

Hindu Kush Himalayas snow update? | Explained

What does the report by the International Centre for Integrated Mountain Development highlight? How important is snow persistence? How much of a role does climate change play in river basins receiving low levels of snowmelt this year?

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The story so far:

The Ganga river basin — India's largest — reached a record low snow persistence in 2024, the Hindu Kush Himalaya snow update of the International Centre for Integrated Mountain Development (ICIMOD) has reported. The Brahmaputra and the Indus basins have suffered similarly, threatening

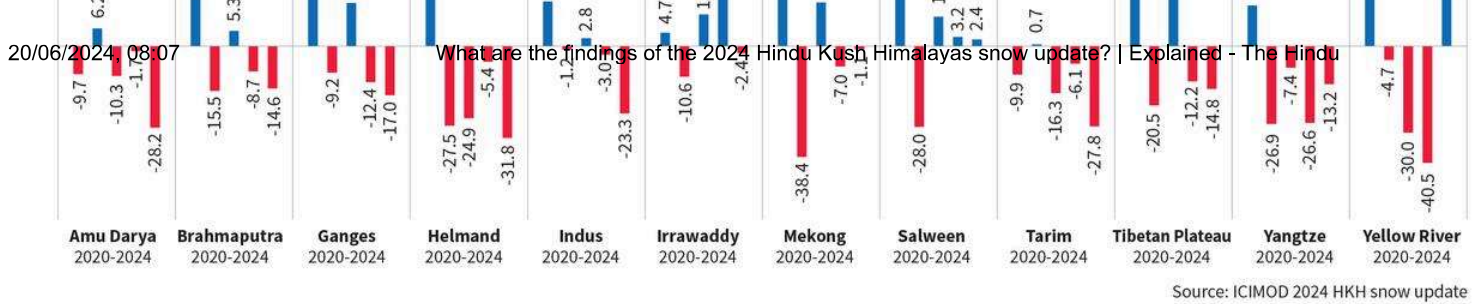
What is snow persistence?

Snow persistence is the fraction of time snow is on the ground. When this snow melts, it provides water to people and ecosystems. In the river basins of the Hindu Kush Himalaya (HKH), snowmelt is the biggest source of water in the streams. Overall, it contributes 23% of the runoff to the region's 12 major river basins every year. The HKH mountains extend around 3,500 km over eight countries — Afghanistan, Bangladesh, Bhutan, China, India, Nepal, Myanmar, and Pakistan. These mountains are also called the “water towers of Asia” because they are the origins of 10 crucial river systems on the continent — Amu Darya, Indus, Ganga, Brahmaputra, Irrawaddy, Salween, Mekong, Yangtze, Yellow river, and Tarim. These river basins provide water to almost one-fourth of the world's population and are a significant freshwater source for 240 million people in the HKH region.

What does the report say?

The authors of the 2024 HKH snow update analysed data from 2003 to 2024 and found significant fluctuations in snow persistence between November and April every year, when snow accumulates above ground. Based on this, they made grim predictions of lasting impact on the people in the region as well as those downstream of the river basins.

In India, snow persistence in the Ganga, the Brahmaputra, and the Indus river basins dropped significantly in 2024. The Ganga river basin noted its lowest snow persistence in 22 years, 17% below the long-term historical average (also known as ‘normal’). The previous holder of this dubious distinction was 2018, when it was 15.2% below normal. In 2015, on the other hand, snow persistence was 25.6% above normal.



Source: ICIMOD 2024 HKH snow update

Similarly, snow persistence in the Brahmaputra basin was 14.6% below normal in 2024. It was worse in 2021, when the average persistence was 15.5% below normal. In the Indus river basin, snow persistence fell 23.3% below normal this year although this was offset by excesses in parts of the lower altitudes.

Outside India, the basin of the Amu Darya river — which flows through Central Asia — recorded its lowest snow persistence in 2024: 28.2% below normal. The figure for the Helmand river, an important source of drinking water for Iran and Afghanistan, was almost 32% below normal in 2024, beating a record set in 2018. Persistence in the part where the Mekong river originates in the Himalaya was only slightly below normal this time. (This river’s delta is Vietnam’s “rice bowl”.)

What explains the lower snow persistence in 2024?

The primary reason for the lower persistence in 2024 was weak western disturbances, ICIMOD remote sensing specialist and author of the report Sher Muhammad told *The Hindu*.

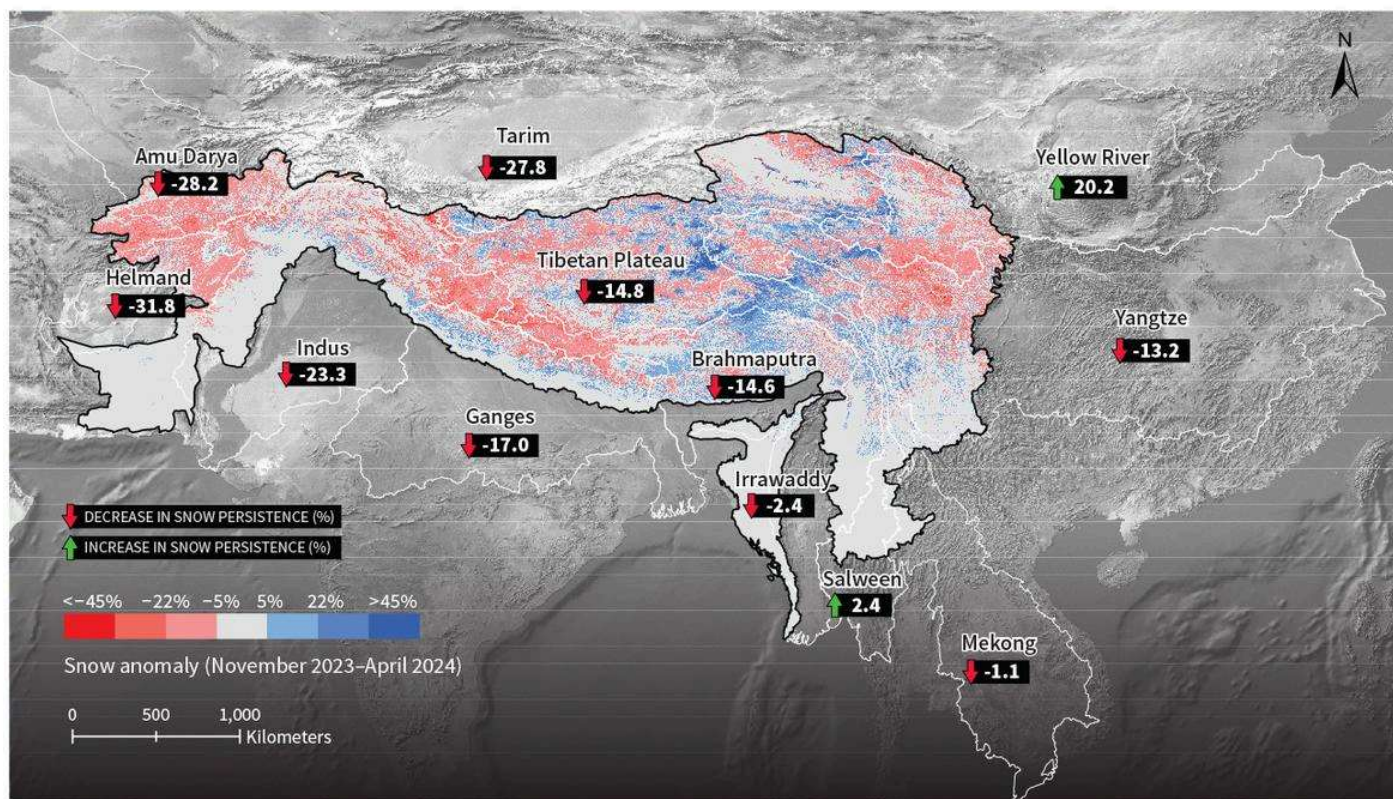
“Due to changing climate and global warming, this pattern is becoming increasingly unstable. Although the exact mechanisms are not fully understood, global warming is thought to exacerbate prolonged and intense La Niña–El Niño conditions. These phases of a recurring climate pattern across the tropical Pacific Ocean significantly influence global weather patterns, including western disturbances,” he added.

arrival of the western disturbance, resulting in reduced winter precipitation and snowfall in the HKH region. The pattern of high temperatures and altered weather systems explains both the record low snow persistence in 2024 and similar historical records.”

“We have warned for years that the 1.5 degrees Celsius limit that governments signed up to in the Paris Agreement is not ambitious enough to protect the snow and ice, people and nature of the Hindu Kush Himalayas because the target is a global average, and the real temperature increase will be far higher here,” Ms. Jackson added.

What explains higher snow persistence?

The persistence of snow in China’s Yellow River basin exceeded the normal value by 20.2% in 2024. “The Yellow river basin is an area where the East Asian winter monsoon brings cold, dry air from Siberia and Mongolia,” Mr. Muhammad said. “When this cold air mass interacts with moist air from other regions, particularly the Pacific Ocean, it can result in snowfall over the higher altitudes of the upper Yellow River basin.”



What about India?

Snow persisting on the ground is important for the Ganga river basin because its melt contributes to 10.3% of the latter's water, versus 3.1% from glacier melts. In the Brahmaputra and the Indus basins as well, snowmelt brings 13.2% and around 40% of the water, respectively, versus 1.8% and 5% from glaciers.

"Lower snow in 2024 may affect water availability, particularly and most importantly in the Indus basin, if there is less rainfall in the early season," Mr. Muhammad said.

In the long term, experts say, reforestation with native tree species can help the ground retain more snow. Better weather forecasting and early warning systems can also help local communities prepare for impending water stress. "Improving water infrastructure and developing policies for protecting areas receiving snowfall are important for long-term change," according to Mr. Muhammad. "Communities' involvement in local, national level decision-making and promoting regional cooperation are vital for comprehensive solutions for the sustainability of snow."

Ms. Jackson also stressed on the need to reduce emissions, which would mitigate increasing sea-surface and ground temperatures, both of which lower the persistence of snow. "The key work for all of us concerned about a liveable future on the earth is to build the political will for our government representatives and business leaders to cut the cord on dirty fossil energy consumption and production, especially among G-20 countries, which account for 81% of all emissions," she said.