



Himalayan Glaciers Impacted by Climate Change

Recently, a study has concluded that the **Chaturangi Glacier**, a tributary of Gangotri glaciers, is receding.

- The study was done by scientists from GB Pant National Institute of Himalayan Environment and Sustainable Development and the Centre for Earth Sciences at the Indian Institute of Science (IISc) using the **satellite data from 1989 to 2016** and **kinematic GPS**.
- The retreating glacier is an example of the impact of climate change.

Kinematic GPS

- Kinematic Global Positioning System (GPS) is a satellite navigation technique used to enhance the precision of data from satellite-based positioning systems.

Findings of the Study

- Chaturangi glacier is **retreating at a “considerable rate”** and may vanish in the future.
- The Chaturangi glacier **was connected with the Gangotri glacier till 1989 but is now detached** and retreating at the rate of about 22.84 m/year.
- The variability in retreating rate is not only controlled by climate change but is also governed by glacier size, type, topographic setting and debris cover.
- The retreating rate of the Chaturangi glacier is higher than the Gangotri glacier because of its smaller size and fast response time to climatic variability.

Impact of Glacier Retreat

- **The flow of Ganga:** Since Ganga originates from Gangotri glacier, which is fed by its tributary glaciers, the rapid retreat of glaciers like Chaturangi and Raktavaran will **impact flow and water level in the Ganga**.
- **Impact on Human Life:** NASA's Land Use Land Cover Change programme has predicted that **glacial melt will impact water supplies in the Himalayan region**.
 - There will also be an **impact on agriculture, including soil loss due to soil erosion, landslides, and floods**.
- **Glacial Lake Outburst Floods (GLOF):** Glacial lakes may also form due to the accumulation of melted ice, which may result in Glacial Lake Outburst Floods (GLOF).

About Gangotri Glacier

- Gangotri Glacier is situated in the **Uttarkashi District of Uttarakhand**.
- The Gangotri glacier originates at the **northern slope of Chaukhamba range of peaks in Garhwal Himalayas**. It is about 30 km long and 0.5 to 2.5 km wide.
- Gangotri is not a single valley glacier, but a combination of several other glaciers. This glacier comprises three main tributaries, namely **Raktavaran (15.90 km), Chaturangi (22.45 km) and Kirti (11.05 km) and more than 18 other tributary glaciers**.

- The **Bhagirathi**, one of the **main tributaries of the Ganga**, originates from the gangotri glacier. The Ganges has five headstreams—the **Bhagirathi, the Alaknanda, the Mandakini, the Dhauliganga, and the Pindar**—all rise in the mountainous region of northern Uttarakhand.

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