GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE

RAJYA SABHA
UNSTARRED QUESTION NO. 1469
TO BE ANSWERED ON 08.03.2021

Climate Change and natural disasters

1469. SHRI MD. NADIMUL HAQUE:

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

(a) whether Government takes serious note of the shrinking of glaciers due to climate change that has resulted in an increased hazard of natural disasters;
(b) whether Government has commissioned a study for the same;
(c) if so, the details thereof;
(d) the number of such disasters in the last decade, State-wise;
(e) the institutions that work towards alerting about the same;
(f) the reasons for the failure of such alerting systems during the Chamoli floods; and
(g) the steps undertaken by Government and the action plan to ensure that such failures will not be repeated?

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

(a) The Government is seized of the matter. The impact of changes in climate variables on specific hazards in particular locations is difficult to establish, though science has established that in general, globally, glaciers are suffering the impact of climate change, through the loss of mass and volume. Glaciers and their characteristics may exhibit complex changes in specific locations such as various sub-regions in the Himalaya.There are stable, retreating, or even advancing glaciers in the Himalaya, thereby emphasizing the complex geographical and cyclical nature of the glacial dynamics.

(b)and(c) The National Centre for Polar and Ocean Research (NCPOR), Ministry of Earth Sciences (MoES), has studied since 2014 the Himalayan glaciers with a focus on sixrepresentative glaciers of the WesternHimalaya. The NCPOR is also monitoring lake terminating glaciers (Samudra Tapu and Gepang Gath) in the Lahaul-Spiti for their historical changes in the lake area and volume and has reported the potential vulnerability of one of the glaciers. The NCPORhas established a research station called Himansh in the Lahaul-Spiti region in Himachal Pradesh and has put in place a collaborative national initiative called HiCOM (Himalayan Cryospheric Observations and Modelling) to undertake state-of-the-art measurements and modelling across the Himalaya, in partnerships with IITs, IISERs, and universities.

The Geological Survey of India (GSI) has conducted studies on the melting of the glaciers by assessment of mass balance studies on nine glaciers and also carried out monitoring the recession/ advancement of 76 glaciers.

Indian Space Research Organization (ISRO) has monitored the glacier advance and retreat of 2018 glaciers, across the Indian Himalayan region using satellite data of 2000-01 to 2010-11. The study shows that 87% of glaciers showed no change, 12% of glaciers retreated, and 1% of glaciers have advanced.

Also, a lab-level study has been initiated by the Defence Geoinformatics Research Establishment (DGRE) to develop a model for mapping and monitoring glaciers outbursts.

Further, the Central Water Commission (CWC) monitors 477 glacial lakes and water bodies in the Himalayan Region of the Indian river basin system, having an area of more than 50 hectareson a monthly basis in the monsoon season since 2011.

The Department of Science and Technology (DST) has sponsored research studies on various aspects of the Himalayan glaciers. The Divecha Centre for Climate Change, Indian Institute of Science has undertaken studieson existing and potential glacial lakes in Sikkim and Uttarakhand. Under the National Missionfor Sustainingthe Himalayan Ecosystem, DST has also established a Network Programme on Himalayan Cryosphere supporting six projects on different thematic areas of the glaciers.

(d) As per the information supplied by the Geological Survey of India (GSI), some of the major disasters in the last decade occurred in Ladakh (August 2010), Jammu & Kashmir (September 2014), and Uttarakhand (June 2013 and February 2021).

(e) and (f) 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. Hence, scientists in India and all over the world are closely studying the investigations, data collection and analysis of various case studies. While many studies monitor changes in the glaciers, the science of attribution of climate change to the shrinking of glaciers is far more complex and currently an evolving subject as there is inherent variability in the climate systems.

(g) As stated above in the reply to parts (b) and (c), the monitoring of glaciers is pursued by ISRO, GSI, MoES, DGRE, CWC, and also studied through various research projects sponsored by the DST. The latter also has an autonomous institution on Himalayan Geology , namely, the Wadia Institute of Himalayan Geology, Dehradun.

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