

# Flash Floods Strike Uttarkashi

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## Flash Floods Strike Uttarkashi : A deadly mix of rainfall, terrain, and glacial risk

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### Context

Recent **flash floods and mudslides** in **Dharali village** of **Uttarkashi district**, Uttarakhand, have claimed the lives of at least **four people**. Several **buildings, shops, and hotels** have been damaged. While cloudbursts are often blamed for such disasters in the region, this incident was caused by **continuous heavy rainfall** over the past **three days**, not a technical cloudburst.

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### Introduction

The **Himalayan state of Uttarakhand** is highly vulnerable to **landslides, flash floods, and glacial disasters** due to its fragile terrain, erratic weather patterns, and increasing climate variability. The recent incident in Uttarkashi once again highlights the deadly combination of **heavy rainfall, unstable slopes, and glacial activity** in this region.

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### Reasons Behind the Flash Floods in Uttarkashi

#### Topographical vulnerability

- Uttarkashi ranges from **800 to 6,900 metres** in elevation, with **snow-covered zones, glaciers, narrow valleys, deep gorges, and steep slopes**.
- The region slopes sharply southwest, with **valley drops of up to 800 metres**.
- The terrain is composed of **centuries-old mudslide layers**, which are easily destabilized by rainfall or minor tremors.

#### Rainfall intensity and pattern

- The district receives **1,289 mm average annual rainfall**, with the **southwest monsoon** (June–September) contributing the most.
- **July** is the **wettest month**, with average rainfall of **312 mm**.
- Though the rainfall on **August 5** was only **2.7 mm**, persistent rainfall over the previous days triggered the disaster.
- The IMD confirms it was **not a cloudburst**, which requires **100 mm of rainfall in one hour** over a **10x10 sq. km area**.

### Flash flood characteristics

- A **flash flood** occurs within **minutes to hours** of intense rainfall or sudden water release, such as from **glacial lake outbursts**.
- Flash floods have **rapid onset**, are **highly localized**, and **extremely destructive**, especially in **hilly terrains**.

### Role of glacial activity

- Satellite imagery reveals **large glaciers** and at least **two glacial lakes** above the affected village.
- Experts suspect a possible **glacial lake outburst flood (GLOF)** or **glacier burst** triggered the sudden surge of water.
- This event resembles the **2021 Raini disaster in Chamoli**, where a rock-ice avalanche killed over **200 people** and destroyed hydropower projects.

### Environmental and climate change factors

- **Climate change** is intensifying **rainfall patterns** and accelerating **glacier melt** in the Himalayas.
- Uttarkashi, situated on the **southern Himalayan slope**, lacks dense vegetation and natural barriers, allowing **loose moraine and soil** to slide rapidly.
- Even **moderate but continuous rainfall** can trigger **massive landslides and floods** in such high-altitude regions.

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## Glacial Lake Risk in Uttarakhand

- Uttarakhand has **1,266 glacial lakes**, many posing **severe threats** to downstream areas.
  - The **National Disaster Management Authority (NDMA)** has identified **13 glacial lakes as high-risk**, of which **5 are considered extremely dangerous** due to their potential for sudden breaches.
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## Conclusion

The Uttarkashi incident reflects the **rising vulnerability** of ecologically fragile Himalayan zones to **natural disasters** driven by **climate change, weak terrain, and unplanned development**. Even without a cloudburst, **persistent rainfall and glacial activity** are enough to unleash destructive flash floods.

There is a pressing need for:

- **Strengthened early warning systems**
- **Scientific monitoring of glacial lakes**
- **Climate-resilient infrastructure**
- **Sustainable development planning**

These steps are essential to reduce disaster risk and protect lives in India's mountainous regions.

