

GOVERNMENT OF INDIA  
MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE

**RAJYA SABHA**  
**UNSTARRED QUESTION NO. 2129**  
TO BE ANSWERED ON 15.03.2021

**Retreating glaciers**

2129. SHRI A. D. SINGH:

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

- (a) the extent to which the major Himalayanglaciers have retreated in the last four decades;
- (b) the steps Government is taking to mitigate the effects of climate change on this important water source; and
- (c) whether Government has put in place any mechanism to keep a watch on formation of glacial lakes in the Himalayan region to prevent further disasters?

**ANSWER**

**MINISTER OF STATE IN THE MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE**  
**(SHRI BABUL SUPRIYO)**

(a) As per the information provided by Indian Space Research Organisation (ISRO), changes in the area of glaciers were mapped for 2,630 glaciers. Glacier extents for the year 1962 were taken from Survey of India topographical maps on 1:50,000 scale as a reference and that of 2001 to 2005 timeframe were taken from satellite data.

Further, monitoring of change in extents of 2,018 glaciers was carried out from IRS LISS III data of year 2000 to 2002 and 2010 to 2011. The monitoring shows that 87% of the glaciers showed no change, 12% retreated and 1% glaciers have advanced.

The net change in a glaciated area varies from one region to another. In a recent study, 5,234 glaciers were monitored between the years 2001 and 2017 to 2018 across the Himalayan–Karakoram (H-K) region from Kashmir to Sikkim using satellite data. In the Karakoram region (north of the Indus river) gain in the area (0.056%) has been observed in the area coverage of 17,903 Km<sup>2</sup>. The loss is observed in the rest of the Himalayan region which varies from 0.751% to 2.32%.

Furthermore, the National Centre for Polar and Ocean Research (NCPOR), under the Ministry of Earth Sciences (MoES) has monitored six glaciers (Sutri Dhaka, Batal, Bara Shigri, Samudra Tapu, Gepang Gath and Kunzam) covering approximately 230km<sup>2</sup> glaciated area of Chandra basin, western Himalaya, since 2013 and has observed that Chandra basin has

experienced negative mass balance ( $0.64 \text{ mw.e.a}^{-1}$ ) since 2013 and lost 3.1 GT (Gigatonne) of glacier mass with a mean thinning of 4.5 m during the last 7 years.

(b) The National Action Plan on Climate Change launched by the Government of India identified the approach to be adopted to meet the challenges of impact of climate change through institutionalization of 8 national missions which *inter-alia* includes a 'National Water Mission'. As per the information received from the Central Water Commission, eight research studies on the impact of climate change on water resources are being taken up by the National Water Mission, Ministry of Jal Shakti (MoJS). Further, the Department of Science and Technology (DST) has supported research projects to Wadia Institute of Himalayan Geology (WIHG); National Institute of Hydrology (NIH); G.B. Pant National Institute of Himalayan Environment; Kashmir University and Indian Institute of Technology Madras to carry out studies on the impact of climate change on water resources.

(c) The monitoring of glaciers is pursued by ISRO, Geological Survey of India (GSI), MoES, Defence Geoinformatics Research Establishment, and through various research projects sponsored by DST.

According to the information provided by the Central Water Commission, monitoring of 477 glacial lakes and water bodies in the Himalayan Region of the Indian river basin system, having an area of more than 50 hectares is done on a monthly basis in the monsoon season since 2011.

Also, fifty moraine-dammed lakes and 5 supraglacial lakes have been mapped in the Chenab basin by NCPOR. A substantial expansion in area and volume (20 times) was observed in two major proglacial lakes Samudra Tapu and Gepang Gath in the Chandra basin over the last four decades (1971-2014) using satellite data.

The National Disaster Management Authority has issued Guidelines titled “Management of Glacial Lake Outburst Floods (GLOFs)” in October 2020, which *inter-alia* includes a discussion on Early Warning Systems. However, monitoring, interpreting data and providing specific alerts for hazards in specific locations is a challenging and developing subject, and new scientific issues arise as our data collection and knowledge advances.

WIHG has also prepared glacial lake inventory for Uttarakhand and Himachal Pradesh using remote sensing and geographical information system.

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