



Himalayas More Prone to Extreme Weather Events

For Prelims: [Himalayan Region](#), [Global Warming](#), [Indo-Gangetic plain](#), [Greenhouse Gas \(GHG\)](#).

For Mains: Impact of Global Warming on the Himalayas, Ecological Challenges to Himalayan region due to rampant urbanisation.

Source: DTE

Why in News?

The [Himalayan Region](#), prone to cloudbursts and extreme weather events, is experiencing accelerated impacts of [Global Warming](#).

How are the Shifts in Weather Patterns Increasing the Frequency of Extreme Events?

▪ Shift in Monsoon Patterns:

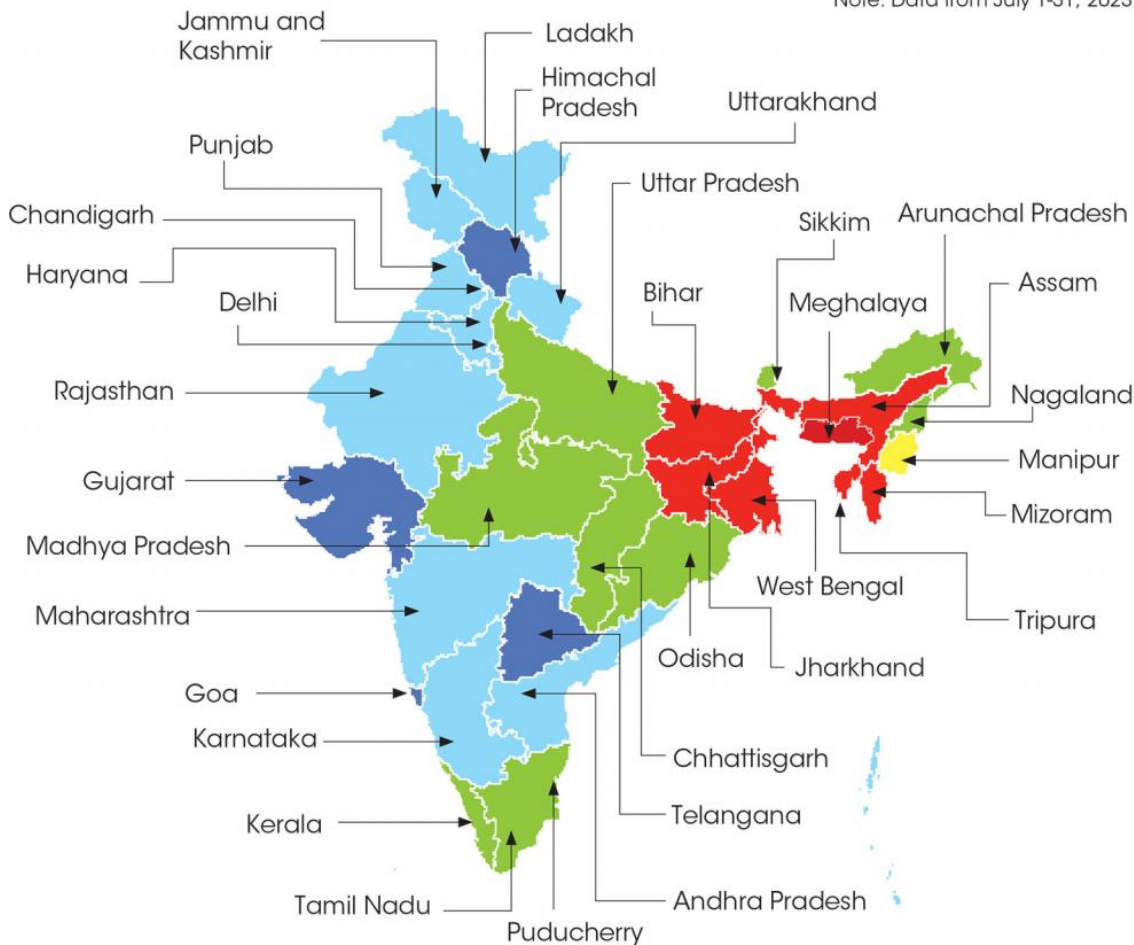
- There is evidence suggesting a **shift in southwest monsoon patterns**, with deviations occurring more frequently in the [Indo-Gangetic plain](#) rather than the **southern half of the sub-continent**.
- This **includes excessive rainfall** in the arid and **semi-arid western half of India** and deficient rainfall in the eastern half and coastal areas, indicating a reversal of historical precipitation patterns.

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In July 2023, when southwest monsoon was at its peak, rainfall was excessive in arid and semi-arid western half of the country, but heavily deficient in the eastern half of Indo-Gangetic plain, northeast and coastal areas

■ Large Deficient (-99 to -60%)
 ■ Deficient (-59 to -20%)
 ■ Normal (-19 to 19%)
 ■ Excess (20 to 59%)
 ■ Large Excess (60%)

Note: Data from July 1-31, 2023



▪ **Temperature Rise in the Arabian Sea:**

- The uppermost layer of the Arabian Sea has experienced abnormal warming, leading to **increased evaporation and potentially** altering the behaviour of the southwest monsoon.
- This warming trend has also contributed to **more Cyclonic storms in the Arabian Sea**, including some making landfall on the west coast of India.
 - Between 2001 and 2019, there has been a **50% increase in the frequency of cyclones in the Arabian Sea**. About half of these dissipate before they land.

▪ **Extreme Rainfall and Cloudbursts:**

- Cloudbursts are not just intense rain showers, but a **genetically different form of rain**. Even in heavy showers, the raindrops are usually about 2 mm in diameter.
- Their size grows to between 4-6 mm during severe thunderstorms and cloudbursts. Being heavier, these raindrops fall faster, thus they trigger **landslides with their tremendous pounding power**.
 - Number of thunderstorms, cloudbursts and hailstorms has increased from between two and 4 per annum during the four decades between **1970-2010, to 53 in Himachal Pradesh alone in 2023**.

SHARP RISE

Himachal Pradesh now records more cloudbursts, more often

Year	Number of cloudbursts (per annum)
1972-2012	3 to 4
2018	21
2019	16
2020	NA
2021	30
2022	39
2023	53



▪ **Glacial Melting and Glacier Lake Outbursts:**

- Rising temperatures in the Himalayas have caused glaciers to melt rapidly, **leading to the formation of [glacial lakes](#)**.
- The **increasing frequency and ferocity of [cloudbursts](#)** are causing these lakes to overflow or burst their banks, resulting in floods and loss of lives and property downstream.

- The number of such lakes in Uttarakhand and east of Himachal Pradesh, has increased from 127 in 2005 to 365 in 2015.

- **Loss of Glacial Ice:**

- The Himalayas have **already lost more than 40% of their ice**, and this trend is expected to continue, with projections indicating a **potential loss of up to 75% by the end of the century**.
 - This loss of ice is affecting the vegetation line, agricultural practices, and water resources in the region.

What can be the Adaptation Measures to Tackle the Impact of Climate Change?

- There is a growing need for improved **monitoring of glaciers and glacial lakes**, as well as **better forecasting and early warning systems for [landslides](#)** and glacial lake outbursts.
 - However, these measures alone may not be sufficient to address the long-term impacts of climate change in the Himalayas.
- Reducing **[Greenhouse Gas \(GHG\)](#)** emissions and transitioning to **renewable energy sources** are seen as essential steps to mitigate the effects of global warming and safeguard the **[Himalayan region](#)** and its inhabitants.
- There should be **Sustainable Construction Activities** in the Himalayas region, which can withstand any calamitous event if it occurs. **Some of the steps are-**
 - **Understanding Terrain Characteristics:** Recognising the **impact of slope, drainage, and vegetation cover** on the stress that an area can endure is fundamental. By delineating zones based on these factors, authorities can better manage construction activities and mitigate risks associated with unstable terrain.
 - **Assessing Climate Vulnerability:** Given the increasing frequency of extreme weather events like floods and landslides, it's essential to project future climate scenarios and identify vulnerable areas. **Projections and simulations can help in devising strategies to adapt** to and mitigate the impacts of climate change.
 - **Managing Development Impacts:** Development projects, particularly **hydropower ventures**, often have significant **ecological consequences in hilly regions**. Regulations should incorporate risk assessments and consider cumulative impacts to safeguard against forest degradation, changes in river courses, and loss of biodiversity.
 - **Enhancing Adaptive Capacity:** As hill town populations grow, **their ability to cope with climate change diminishes** due to various challenges such as water scarcity, inadequate infrastructure, and limited livelihood options.
 - Improving adaptive capacity involves bolstering services and infrastructure while prioritising sustainable solutions with community involvement.

What are the Government Initiatives Related to the Himalaya?

- **[National Mission on Sustaining Himalayan Ecosystem \(2010\):](#)**
 - **Covers 11 states** (Himachal Pradesh, Uttarakhand, Sikkim, all northeast states, and West Bengal) **and 2 UTs** (Jammu & Kashmir and Ladakh).
 - Part of the **[National Action Plan on Climate Change \(NAPCC\)](#)**, comprising eight missions.
- **Indian Himalayas Climate Adaptation Programme (IHCAP):**
 - It aims to enhance the **resilience of vulnerable communities in the Indian Himalayas** by strengthening the capacities of Indian institutions in climate science, with a specific focus on glaciology and related areas
- **SECURE Himalaya Project:**
 - Integral to the "**Global Partnership on Wildlife Conservation and Crime Prevention for Sustainable Development**" (Global Wildlife Program), funded by the **[Global Environment Facility \(GEF\)](#)**.
 - Focuses on promoting sustainable management of alpine pastures and forests in the high-range Himalayan ecosystems.
- **[Mishra Committee Report 1976:](#)**
 - Named after MC Mishra, the then **Garhwal commissioner in erstwhile Uttar Pradesh**. It provided findings **on land subsidence in Joshimath**.
 - Recommendations included **imposing restrictions on heavy construction work**,

blasting, excavation for road repairs and other construction activities, and **tree felling in the region.**

Conclusion

- The recent shifts in monsoon patterns and extreme weather events underscore the urgent need for proactive measures to address the impacts of climate change in the Indian subcontinent.
- It is imperative for governments and stakeholders to prioritise adaptation and mitigation strategies to minimise the socio-economic and environmental risks posed by these changing climatic conditions.
- Only through concerted efforts in sustainable development, renewable energy adoption, and disaster preparedness can we mitigate the adverse effects of climate change and ensure the resilience of communities across the subcontinent.

UPSC Civil Services Examination, Previous Year Questions (PYQs)

Prelims:

Q. Consider the following pairs: (2020)

	Peak	Mountains
1.	Namcha Barwa	Garhwal Himalaya
2.	Nanda Devi	Kumaon Himalaya
3.	Nokrek	Sikkim Himalaya

Which of the pairs given above is/are correctly matched?

- (a) 1 and 2
- (b) 2 only
- (c) 1 and 3
- (d) 3 only

Ans: (b)

Q. If you travel through the Himalayas, you are likely to see which of the following plants naturally growing there? (2014)

1. Oak
2. Rhododendron
3. Sandalwood

Select the correct answer using the code given below:

- (a) 1 and 2 only
- (b) 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

Ans: (a)

Q. When you travel in the Himalayas, you will see the following: (2012)

1. Deep gorges
2. U-turn river courses
3. Parallel mountain ranges
4. Steep gradients causing landsliding

Which of the above can be said to be the evidence for Himalayas being young fold mountains?

- (a) 1 and 2 only
- (b) 1, 2, and 4 only
- (c) 3 and 4 only
- (d) 1, 2, 3 and 4

Ans: (d)

Mains:

Q. Differentiate the causes of landslides in the Himalayan region and Western Ghats. **(2021)**

Q. How will the melting of Himalayan glaciers have a far-reaching impact on the water resources of India? **(2020)**

Q. "The Himalayas are highly prone to landslides." Discuss the causes and suggest suitable measures of mitigation. **(2016)**

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