

Global Warming & Its Impact on Mountain Ranges - Glacier Melt & Climate Change

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What's in Today's Article?

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Glacier Melting and Climate Change Latest News

- A new UNESCO report, **The United Nations World Water Development Report 2025 - Mountains and Glaciers: Water Towers**, highlights the alarming impact of rising temperatures on the world's mountain ranges.
- It reveals that higher elevations are warming faster than lower ones, leading to accelerated glacier melt, increased permafrost thawing, and a decline in snow cover. Snowfall patterns have also become more erratic, further affecting water availability.
- Released on March 21 to mark the first-ever World Day for Glaciers, the report underscores the urgent need for climate action to address these critical issues.

Key Highlights of the Report

- **Glacier Melting at an Unprecedented Rate**
 - Glaciers worldwide are disappearing faster than ever, with the past three years witnessing the largest glacial mass loss on record.
 - Since 1975, glaciers (excluding the Greenland and Antarctica ice sheets) have lost over 9,000 billion tonnes of mass, equivalent to an ice block the size of Germany with a thickness of 25 meters.
 - In 2024 alone, glaciers lost 450 gigatons of mass, with Scandinavia, Svalbard, and North Asia experiencing the largest annual losses.
- **Causes of Accelerated Glacier Melting**
 - While rising temperatures remain a primary factor, wildfires and dust storms are also contributing to glacier melt.
 - The deposition of black carbon and particulate matter on glacier surfaces darkens the ice, increasing solar radiation absorption.
 - This accelerates melting, particularly in areas and periods of high sunlight exposure.

- **Urgent Need for Climate Action**

- With five of the last six years recording extreme glacier loss, the UNESCO report underscores the critical need for global efforts to mitigate climate change and reduce environmental pollutants to slow down glacier retreat.

- **Accelerating Permafrost Thaw**

- Permafrost, which remains frozen for at least two consecutive years, is rapidly melting due to rising temperatures.
- This is concerning as mountain permafrost stores approximately 4.5% of global soil organic carbon.
- When thawed, this carbon is released into the atmosphere, exacerbating climate change.
- Additionally, permafrost plays a crucial role in stabilizing rock slopes, moraines, and debris-covered areas.
- As it melts, these landscapes become more prone to erosion, landslides, and other geological hazards.

- **Decline in Snow Cover**

- Snow cover across nearly all mountain regions has been steadily declining, particularly in spring and summer.
- This trend is expected to worsen in the coming decades.
- A 2024 study published in Nature revealed a 7.79% global decrease in persistent snow cover between 1979 and 2022, highlighting the widespread impact of warming temperatures on mountain ecosystems.

- **Erratic Snowfall Patterns**

- Atmospheric warming is shifting the altitude at which rainfall transitions to snowfall, leading to reduced snow depth and duration at lower elevations.
- In some mountain ranges, more precipitation is falling as rain rather than snow, causing earlier snowmelt and shrinking snow-covered areas.
- These changes disrupt water availability, ecosystems, and local communities reliant on snow-fed rivers.

Significance of this Study

- **Mountains: A Vital Source of Freshwater**

- Mountains cover 33 million sq km of the Earth's surface and play a crucial role in sustaining life.
- Nearly 2 billion people depend on freshwater from melting glaciers.
- However, rapid glacier melting due to climate change threatens water availability, making flows more erratic, uncertain, and variable.
- This will disrupt the timing, quantity, and quality of water resources downstream, impacting agriculture, drinking water supply, and hydropower.

- **Rising Threat of Glacial Lake Outburst Floods (GLOFs)**

- Glacier melting and permafrost thawing are increasing the risk of glacial lake outburst floods (GLOFs)—sudden, catastrophic floods caused by the failure of natural glacial dams.

- **Glacier Melting and Rising Sea Levels**

- Melted glacier ice accounts for 25-30% of the rise in global sea levels.

- Between 2006 and 2016, the world lost 335 billion tonnes of glacier ice annually, leading to an almost 1 mm increase in sea levels per year.
- Every millimeter of sea level rise puts up to 300,000 people at risk of annual flooding, increasing the urgency for climate action.

Heat Action Plans in India FAQs

Q1. Why are glaciers melting at an unprecedented rate?

Ans. Rising temperatures, black carbon deposition, and dust storms accelerate glacier melt, disrupting ecosystems and water supply.

Q2. How does permafrost thawing impact the environment?

Ans. Thawing releases stored carbon, worsening climate change, and destabilizes slopes, increasing landslides and geological hazards.

Q3. What is the effect of declining snow cover on water availability?

Ans. Reduced snow cover affects river flows, leading to erratic water supply for agriculture, drinking, and hydropower.

Q4. How do glacial lake outburst floods (GLOFs) pose a threat?

Ans. GLOFs cause sudden floods, damaging homes, infrastructure, and displacing thousands, especially in mountain regions.

Q5. Why is climate action urgent for mountain ecosystems?

Ans. Continued glacier loss contributes to rising sea levels, extreme weather, and water crises, affecting billions globally.

Source: IE | UNESCO

Source: <https://vajiramandravi.com/current-affairs/global-warming-its-impact-on-mountain-ranges/>

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