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IAS Study Circle

Lead by IAS, IPS, IPOS officers

HIMALAYAN FLOOD

MOST IMPORTANT NOTES FOR MAINS

SCAN TO EXPLORE



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GS 1- GEOGRAPHY

GS 3 - DISASTER MANAGEMENT

FLOOD IN HIMALAYAS

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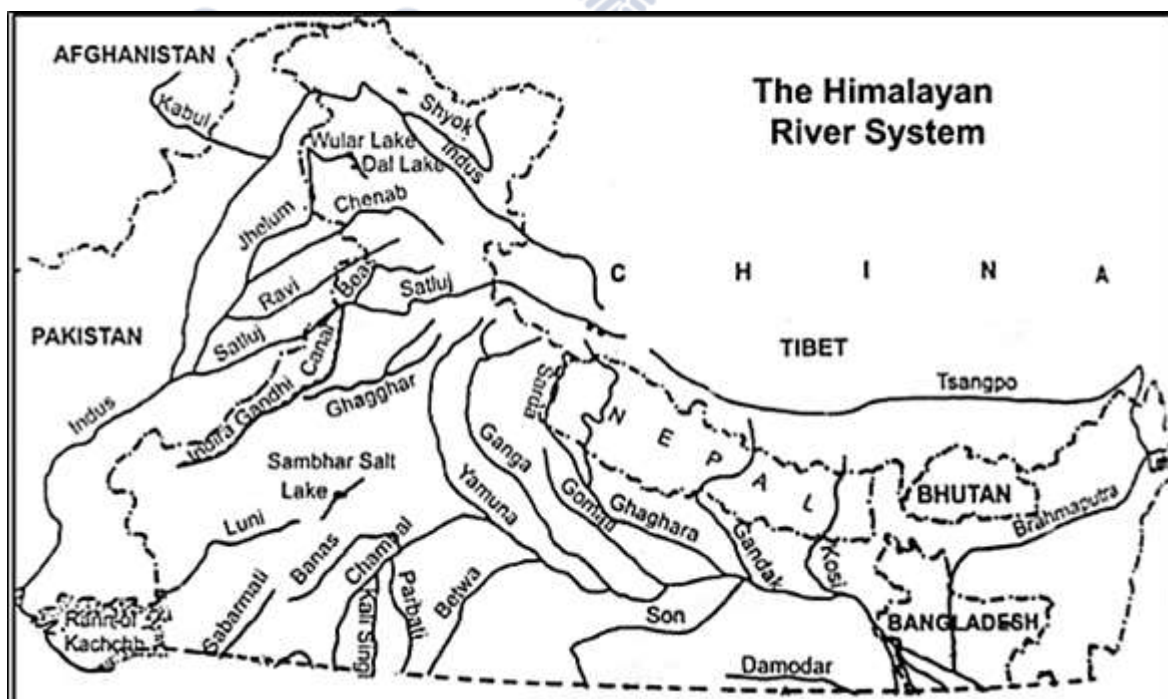
Have fun. Achieve dreams.

The Himalayan drainage system has evolved through a long geological history. It mainly includes the Ganga, the Indus and the Brahmaputra River basins. Since these are fed both by melting of snow and precipitation, rivers of this system are perennial.

The major Himalayan rivers rise north of the mountain ranges and flow through deep gorges that generally reflect some geologic structural control, such as a fault line. The rivers of the Indus system as a rule follow northwesterly courses, whereas those of the Ganges-Brahmaputra systems generally take easterly courses while flowing through the mountain region.

HIMALAYAN FLOODS:

Floods in the Himalayas are part of natural processes and are inevitable. However large floods, like those in Leh (2010), Kedarnath (2013) and Rishi Ganga (2021), are becoming more frequent



HIMALAYAN FLOODS ON THE RISE: WHY?

- **Intense rainfall events and Cloudbursts:** The rise in surface temperature is increasing the availability of atmospheric energy and total precipitation.
 - The reports of the Intergovernmental panel on climate change (IPCC) indicate an overall increase in the **frequency of high-intensity rainfall events** in the Himalayas.
- **Rapid Urbanisation** in Himalayan region with a substantial **increase in population** led to **encroachment of river channels**. During the past fifty years (1961 -2011), the number of people living in the Himalayan region has grown from 19.9 to 52.8 million.
- **Glacial dammed Lake outbursts (GLOFs): Retreating glaciers**, usually result in the formation of lakes at their tips. These lakes are called **proglacial lakes**. These proglacial lakes are often bound by sediments, boulders, and moraines. If the boundaries of these lakes are breached, then flooding will take place downstream of that glacial lake.
 - The 2013 Kedarnath incident in the Garhwal Himalayas, besides widespread rainfall, was compounded by a breach of a moraine-dammed lake in the Chorabari glacier region.
 - Glacial burst in Chamoli, Uttarakhand in February 2021.
- **Landslide dammed lake outbursts (LLOFs):** These floods occur due to breach of dammed lakes which form as a result of obstruction of water flow of river by debris of landslides. Landslides may occur due to rainfall, seismic activity like earthquakes, etc.
 - Sutlej river valley (Himachal Himalayas) also witnessed massive devastation due to LLOFs in the years 2000 and 2005.
- **Environmental Damage:** little attention has been paid to the damage caused to local ecology and loss of forest cover in the upper reaches of the central Himalayas by building hydel dams and construction of wider roads overlooking environmental norms.

- the upper reaches of Uttarakhand, the source for several small riverine systems feeding the Ganga, already have 16 dams and another 13 under construction, proposed another 54 dams to harness the hydel energy potential of these rivers.
- **Faster melting of Glaciers in Himalayas:**
 - A new report by the Kathmandu-based International Centre for Integrated Mountain Development (ICIMOD) held that 36% of the volume of glaciers in the Hindu Kush Himalayan region will be gone by the end of 2100 even if the world manages to keep the temperature rise within 1.5-degree Celsius target of the **Paris Climate Agreement**.
 - Similarly, the data from the **Indian Space Research Organisation (ISRO)** reveal that the melting of the glaciers has increased in the first 20 years of this century.

CHALLENGES IN ADAPTATION AND MITIGATION

- **Lack of flood level data:** India does not have flood level observation beyond hundred years. This is not enough to understand the long-term variability of floods and the forcing factors behind large events.
- GLOFs and LLOFs induce a faster rate of rise in water levels which makes it hard to predict sudden floods.
- Events of Cloud Burst in Himalayas with regional variation in rainfall makes flood prediction difficult.
- Rising need for energy and need for greener alternatives makes it critical for building more hydroelectric projects in high altitude and fragile Himalayan landscapes.

WAY FORWARD

- Use of technology: The rate of rising of flood and flow velocity can be measured effectively by Differential Global Positioning Systems (DGPS), Artificial Intelligence (AI), and LiDAR (Light Detection and Ranging) technologies. So, the government has to install a dense network of flood gauging systems.
- Similarly, state-of-the-art Internet of Things (IoT) and radars can be used to quickly disseminate the data to remote locations and flood management centres.
- Broad Framework for Vulnerable Zones: With the increasing frequency of flash floods in the Himalayan region, a broad framework for robust early warning systems, infrastructure development, construction, and excavation in vulnerable zones must be evolved.
- Reexamining HydroPower Option: IPCC report has assessed that the climate crisis has altered the frequency and magnitude of the natural hazards in high mountain regions of the world.
- **The Chopra Committee**, which studied the impact of receding glaciers on hydroelectric power projects (HEPs) and objected to the construction of HEPs in paraglacial regions (between 2,200 to 2,500 metres above the sea level) need to be adhered.
- **Damage Predictive Models for the Himalayas:** Proper understanding of the orography of the Himalayas and the past flood events has to be used to prepare damage prediction models. Further, the model should include Landslide and glacial lake monitoring systems. This can help in deciding the focus, magnitude, and type of infrastructural development to be done in the Himalayas.
- Apart from hydro power other alternatives like solar energy, wind energy can be pursued as the green growth model of development.
- Restricting constructions and development in glacial lake outburst flood-prone areas is very important to reduce risks. The NDMA

guidelines say that the construction of any habitation should be prohibited in the high hazard zone.

The Himalayas have been giving us life through water, fertile soil, biodiversity, wilderness and a feel of spirituality. Rivers originating in the Himalayas are the lifeline for one-fifth of the global population. We cannot and should not try to control or dictate the Himalayas with mindless development work so that climate change induced hazards like floods won't turn to be a disaster.





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