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The Gangotri Crisis: When Glaciers Retreat, Water Wars Begin

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INTERVIEW ANGLE

"As Himalayan glaciers retreat, should India treat water security from glacier systems as a national security issue requiring the same strategic focus as defence?"

WHY IN NEWS

Gangotri National Park reopened for the 2026 summer season on April 1, 2026. The Gangotri glacier — primary source of the Ganga river — continues to retreat at approximately 22 metres per year, with total retreat of about 2 km since 1935.

THE EDITORIAL ARGUMENT

Each summer opening of Gangotri National Park brings tourists, trekkers, and pilgrims. It should also bring a serious national conversation about what it means when the world's largest democracy's most sacred river is losing its source. The Gangotri glacier's retreat is not a distant environmental abstraction — it is a slow-moving water security emergency that will manifest in India's most densely populated river basin within this generation.

THE GANGA BASIN: DEPENDENCY AT SCALE

The Ganga river basin is home to **over 800 million people** — more than double the population of the entire United States. The basin contributes approximately **40% of India's agricultural output** and is the economic engine of states from Uttarakhand to West Bengal.

The Gangotri glacier currently contributes approximately 40-50% of the Bhagirathi's dry-season flow. As the glacier retreats:

- **Short term (2026-2050):** Increased summer melt initially boosting flow ("peak water")

- **Medium term (2050-2080):** Declining glacier mass reducing summer flows — affecting irrigation, hydropower, and municipal water supply
- **Long term (2080-2100):** IPCC projects 50-70% loss of Himalayan glacier mass under high-emission scenarios — transforming perennial rivers into seasonal streams dependent on monsoon

THE PEAK WATER PARADOX

Scientists describe a "peak water" phase — as glaciers melt faster, they temporarily release more water than they accumulate. India may currently be in this phase. But this is the calm before the storm: increased meltwater masks the underlying depletion. When glacier mass falls below a critical threshold, the sharp decline begins.

India's hydropower projects in the upper Himalayan region — notably the Tehri Dam on the Bhagirathi — are designed for current flow regimes. A 30-40% reduction in dry-season flows (as some models project for 2060-2080) would significantly reduce hydropower generation, impacting northern India's power grid.

WHAT INDIA MUST DO

1. Accelerate Glacier Monitoring

India's glacier monitoring is fragmented across GSI (Geological Survey of India), WIHG (Wadia Institute of Himalayan Geology), SAC (Space Applications Centre/ISRO), and IMD. A consolidated national glacier monitoring authority with annual mass-balance reports for all major glaciers is overdue.

2. Integrate Glacier Data into River Basin Management

The National Mission for Sustaining the Himalayan Ecosystem (NMSHE) — one of NAPCC's eight missions — must be elevated from a research programme to an operational river basin management tool. Glacier data must feed directly into irrigation scheduling and dam operations.

3. Regulate Tourism in Fragile Zones

The NGT's 150 trekker/day limit at Gaumukh is a step in the right direction, but monitoring and enforcement are weak. The carbon footprint of Himalayan tourism — helicopters, diesel generators at camps, waste management failures — contributes to localised warming that accelerates glacier retreat.

4. Accelerate Emissions Commitments

India's NDC commitments and domestic clean energy transition directly impact Himalayan glacier futures. The science is clear: at 1.5°C warming, Himalayan glacier loss is manageable; at 2°C+, it becomes catastro

THE GEOPOLITICAL DIMENSION

China controls the Tibetan Plateau — the origin of the Indus, Brahmaputra, Mekong, Yangtze, and Yellow rivers. Chinese dam construction on the Brahmaputra (Yarlung Tsangpo) before it enters India creates downstream flow control risks. Himalayan glacier monitoring is therefore also a **strategic intelligence requirement** — India needs real-time data on Tibetan glacier status and upstream dam operations.

UPSC RELEVANCE

GS Paper 1 — Geography

- Himalayan river systems; Ganga basin; glacier hydrology; peak water concept
- Climate change and river flow patterns in India

GS Paper 3 — Environment

- NAPCC and NMSHE; climate change adaptation in water sector
- Protected area management (Gangotri NP); NGT orders
- Hydropower and river ecology conflicts

Mains Keywords

Gangotri glacier, peak water, NMSHE, NAPCC, Ganga basin water security, NGT, glacier monitoring, climate adaptation

📌 KEY FACTS

Gangotri glacier retreat: ~22 m/year; total retreat since 1935: ~2 km

Ganga basin population: 800+ million; 40% of India's agricultural output

NMSHE: National Mission for Sustaining the Himalayan Ecosystem (one of 8 NAPCC missions)

NGT trekker limit: 150/day at Gaumukh (2013)

IPCC: 50-70% Himalayan glacier loss by 2100 under high-emission scenario

Gangotri NP: 1989; 1,553 sq km; Uttarkashi, Uttarakhand

Sources: The Hindu , GSI , IPCC , Down to Earth

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