

GLACIERS RETREAT AND UNCERTAINTIES ADVANCE

Recently researchers reported in the journal *Nature Geoscience* that mountain glaciers that are shrinking due to climate change are less voluminous than previously understood, putting millions who depend on them for water supply at risk. For instance, glaciers in the Andes Mountains of South America were found to store 23% less fresh water when compared to earlier estimates. Here's a look at the study

SHRINKING GLACIERS

As the slow-moving rivers of ice lose more mass through melt-off than they gain with fresh snow, water flows become irregular—including periods of flooding—and eventually dry up, first in low altitude mountains, and eventually in higher ones

**11%
SMALLER THAN
ESTIMATES**

The satellite-based survey covering 98% of the world's glaciers—around 2,50,000—found that the volume of all glaciers combined, above and below sea level, was 11% smaller than earlier calculations

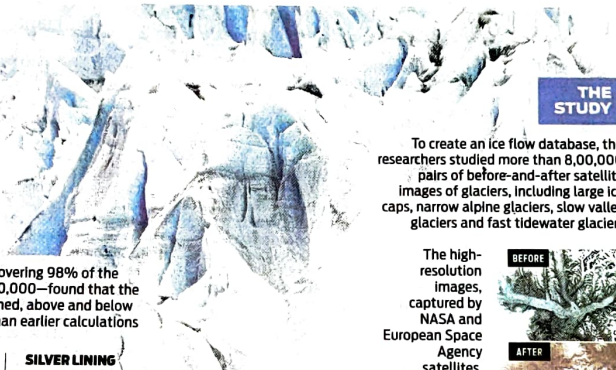
ARE ALL GLACIERS SHRINKING?

No. Few regions, including the Himalayan mountains, were found to have up to a third more ice than thought, reducing the pressure on water resources. However, a recent research led by Maine University found that the highest glacier in the Himalayas—the South Col Glacier—has lost more than 54m thickness

SILVER LINING

On the flip side, lower volumes will reduce the sea-level rise in the world, projected to be among the most devastating consequences of global warming

Throughout the 20th century, melting glaciers was one of the main causes of rising ocean levels, along with the expansion of sea water as it warms



THE STUDY

To create an ice flow database, the researchers studied more than 8,00,000 pairs of before-and-after satellite images of glaciers, including large ice caps, narrow alpine glaciers, slow valley glaciers and fast tidewater glaciers

The high-resolution images, captured by NASA and European Space Agency satellites, required more than one million hours of computational time on super-computers in Grenoble, France



Images from NASA show the transformation of Green glaciers over the span of 50-years

FROM 33 TO 26 CM

The new estimate lowers the potential contribution of glaciers to sea-level rise from about 33 to 26 centimetres. But that reduction—while not insignificant—compared to the impact of melting ice sheets, which have become the main cause of rising sea levels in the 21st century

THREAT FROM ICE SHEET MELT

The kilometres-thick blankets of ice atop West Antarctica and Greenland hold enough frozen water to lift oceans some 13 metres. We generally think about glaciers as solid ice that may melt in summer, but ice actually flows like thick syrup under its own weight

GLACIERS ARE CRUCIAL

Water formed from glaciers flowing into rivers is important for hydropower generation and agriculture. Bolivia's largest city La Paz, with more than two million inhabitants, is highly dependent on glacier runoff for agriculture and as a buffer against drought



Because there is less ice stored in the world's glaciers than we had thought they will disappear earlier than expected, and so the communities that depend on their ice and water will experience the worst effects of climate change sooner

Andrew Shepherd, director of the Centre for Polar Observation and Modelling at the University of Leeds