builds stress, which releases as quakes.

o**Example:** The **2015 Nepal earthquake (7.8 magnitude)** killed nearly 9,000 people and affected northern India.

3Glacial Lake Outburst Floods (GLOFs)

oRapid melting of glaciers due to climate change leads to the formation of unstable glacial lakes, which can burst suddenly.

o**Example:** The **South Lhonak Lake outburst in Sikkim 2023** caused flash floods, destroying the Teesta dam and killing over 40 people.

4Climate Change & Warming

oThe Himalayas are warming at nearly **twice the global average**, accelerating glacier melt, erratic rainfall, and extreme weather.

o**Example:** Increased cloudbursts and flash floods in Himachal Pradesh and Uttarakhand in **2023 monsoon** caused over 400 deaths.

5Steep Slopes & High Relief

oSteep gradients make the region naturally prone to landslides and flash floods.

oEven small triggers (rain, road-cutting, deforestation) can destabilize slopes.

6Unplanned Infrastructure Development

oRapid construction of roads, tunnels, hydroelectric projects, and urban centers without proper environmental assessment weakens slopes.

o**Example:** The **Joshimath land subsidence 2023** in Uttarakhand was linked to unregulated construction and tunnelling for the NTPC hydro project.

7Intense Monsoon Rains

oThe Himalayas receive heavy rainfall, and steep slopes funnel water into valleys, leading to floods and landslides.

o**Example:** **Himachal Pradesh floods 2025** caused massive destruction of roads, bridges, and homes.

8Deforestation & Land Use Change

oForests stabilize slopes and regulate water flow. Their removal for farming, settlements, or infrastructure increases soil erosion and landslide risk.

o**Example:** **Landslides in Darjeeling & Sikkim 2023** were worsened by hill cutting and deforestation.

9Population Pressure & Tourism

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oRising population and tourism put stress on fragile ecosystems. Settlements on unstable slopes and floodplains face high disaster risk.

o**Example:** The **Kedarnath tragedy 2013**, where over 5,000 died, was worsened by unregulated hotels and shops near the temple.

10. Transboundary Hazards & Cascading Effects

Many Himalayan rivers and glaciers are shared across India, Nepal, Bhutan, and China. A disaster in one region can trigger impacts downstream.

Example: The **Teesta flood 2023** in Sikkim affected not only India but also Bangladesh downstream.

Government initiatives to mitigate disaster risk

1National Mission on Sustaining the Himalayan Ecosystem (NMSHE)

- Part of the National Action Plan on Climate Change (NAPCC).
- Aims to understand and monitor the impact of climate change on Himalayan glaciers, biodiversity, and communities.
- Helps in reducing long-term disaster risks from glacial retreat, biodiversity loss, and changing hydrology.
- Example: Establishment of Himalayan Research Institutes (like G.B. Pant National Institute of Himalayan Environment).

2National Landslide Risk Mitigation Project (NLRMP)

- Implemented by the Ministry of Mines & Geological Survey of India (GSI).
- Focuses on hazard mapping, early warning systems, landslide stabilization, and awareness campaigns in Himalayan states.
- Example: Landslide susceptibility maps have been created for Uttarakhand, Himachal Pradesh, and Sikkim to identify high-risk zones.

3Himalayan Hydro-Projects Safety Measures

- After repeated dam failures, stricter Environmental Impact Assessments (EIA) and guidelines for hydropower in fragile Himalayan valleys were issued.
- NDMA and CWC (Central Water Commission) monitor dam safety.
- Example: Post Teesta dam collapse (2023), the Centre mandated safety audits of all Himalayan hydropower projects.

4National Earthquake Risk Mitigation Project (NERMP)

- Focus on seismic micro-zonation, retrofitting of lifeline buildings, and earthquake-resistant construction in Himalayan states (which fall in high seismic zones).
- Example: Pilot projects for retrofitting schools and hospitals in Gangtok (Sikkim) and Shimla (Himachal Pradesh).

5National Disaster Management Authority (NDMA) Framework

- NDMA (set up under the Disaster Management Act, 2005) lays down guidelines for managing earthquakes, landslides, floods, and GLOFs (Glacial Lake Outburst Floods).
- Special focus is given to the Himalayan states because of their seismic sensitivity and fragile ecology.
- Example: NDMA issued guidelines for Landslide Risk Reduction (2009) and Glacial Lake Outburst Floods (2020) for Himalayan terrain.

6Community-Based Disaster Management (CBDM)

- Himalayan states promote local participation in disaster preparedness through mock drills, village disaster management committees, and use of local knowledge.
- Example: Himachal Pradesh State Disaster Management Plan includes school-level awareness programs for landslides and flash floods.

What measures can be adopted to enhance disaster resilience?

1Strengthening Early Warning Systems

- Use of satellite-based monitoring, AI, IoT sensors, and Doppler radars for accurate forecasts of floods, landslides, cyclones, and earthquakes.
- Example: After the 2023 Sikkim GLOF, India initiated real-time glacial lake monitoring with ISRO and ICIMOD support.

2Infrastructure Resilience & Retrofitting

- Enforce earthquake-resistant building codes, slope stabilization, and flood-resilient designs in vulnerable areas.
- Retrofitting critical lifeline structures (schools, hospitals, bridges).
- Example: Delhi Metro and Mumbai's monorail were built with seismic safety provisions for Zone IV

3Sustainable Land Use & Urban Planning

- Avoiding construction on floodplains, steep slopes, and landslide-prone zones.
- Introducing zoning regulations and hazard mapping for town planning.
- Example: Shimla Development Plan (2022) imposed restrictions on construction in high-risk zones.

4Ecosystem-Based Solutions (Nature-Based Infrastructure)

Promoting afforestation, wetland restoration, mangrove protection, and catchment area treatment to reduce disaster risks.

Example: Mangrove restoration in Odisha's Bhitarkanika reduced cyclone damage during Cyclone Fani (2019).

5Community-Based Disaster Management (CBDM)

Involving locals in preparedness through mock drills, training, and disaster management committees. Harnessing traditional knowledge for resilience.

Example: Nagaland Village Disaster Committees integrate indigenous practices for landslide management.

Conclusion

Disasters in regions like the Himalayas are inevitable, but their impacts need not be catastrophic. By combining science and technology with community wisdom, infrastructure resilience with ecosystem protection, and national planning with regional cooperation, India can shift from a reactive approach to a culture of preparedness and resilience. As the Sendai Framework for Disaster Risk Reduction (2015–2030) emphasizes, resilience is not just about saving lives during disasters, but about ensuring sustainable development, climate adaptation, and human security in the long run.