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Environmental, ecological and hydrological effects of climate change on Himalayan glaciers

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Mountains are essential sources of freshwater for our world, but their role in global water resources could well be significantly altered by climate change. Over the last few years, global temperature has increased rapidly and continuously at around 0.2°C per decade. Rise in atmospheric temperature due to climate change will lead to loss of glaciers in the Himalayas, changes in the ice caps due to melting, thinning, shrinking, retreating, freezing and disappearing. The Greater Himalayas holds the largest mass of ice outside Polar Regions and are the source of the ten largest rivers in Asia. The high Himalayan and Inner Asian ranges have 116,180 km^2 of glacial ice, the largest area outside Polar Regions. Various studies suggest that warming in the Himalayas has been much greater than the global average of 0.74°C over the last 100 years. During the twentieth century, majority of the Himalayan glaciers have shown recession in their frontal parts, besides thinning of the ice mass. The melting of ice is changing the hydrological cycle and is also affecting the ocean currents. Recent measurements suggest that the mass budget over large parts of the Himalaya has been negative over the past five decades, which the rate of loss increased after roughly 1995. Monsoon-affected glaciers are more affected by climate change than winter-accumulation type glaciers. As a result of climate change, snowmelt begins earlier and winter is shorter; this affects river regimes, natural hazards, water supplies, and people's livelihoods and infrastructure. Retreat in glaciers can destabilize surrounding slopes and may give rise to catastrophic landslides, which can sometimes lead to outbreak floods. Excessive meltwaters, often in combination with liquid precipitation, may trigger flash floods or debris flows. Initially, increased melting will result in increased discharge. With time, however, as glaciers completely disappear or approach new equilibrium, long-term effects will be increasing water shortages and limited supplies for downstream communities, particularly during the dry season. The cascading effects of rising temperatures and loss of ice and snow in the Himalayan region are affecting water availability (amounts, seasonality), biodiversity (endemic species, predator–prey relations), ecosystem boundary shifts (tree-line movements, high-elevation ecosystem changes), and global feedbacks (monsoonal shifts, loss of soil carbon).

Biography

Sayan Bhattacharya completed his MSc and PhD in Environmental Science from University of Calcutta. He has been engaged in Post Doctoral Research in Dept. of Chemistry, Presidency University from September, 2012 to present. He has published 18 international journal papers, 10 book chapters, 30 international conference proceedings and many national conference proceedings. He received Young Researcher Award from Govt. of India. He is in the reviewers' committee of many international journals and in the editorial boards of international journals with high impact factors. He has over 7 years of teaching experiences in 5 colleges and universities of West Bengal.

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