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EDITORIAL ANALYSIS

As Gangotri Opens, the Glacier Closes: Pilgrimage Tourism Cannot Ignore the Ice That Feeds the Ganga

DOWN TO EARTH

19 April 2026 · ENVIRONMENT · GEOGRAPHY · GS3 · GS1

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Down to Earth 19 April 2026 GS3 GS1

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INTERVIEW ANGLE

"Gangotri Temple opened today on Akshaya Tritiya, marking the start of the Char Dham Yatra 2026 — which will bring millions of pilgrims to Uttarakhand's Himalayan shrines. Down to Earth argues that the celebration of pilgrimage season cannot be separated from the ecological emergency at Gangotri Glacier — retreating at ~22 metres per year — which is the physical source of the Bhagirathi-Ganga river system. The Char Dham road project, the mass tourism infrastructure, and the absence of a cryosphere governance framework are collectively threatening the very glacial system that sustains hundreds of millions downstream. Is India's pilgrimage economy consuming the ecological foundation it depends on?"

EDITORIAL SUMMARY

Down to Earth argues that Gangotri Temple's opening on Akshaya Tritiya cannot be separated from the ecological emergency at Gangotri Glacier — retreating 22 m/year, threatening the Bhagirathi-Ganga's perennial character. The Char Dham road project accelerates hillside destabilisation; pilgrimage tourism adds ecological stress. India needs a Himalayan Cryosphere Authority, Gaumukh Eco-Sensitive Zone, pilgrim carrying capacity caps, and GLOF early warning systems — treating glaciers as national infrastructure, not scenic backdrops.

GANGOTRI GLACIER: KEY FACTS

PARAMETER	VALUE
Length	~30 km
Area	~143 sq km
Location	Uttarkashi district, Uttarakhand
Altitude (Gangotri town)	3,048 m
Altitude (Gaumukh snout)	3,892 m, 18 km upstream
Retreat rate	~22 metres per year
River formed	Bhagirathi → (joins Alaknanda at Devprayag) → Ganga

HIMALAYAN GLACIER GOVERNANCE FRAMEWORK (EXISTING)

AGENCY	ROLE	GAP
Geological Survey of India (GSI)	Glacier inventory and monitoring	Underfunded, fragmented
NCPOR (MoES)	Cryosphere research	Limited Himalayan focus
ISRO Space Applications Centre	Satellite-based glacier monitoring	No enforcement mandate
NMSHE (NAPCC 2008)	Mission for Sustaining Himalayan Ecosystem	Slow implementation, underfunded
Supreme Court HPC (2019)	Char Dham road project oversight	Recommendations not fully implemented

UPSC RELEVANCE

PAPER	ANGLE
GS1 — Geography	Himalayan river systems, glacier retreat, Panch Prayag, Ganga basin
GS3 — Environment	Climate change, IPCC 6th AR, cryosphere, NAPCC, NMSHE, GLOF
GS3 — Disaster	Glacial Lake Outburst Floods, 2013 Kedarnath floods, Sendai Framework
GS3 — Economy	Pilgrimage tourism economy, Uttarakhand tourism dependence
Mains Keywords	Gangotri Glacier, Gaumukh, Bhagirathi, Devprayag, glacier retreat, cryosphere, NMSHE, NAPCC, GLOF, Char Dham road project, Eco-Sensitive Zone, IPCC 6th AR, carrying capacity

KEY ARGUMENTS AT A GLANCE

Gangotri Glacier — the source of the Bhagirathi River that becomes the Ganga at Devprayag — is retreating at ~22 metres per year due to climate change, threatening the perennial character of India's most sacred and ecologically vital river; yet India's policy response remains inadequate: the Char Dham road project is cutting into ecologically sensitive Himalayan hillsides for tourist and pilgrim access, the absence of a dedicated Himalayan Cryosphere Authority leaves glacier monitoring and protection fragmented across multiple agencies, and pilgrimage tourism numbers at 30-55 lakh annually create waste, infrastructure pressure, and ecological stress at high altitudes; Down to Earth argues that India needs a legally binding Himalayan Cryosphere Protection Framework that treats glaciers as critical national infrastructure.

✓ SUPPORTING

- **The scale of the emergency:** Gangotri Glacier is approximately 30 km long and covers ~143 sq km — one of the largest glaciers in the Himalayas. Its retreat rate of ~22 m/year has accelerated significantly in the 21st century.

The IPCC's 6th Assessment Report classified Himalayan glaciers as critically vulnerable to a 1.5°C global warming scenario. If current trends continue, studies project a 40-70% volume loss in Himalayan glaciers by 2100 — transforming seasonal river flows from perennial to intermittent.
The **Bhagirathi-Ganga system** dependent on Gangotri Glacier meltwater supplies drinking water and irrigation to hundreds of millions in the Gangetic plains.

- **The Char Dham road project aggravation:** The Char Dham Mahamarg Vikas Pariyojana — a ₹12,000 crore project building 10-metre-wide all-weather roads to the four Himalayan shrines — has been flagged by a Supreme Court- appointed High Powered Committee (2019) for "unscientific hill cutting" that destabilises slopes, increases sedimentation, and creates new landslide risk. Wider roads attract more vehicles, more pilgrims, more waste, and more construction activity in fragile high-altitude ecosystems. The road project is a magnifier of the very ecological stress that glacier retreat creates.
- **The pilgrimage economy contradiction:** The Char Dham Yatra draws 30-55 lakh pilgrims annually. Kedarnath town (3,584 m altitude) sees hundreds of thousands of visitors during a compressed pilgrimage season.
  The resulting solid waste, wastewater, and infrastructure demand in ecosystems above 3,000 m altitude — where decomposition is slow and catchment areas are glacially connected — creates ecological stress that compounds climate-driven glacier retreat. The 2013 Kedarnath floods killed over 5,700 people; post-disaster reconstruction brought more infrastructure and more pilgrims.
  The underlying ecological vulnerability was never resolved.
- **The governance gap:** India has no dedicated **Himalayan Cryosphere Authority**. Glacier monitoring is split across: the **Geological Survey of India (GSI)**, the **National Centre for Polar and Ocean Research (NCPOR)**, the **Space Applications Centre (ISRO)**, and various state forest departments.
  The **National Action Plan on Climate Change (NAPCC 2008)** includes the **National Mission for Sustaining the Himalayan Ecosystem (NMSHE)** — but implementation has been slow, underfunded, and fragmented. India has no equivalent of the Andean glacier protection legislation.

⚠ **COUNTER**

The government argues that pilgrimage is a constitutional right and economic lifeline for Uttarakhand — whose 80% economy depends on tourism. The Char Dham road project creates employment, improves disaster response capacity (the 2013 Kedarnath floods revealed the cost of poor connectivity), and enables emergency military movement.
Climate change and glacier retreat are global phenomena that India alone cannot arrest — India's carbon emissions (though large in absolute terms) are far lower per capita than the

G7 nations driving most of historical emissions. Restricting pilgrimage would not reverse glacier retreat; it would merely impoverish Uttarakhand.

→ **WAY FORWARD**

Six-pillar Himalayan cryosphere framework: (1) **Himalayan Cryosphere Authority** — dedicated statutory body integrating GSI, NCPOR, ISRO-SAC, and state agencies for glacier monitoring, early warning, and research; (2) **Pilgrimage carrying capacity** — legally mandated daily visitor caps for all four Char Dham shrines based on ecological carrying capacity assessments, enforced through advance registration; (3) **Eco-Sensitive Zone** — declare a 10-km radius around Gaumukh (Gangotri Glacier snout) as a legally protected Eco-Sensitive Zone under the Environment Protection Act, restricting all tourism and construction activity; (4) **Char Dham road review** — implement SC committee recommendations on hillside slope stabilisation, retaining walls, and 5.5-metre road width maximum in ecologically critical stretches; (5) **Climate adaptation finance** — dedicated Climate Adaptation Fund for Himalayan states from India's climate finance commitments, prioritising glacier monitoring, landslide risk management, and water storage infrastructure; (6) **Disaster preparedness** — GLOF (Glacial Lake Outburst Flood) early warning system covering all high-risk glacial lakes in the Himalayan catchment areas.

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✍ MAINS ANSWER FRAMEWORK

QUESTION

Gangotri Glacier is retreating at approximately 22 metres per year due to climate change, threatening the long-term perennial flow of the Bhagirathi- Ganga river system. Critically examine the causes of Himalayan glacier retreat, its implications for India's freshwater security, and the policy framework needed to protect the Himalayan cryosphere. (250 words)

INTRODUCTION

Gangotri Glacier — located in Uttarkashi district, Uttarakhand, at ~3,048 m altitude — is the source of the **Bhagirathi River**, which joins the Alaknanda at Devprayag to form the Ganga. Covering ~143 sq km and ~30 km in length, it is one of India's largest glaciers.

Its retreat rate of **~22 metres per year** reflects a broader Himalayan cryosphere crisis that threatens India's freshwater security.

BODY

Causes of Himalayan glacier retreat: The primary driver is **anthropogenic climate change** — rising global temperatures driven by greenhouse gas emissions are warming the Himalayas at approximately twice the global average rate. The IPCC 6th Assessment Report found the Hindu Kush Himalayan region critically vulnerable at 1.5°C warming.

Black carbon deposition from biomass burning and diesel emissions accelerates ice melt by reducing surface albedo. Permafrost degradation in high-altitude areas contributes to increased sedimentation and slope instability. **Implications for freshwater security:** Himalayan glaciers are the "water towers of Asia" — sustaining perennial river flows during dry seasons when monsoon precipitation is absent.

The Bhagirathi-Ganga system irrigates the Indo-Gangetic Plain, which produces ~50% of India's food. **Short-term risk** (increasing glacier melt): enhanced seasonal flows may actually increase initially. **Long-term risk** (glacier depletion): rivers become seasonal, threatening perennial irrigation and drinking water supplies for hundreds of millions. **Freshwater stress** in the Gangetic plains will intensify, with cascading effects on agriculture, groundwater recharge, and urban water supply. **Policy framework needed:** (1) Dedicated Himalayan Cryosphere Authority for integrated monitoring; (2) GLOF early warning systems; (3) Pilgrimage carrying capacity enforcement; (4) Eco-Sensitive Zone around Gaumukh; (5) Char Dham road project ecological compliance; (6) Black carbon reduction (transition from biomass/diesel to clean energy in mountain communities).

CONCLUSION

The Gangotri Glacier's retreat is not merely an environmental statistic — it is a slow-moving threat to India's most important river system and the agricultural and urban water security of hundreds of millions of people. India cannot simultaneously celebrate its pilgrimage economy and ignore its glaciological emergency.

The Char Dham Yatra 2026 opening is a moment to acknowledge that sustainable pilgrimage requires a surviving glacier — and that requires a governance framework India has so far failed to build.

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