



## Place in News - Gangotri Glacier

**Context:** A recent study conducted by IIT Indore, ICIMOD (Nepal), and researchers from the United States has revealed that the Gangotri Glacier system has experienced a reduction of approximately 10% in its snowmelt flow over the past four decades (1980–2020).



### About Gangotri Glacier

- The largest glacier in the Garhwal Himalayas, serving as the source of the Bhagirathi river, which is the headstream of the Ganga.
- It extends roughly 30 km in length and covers an area of approximately 143 square kilometers.
- This glacier is considered sacred in Hinduism, with its snout located at the Gaumukh cave, which is venerated as the origin of the Ganga.



### **Location**

- It is located in the Uttarkashi district of Uttarakhand, within the confines of Gangotri National Park.
- The glacier is positioned in the central Himalayas, forming part of the Greater Himalayan ranges.
- It is surrounded by notable peaks such as Shivling, Thalay Sagar, Meru, and the Bhagirathi group.

### **Key Features**

- The glacier is nourished by snowmelt, glacier melt, rainfall, and base flow.
- It contributes approximately 25% of the Ganga's water during the non-monsoon months.

### **Flow composition from 1980 to 2020 is as follows:**

- Snowmelt – 64%
- Glacier melt – 21%
- Rainfall-runoff – 11%
- Base flow – 4%

### **Climate Change Impact**

- The share of snowmelt is declining, decreasing from 73% (1980–90) to 63% (2010–20).
- There has been a temperature increase of +0.5°C from 2001 to 2020 compared to the period from 1980 to 2000.
- The peak flow has shifted from August to July, attributed to earlier summer melting.



- There is an increased contribution from rainfall-runoff and base flow, indicating hydrological changes induced by warming.
- The glacier snout is retreating steadily, which is supported by other Himalayan studies that report an average annual thickness loss of 46 cm.

### **Strategic Importance**

- Water security is crucial for millions who rely on the Ganga basin.
- Changes in seasonal discharge have implications for hydropower generation.
- Altered flow patterns pose risks of irrigation shortages in agriculture.
- The glacier holds cultural significance as it is the sacred source of the river, which is central to the Hindu faith.