

Flash Floods in Uttarkashi: Causes, Topography, and Climate Change Risks Explained

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Flash Floods in Uttarkashi Latest News

- At least four people died as flash floods and mudslides struck Dharali village in Uttarkashi, Uttarakhand, damaging several buildings, shops, and hotels.
- While cloudbursts are common triggers of flash floods in Uttarakhand's hilly regions, the recent incident was not due to a technical cloudburst but rather sustained heavy rainfall over the past three days.
- The region's topography, prone to landslides during intense rains, caused mud and debris to surge into rivers, leading to destructive flash floods downstream.

Topography of Uttarkashi

- Uttarkashi district ranges from 800 to 6,900 metres above sea level, with vast snow-covered areas and several glaciers.
- It houses the source regions of the Ganga (Gangotri) and Yamuna (Yamunotri) rivers.

- The terrain is rugged, with high ridges, perennial rivers, narrow valleys, and deep gorges.
- Land slopes sharply southwest, with valley drops of up to 800 metres.

Rainfall Pattern in Uttarkashi

- Uttarkashi receives an average annual rainfall of 1,289 mm, with the southwest monsoon (June-September) bringing maximum rainfall, especially in southern areas.
- The highest recorded rainfall was 2,436 mm in 1969. July is the wettest month, averaging 312 mm.
- The district is also prone to frequent thunderstorms in its hilly regions.

Flash Flood

- A flash flood is a sudden, intense flood that occurs within a very short period (usually within 6 hours) of heavy rainfall, dam/levee failure, or sudden release of water (like glacier bursts or cloudbursts).
- Flash floods are characterized by:
 - Rapid onset and high intensity.
 - Localized impact, often affecting mountainous or hilly terrains.
 - Triggered by localized heavy rain, cloudbursts, glacial lake outbursts (GLOFs), or infrastructure failures.
- The distinguishing factor between a flood and a flash flood is the amount of time it takes for the flood to occur.
 - A flash flood occurs within minutes or hours. A flood occurs more gradually.
- Flash floods are often more dangerous because they occur with little warning.
- Their quick nature makes them much more powerful than floods, and they often become raging torrents of water, sweeping away everything in their path.

Factors Behind Uttarkashi Flash Floods

- Continuous rainfall over the past few days, combined with Uttarkashi's fragile topography, triggered mudslides, debris flows, and flash floods.
- Climate change-induced intense rainfall and accelerated glacier melting further worsened the situation.
- Rainfall of any intensity, if continuous, recorded over such high altitudes where Uttarkashi is located, can be disastrous.
- That is because this region is built on layers of mudslides over the past several centuries.
- Uttarkashi district is situated along the southern Himalayan slope, where there is limited vegetation and no significant obstruction.
- Mild triggers such as rainfall or earthquakes can cause loose moraine and soil to easily slither downhill, swallowing homes and roads along its path.

Glacial Avalanche or Lake Breach Suspected

- Satellite imagery confirmed the presence of large glaciers and at least two glacial lakes directly above the affected area.

- Experts suspect a sudden release of water from a glacier burst or a GLOF could have unleashed the destructive torrent, similar to the 2021 Rains disaster in Chamoli.
 - In that incident, a rock-ice avalanche devastated hydropower projects and caused over 200 deaths.
- According to the Wadia Institute of Himalayan Geology, Uttarakhand has 1,266 glacial lakes, many of which pose severe risks to downstream communities.
- The National Disaster Management Authority (NDMA) has identified 13 glacial lakes as high-risk, with five classified as extremely dangerous due to their potential for sudden breaches.

Why Uttarkashi Rainfall Was Not a Cloudburst

- According to IMD, a cloudburst requires 100 mm rainfall in an hour over a 10×10 km area.
- Uttarkashi recorded only 2.7 mm in 24 hours till 8:30 am on August 5, with rainfall throughout the day remaining below cloudburst thresholds.
- Though heavy rains occurred in Uttarakhand, such as 300 mm in Haridwar, Uttarkashi's event did not meet cloudburst criteria.
- Cloudbursts cause widespread destruction—collapsing houses, disrupting transport, and leading to significant casualties.
- The growing frequency of these events necessitates robust disaster management policies, better infrastructure planning, and proactive global and national intervention, as urged by the 2023 research paper.

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