GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
LOK SABHA
STARRED QUESTION No.*271
TO BE ANSWERED ON WEDNESDAY MARCH 14, 2018

STUDY ON NATURAL DISASTERS

***271. SHRI JANAK RAM:**

Will the Minister of EARTH SCIENCES be pleased to state:

(a) **whether the government has conducted or purposes to conduct any study regarding the natural disasters like landslide and avalanche occurring almost every year in some parts of the country;**
(b) **if so, the details thereof**
(c) **whether any system is existing for identifying such places for the purpose of carrying out preventive measures; and**
(d) **if so, details thereof ?**

ANSWER
MINISTER FOR MINISTRY OF SCIENCE AND TECHNOLOGY AND MINISTRY OF EARTH SCIENCES
(Dr. HARSH VARDHAN)

(a) to (d): A statement is laid on the Table of the House.

STATEMENT REFERRED TO IN REPLY TO PARTS (A) TO (D) OF THE LOK SABHA STARRED QUESTION NO. *271 REGARDING 'STUDY ON NATURAL DISASTERS' FOR ANSWER ON 14TH MARCH, 2018.

(a) **Yes Madam. Geological Survey of India (GSI) under the Ministry of Mines carries out studies on landslides.**

Snow And Avalanche Study Establishment (SASE), an Institute under the Defence Research and Development Organization (DRDO) is a service based laboratory providing avalanche and weather forecasting over J&K, HP and Uttarakhand for safe mobility of troops deployed in snow bound areas. The information on avalanche danger in civilian areas is also passed on to State Disaster Centers as and when required.

(b) **Geological Survey of India (GSI) has been carrying out pre-disaster and post-disaster landslide studies since very long. Being the nodal department of landslide studies in India, it has been undertaking regular annual programmes on varied types of landslide investigations like macro (1:50,000) and meso scale (1:15000 /10000) landslide investigations, landslide susceptibility zonation, landslide inventory mapping and site-specific landslide investigations. The site-specific landslide investigations (in <1:5000 scale) are mostly of post-disaster phases and are being undertaken at the request of the Road maintaining authorities, Railways, State Governments, Municipalities etc.**

All earlier studies on landslides (prior to 2014) carried out in NW Himalayas (J&K, Himachal Pradesh and Uttarakhand); Maharashtra; southern parts of Western Ghats (Kerala, Tamil Nadu, Karnataka and Goa) and Darjeeling/Sikkim Himalayas (Darjeeling and Sikkim) have been published as 'Special Publications' of GSI.

Since 2014-15, GSI is carrying out a national programme on National Landslide Susceptibility Mapping (NLSM) to prepare 1:50,000 scale seamless landslide susceptibility maps of the entire landslide prone terrains (0.42 Million sq. km) in India. The NLSM maps along with landslide inventory maps are disseminated through the interactive map service portal of GSI known as "Bhukosh". GSI also maintains all its information about landslides in its "Landslide Hazard Studies" threads of GSI portal (www.gsi.gov.in).

Apart from the above regular items of landslide investigations, GSI has always been deploying its workforce during any post-disaster situations to study the landslides, its damages and its related hazards, mainly to assist and help the State Government authorities in restoration/ rehabilitation works. Similar endeavour made by GSI in recent times was after the recent Uttarakhand deluge in 2013.

Based on the data of past years and expert opinion, SASE has developed statistical models for prediction of precise avalanches in the Himalayan region.

(c) **Yes. Both GSI and SASE are working on such systems for identifying the areas prone for landslides and avalanches.**

(d) **Landslide susceptibility analysis is one such tool which is relevant in this direction and GSI has been working on that in a pan-India platform through its national programme – NLSM. The final product of NLSM would be seamless landslide susceptibility maps of the landslide-prone areas of the country on scale 1:50,000, which -**

1. **Would predict the spatial locations of future landslide initiation areas.**
2. **Would help the planners and administrators to frame future land use zoning regulations, taking up non-structure mitigation options and if needed, would help in developing the master plans for future infrastructure development work in mountainous areas.**
3. **Would help in identifying right resources and areas for prevention and protection measures as well as areas of safe constructions.**
4. **Would act as the main input maps to prepare landslide hazard and risk maps which are the ultimate aims to manage landslide related risk in an area.**

Landslide Early Warning is another technique through which forecasting as well as early warning mechanisms can be developed to minimise the losses caused by such disaster. This aspect is still under developing stage. GSI, in collaboration with Defence Terrain Research Laboratory (DTRL), British Geological Survey and Natural Resources Canada is working on different research projects on this subject.

The site-specific landslide investigations (in <1:5000 scale) provide inputs for designing suitable structural mitigation measures for containing a landslide or active slope. GSI has been associated with several site specific preventions of landslides in the country.

SASE has established a total no of 56 Snow Met Observatories and 55 Automatic Weather Stations (AWS) established by SASE in high altitude areas, data is regularly received from snow observatories at 3 hrs intervals and at 1 hr interval from AWS at SASE. This output and the expert opinion is used to draw avalanche forecast for different areas at least 24 hrs in advance. Establishment also developed its own Avalanche map indicating locations of potential avalanche sites located all over the Himalayas and is being used by Troops for their safe mobility in snow bound area. Engineering solutions are also being provided as per the user's requirements.

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