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Tawang Glacial Lakes and GLOF Risk in the Himalaya

21 June 2026

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Tawang Glacial Lakes and GLOF Risk in the Himalaya

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WHY IN NEWS

*A June 2026 satellite study found that **four of five glacial lakes in the Mago Chu basin near Tawang, Arunachal Pradesh, are expanding.** The largest, **Sanhapo Lake**, grew from **55.87 hectares in 2016 to 88.81 hectares by June 2026**, sharpening concerns about **Glacial Lake Outburst Floods (GLOFs)** in the eastern Himalaya.*

The findings, based on satellite analysis by a private geospatial firm, add to mounting evidence that a warming climate is reshaping the Himalayan cryosphere (<https://ujyari.com/vocab/cryosphere/>) and creating new disaster risks downstream.

WHAT IS A GLOF?

A **Glacial Lake Outburst Flood (GLOF)** is the sudden release of water from a glacial lake. Glacial lakes form when meltwater collects behind a natural dam, often a loose pile of glacial debris called a **moraine**. When this moraine dam fails, whether from overtopping, ice avalanche, earthquake or simple erosion, a massive volume of water and debris surges downstream with little warning.

ELEMENT	DESCRIPTION
Glacial lake	Meltwater body dammed by moraine or ice
Trigger	Avalanche, landslide, earthquake, overtopping
Hazard	Sudden, high-energy flood with debris
Reach	Can devastate valleys tens of kilometres downstream

THE TAWANG FINDINGS

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LAKE / PARAMETER	DETAIL
Basin	Mago Chu basin, Tawang, Arunachal Pradesh
Lakes expanding	4 of 5 studied
Sanhapo Lake (2016)	55.87 hectares
Sanhapo Lake (June 2026)	88.81 hectares

The expansion is driven by **accelerated glacial melt** as temperatures rise. Larger lakes mean larger potential flood volumes and greater pressure on the natural dams holding them.

Arunachal: India's GLOF Hotspot

According to the **Central Water Commission (CWC)**, **Arunachal Pradesh has 197 expanding glacial lakes, the highest in India**. The state's steep terrain, seismic activity (it lies in a high earthquake zone) and dense river network make it especially vulnerable.

WHY THE HIMALAYA IS WARMING FASTER

The Himalaya is part of the "Third Pole", holding the largest store of ice outside the polar regions. It is warming faster than the global average, a phenomenon linked to **elevation-dependent warming**. This accelerates glacier retreat, increases meltwater, and multiplies the number and size of glacial lakes.

THE SOUTH LHONAK PRECEDENT

The risk is not theoretical. In **October 2023, the South Lhonak Lake GLOF in Sikkim** breached the Teesta III dam at Chungthang, causing catastrophic downstream flooding and loss of life. It remains the most prominent recent reminder of GLOF danger in the Indian Himalaya and a template for what unmonitored lakes can unleash.

INSTITUTIONAL AND POLICY RESPONSE

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BODY	ROLE
National Disaster Management Authority (NDMA)	GLOF risk guidelines, mitigation (https://ujjyari.com/vocab/mitigation/) programme
Central Water Commission (CWC)	Monitoring and inventory of glacial lakes
State disaster authorities	Early warning, evacuation planning

The NDMA has been running a national GLOF risk-reduction effort, including lake-level monitoring, automated early-warning systems, and controlled lowering of high-risk lakes.

ANALYSIS AND WAY FORWARD

- **Continuous monitoring:** Combine satellite surveillance with on-ground sensors for high-risk lakes.
- **Early-warning systems:** Install and maintain automated alarms in vulnerable valleys.
- **Risk-informed development:** Avoid siting critical infrastructure (dams, settlements) in GLOF flood paths without safeguards.
- **Climate action:** Address the root cause, accelerated warming, through mitigation while building resilience (<https://ujjyari.com/vocab/resilience/>).

UPSC RELEVANCE

- **GS Paper 1 (Geography):** Himalayan geomorphology, glaciers, moraine-dammed lakes and the cryosphere.
- **GS Paper 3 (Environment / Disaster Management):** Climate change impacts, GLOF risk and disaster mitigation.
- **Prelims:** GLOF definition, Mago Chu basin, Arunachal having 197 expanding lakes (highest), South Lhonak 2023.
- **Mains:** “Glacial Lake Outburst Floods are an emerging climate-linked disaster in the Himalaya. Discuss causes and mitigation.”

FACTS CORNER

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GLOF: Glacial Lake Outburst Flood, the sudden release of water from a glacial lake.

Tawang study: 4 of 5 lakes in the Mago Chu basin expanding; Sanhapo Lake grew from 55.87 ha (2016) to 88.81 ha (June 2026).

Arunachal: 197 expanding glacial lakes per the CWC, the highest in India.

Precedent: South Lhonak Lake GLOF, Sikkim, October 2023.

Key bodies: NDMA (mitigation) and Central Water Commission (monitoring).

Sources: National Disaster Management Authority (<https://ndma.gov.in>), Central Water Commission (<https://cwc.gov.in>), Down To Earth (<https://www.downtoearth.org.in>)

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