

GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE

RAJYA SABHA
STARRED QUESTION NO. 195
TO BE ANSWERED ON 08.08.2024

Effects of climate change

195* SHRI SANT BALBIR SINGH:

Will the Minister of ENVIRONMENT, FOREST AND CLIMATE CHANGE be pleased to state:

- (a) the effects of climate change on the country and especially on the country's glaciers;
- (b) the manner in which the melting of glaciers will affect the rivers of the country and human life;
- (c) the measures Government has taken to prevent the rapid melting of glaciers;
- (d) the expected state of glaciers by 2047 along with preparedness of Government to deal with it; and
- (e) the details on the state of the glaciers in the last three years?

ANSWER

MINISTER FOR ENVIRONMENT, FOREST AND CLIMATE CHANGE
(SHRI BHUPENDER YADAV)

(a) to (e): A statement is laid on the table of the House.

Statement referred to in reply to parts (a) to (e) of Rajya Sabha Starred Question No. 195 due for reply on 08.08.2024 regarding 'Effects of Climate Change' by Shri Sant Balbir Singh, Hon'ble Member of Rajya Sabha

(a) & (b) Climate change is a complex and multifaceted global phenomenon, which necessitates coordinated action from all nations. India, through its Third National Communication has submitted to the United Nations Framework Convention on Climate Change (UNFCCC) in 2023 that our country experiences full range of climate change impacts, from floods and droughts to heatwaves and glacier melt. The impacts of climate change are observed in sectors, biodiversity and forests; agriculture; water resources; coastal and marine ecosystems; human health; gender; urban and infrastructure; and economic costs.

Climate change is likely to enhance the retreat of glaciers, which may further increase the number of glacial lakes and expand the size of existing ones. The Indian Himalayan Region (IHR), which is highly prone to earthquakes, make the glacial lakes vulnerable to breaches, unleashing sudden, potentially disastrous floods in the nearby communities. Studies show that glacial melt impacts river systems by initially increasing water flow, benefiting agriculture and hydropower. However, long-term water availability may decline as glaciers continue to shrink, potentially causing water scarcity particularly during dry seasons.

(c) & (d) Government of India is committed to protect the glaciers and has made efforts to reduce the impact of climate change through several measures undertaken through its various Ministries, Departments and Institutes. Several Indian institutes/ universities/ organizations are engaged in regular monitoring of glacier dynamics, snow and glacier melting. Long-term measurements on glacier-climate interaction in the different parts Indian Himalayan Region are carried out by some of these agencies.

The Ministry of Jal Shakti, Department of Water Resources River Development and Ganga Rejuvenation (DoWR,RD&GR) has constituted a Steering Committee on 'Monitoring of Glaciers' at the National Institute of Hydrology (NIH), Roorkee. The Department has also established a Centre for Cryosphere and Climate Change Studies at NIH to facilitate effective management of snow and glaciers in India.

Further, the Central Water Commission (CWC) monitors 902 Glacial Lakes and Water Bodies (GLs&WBs) in the Himalayan Region of Indian River Basins for the period June to October every year, and reports the relative change in water spread area to various stakeholders including National Disaster Management Authority (NDMA) and State Disaster Management Authorities (SDMA).

The National Centre of Polar and Ocean Research (NCPOR), an autonomous Institute under Ministry of Earth Science, monitors six glaciers in the Chandra Basin, Himachal Pradesh to understand differential response of glaciers to climate change and its impact on downstream hydrology. A state-of-the-art field research station 'Himansh' established in Chandra basin is operational since 2016 for conducting field experiment and expeditions to glaciers.

The Geological Survey of India (GSI) under Ministry of Mines has conducted mass balance studies on nine glaciers and carried out secular movement studies on 90 glaciers to access the recessional and advancement pattern of the glacier.

The Department of Science and Technology (DST) has supported various R&D projects on Himalayan Glaciers under the National Mission for Sustaining Himalayan Ecosystem (NMSHE) and National Mission on Strategic Knowledge for Climate Change (NMSKCC). Key studies by institutions such as the University of Kashmir, Sikkim University, Indian Institute of Science (IISc) and Wadia Institute of Himalayan Geology (WIHG) have contributed to understanding glacier dynamics.

The G.B. Pant National Institute of Himalayan Environment (GBPNIHE), an autonomous institute of the Ministry of Environment, Forest and Climate Change (MoEF&CC), is also involved in glacier studies in Himalayan region, which includes snout monitoring, melt rate, mass balance and water quality and hydro-meteorological studies through field measurements and remote sensing approach. A discussion paper on "Himalayan Glaciers: A State-of-Art Review of Glacial Studies, Glacial Retreat and Climate Change" was prepared by the Institute to facilitate informed science-based discussion and policy planning on critical environmental issues of Himalayan glaciers. Further, MoEF&CC is also funding glacial studies under the National Mission on Himalayan Studies (NMHS).

Nevertheless, melting of glaciers, which is a natural process, cannot be prevented and as it is controlled by various complex meteorological factors, accurate prediction of their future state may not be possible.

(e) The monitoring and assessment of 7 glaciers of the Shyok, Nubra, South Chenab and Beas basins carried out by GSI revealed that these glaciers are passing through a marked phase of recession, with average annual retreat ranging from 1.68 m per year to 18 m per year.

According to the monitoring of glaciers in Uttarakhand carried out by WIHG, the Dokriani Glacier is retreating at 15-20 m and the Chorabari Glacier is retreating at 9-11 m annually. In Ladakh region, Durung-Drung and Pensilungpa glaciers in the Suru basin are retreating at rates of 12 m/a and approximately 5.6 m/a, respectively.

As per the study conducted by NIH over the Upper Himalayan Ganga river basin (up to Rishikesh), a noticeable reduction in the glacier areas have been observed during 1990-2020 with a corresponding increase in glacier melt. Increase in glacier melt by around 3-4% have been computed at Bhojwasa and around 1-2% at Rishikesh.

The glacier inventory prepared by NCPOR for the Chandra basin shows that it has lost about 6% of its glacial area during last 20 years and 2.4 meter water equivalent (m w.e.) to 9 m w.e. ice mass during 2013-2021. The glaciers in Bhaga basin lost huge ice mass in the range 6 m w.e. to 9 m.w.e. during 2008-2021. Annual rate of retreat of Chandra basin glaciers vary from 13 to 33 meter/year during last decade.
