



Landslide Dams in Uttarakhand

Why in News?

A recent study by [IIT Roorkee](#) identified [the Alaknanda River](#), flowing through the Garhwal region, as the **most vulnerable to landslide-induced natural dams**. The study is titled '**Landslide Dam Studies in Uttarakhand, India: Past, Present, and Future**' and published by Springer.

- It highlights that the Alaknanda is followed by [the Mandakini](#), [Dhauliganga](#), and [Bhagirathi rivers](#) in terms of susceptibility to such dams.

Key Points

- **Findings of the Study:**
 - **Uttarakhand's Terrain:**
 - Uttarakhand's narrow valleys and gorges make it highly vulnerable to landslide-induced natural dams, which block rivers and create upstream lakes.
 - These blockages pose a significant risk of [landslide lake outburst floods \(LLOFs\)](#), which can have catastrophic consequences.
 - **Most Affected Areas:**
 - Chamoli, Rudraprayag and Uttarkashi, are the most affected by landslide dams.
 - The breach of **Gohna Tal in Chamoli** remains the region's most severe landslide dam incident, impacting areas downstream as far as Haridwar.
 - **Historical Context of Landslide Dams:**
 - Landslide dam formations in Uttarakhand trace back to the **Last Glacial Maximum (LGM)**, between 29,000 and 19,000 years ago.
 - Significant events of landslide damming have been recorded since the 19th century, with the most notable being the breach of Gohna Lake in 1970, which had long-term impacts.
 - **Current Trends and Concerns:**
 - The study indicates that the **peak month for landslide dam events is August**, coinciding with monsoon rains.
 - [Climate change](#), [deforestation](#), road construction, and [hydropower projects](#) have exacerbated the frequency of such events in recent decades.
 - **Risk Mitigation and Preparedness:**
 - While there have been fewer major incidents since 2018, the study stresses the need for **preparedness to mitigate future risks**.
 - The instability of landslide dams, especially in narrow valleys, poses significant challenges for [disaster management](#).
 - **Key Triggers of Landslides:**
 - **Heavy rainfall** and [cloudbursts](#) are identified as major triggers of landslides.
 - [Debris slides](#) are the most common type of landslide responsible for blocking rivers in Uttarakhand's hills.

Alaknanda River

- It is one of the **headstreams of the Ganga**.
- It **rises at the confluence and feet of the Satopanth and Bhagirath glaciers** in

Uttarakhand.

- It **meets the Bhagirathi River at Devprayag** after which it is called the Ganga.
- Its **main tributaries** are the **Mandakini, Nandakini, and Pindar rivers**.
- The Alaknanda system drains parts of **Chamoli, Tehri, and Pauri districts**
- The Hindu pilgrimage center of **Badrinath** and the natural spring Tapt Kund lie along the banks of the Alaknanda River.

Bhagirathi River

- It is a **turbulent Himalayan river** of Uttarakhand, and one of the two headstreams of the Ganges.
- The Bhagirathi **rises at the foot of Gangotri Glacier, at Gaumukh**, at an elevation of 3892m and fanning out into the 350 km wide Ganga delta, it finally empties into the Bay of Bengal.
- The **Bhagirathi and Alaknanda join at Devprayag in Garhwal** and are **thereafter known as the Ganges**.

Dhauliganga

- It originates from **Vasudhara Tal**, perhaps the **largest glacial lake** in Uttarakhand.
- Dhauliganga is one of the **important tributaries of Alaknanda**, the other being the **Nandakini, Pindar, Mandakini and Bhagirathi**.
- Dhauliganga is joined by the **Rishiganga river at Raini**.

