Glacial Lake Outburst Floods

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Context:

The Uttarakhand government has constituted two teams of experts to evaluate the risk posed by five potentially hazardous glacial lakes in the region. These lakes are prone to Glacial Lake Outburst Floods (GLOFs), the kind of events that have resulted in several disasters in the Himalayan states in recent years.

Background:

The National Disaster Management Authority (NDMA), which operates under the Union Ministry of Home Affairs, has identified 188 glacial lakes in the Himalayan states that can potentially be breached because of heavy rainfall. Thirteen of them are in Uttarakhand.

About Glacial Lake Outburst Floods:

1. GLOFs are disaster events caused by the abrupt discharge of water from glacial lakes — large bodies of water that sit in front of, on top of, or beneath a melting glacier. As a glacier withdraws, it leaves behind a depression that gets filled with meltwater, thereby forming a lake.
2. The more the glacier recedes, the bigger and more dangerous the lake becomes. Such lakes are mostly dammed by unstable ice or sediment composed of loose rock and debris.
3. In case the boundary around them breaks, huge amounts of water rush down the side of the mountains, which could cause flooding in the downstream areas — this is referred to as a GLOF event.
4. GLOFs can be triggered by various reasons, including glacial calving, where sizable ice chunks detach from the glacier into the lake, inducing sudden water displacement.
5. Incidents such as avalanches or landslides can also impact the stability of the boundary around a glacial lake, leading to its failure, and the rapid discharge of water.
6. GLOFs can unleash large volumes of water, sediment, and debris downstream with formidable force and velocity.
7. The floodwaters can submerge valleys, obliterate infrastructure such as roads, bridges, and buildings, and result in significant loss of life and livelihoods.
8. In recent years, there has been a rise in GLOF events in the Himalayan region as soaring global temperatures have increased glacier melting. Rapid infrastructure development in vulnerable areas has also contributed to the spike in such incidents.
9. Uttarakhand has witnessed two major GLOF events in the past few years. The first took place in June 2013, which affected large parts of the state — Kedarnath valley was the worst hit, where thousands of people died. The second occurred in February 2021, when Chamoli district was hit by flash floods due to the bursting of a glacier lake.