

GOVERNMENT OF INDIA  
MINISTRY OF EARTH SCIENCES  
**LOK SABHA**  
**UNSTARRED QUESTION NO. 1663**  
TO BE ANSWERED ON WEDNESDAY, 13<sup>TH</sup> DECEMBER, 2023

SURVEY OF NATURAL DISASTERS

1663. SHRIMATI PRATIBHA SINGH:

Will the Minister of Earth Sciences be pleased to state:

- (a) whether the Government has conducted or intends to conduct any study/survey in respect of natural disasters such as landslides and avalanches occurring in the hilly areas including Himachal Pradesh;
- (b) if so, the details thereof;
- (c) whether any classification of such hazardous terrain locations has been made for the purpose of taking preventive measures and any system is in place to identify such potential locations effectively; and
- (d) if so, the details thereof?

**ANSWER**

THE MINISTER OF EARTH SCIENCES  
(SHRI KIREN RIJU)

- (a) & (b) Yes Sir. Geological Survey of India (GSI) under the administrative control of Ministry of Mines as the Nodal agency for landslide studies has been conducting investigations and Survey on various domains of landslide studies.

Under landslide studies, regular major activities of GSI are conducted every year under Pre-disaster studies (multi-scale landslide susceptibility mapping and conducting landslide awareness programme); Post-disaster studies (landslide inventory mapping and detailed site specific mapping, slope stability analysis and landslide monitoring), and Regional landslide forecasting.

GSI launched the National Landslide Susceptibility Mapping (NLSM) Programme in 2014-15 for generating the baseline data on 1: 50,000 scale and completed the landslide susceptibility mapping of 4.3lakh sq.km of the landslide prone areas in India which includes approx. 42093 sq.km area in Himachal Pradesh. The landslide Susceptibility Map classified landslide prone hilly terrains of the country into High, Moderate and Low zones based on proneness to land sliding. Under this programme, GSI also mapped historical 87,230 nos. of landslide polygon using both remote sensing (RS) and field-based source data, out of which, 30,881 landslides are field validated. Out of the total number of landslide incidents, 17,102 landslide incidents have been recorded in Himachal Pradesh. This huge historical national landslide inventory is continuously being updated with the new landslide data collected year-

wise as part of Post-disaster studies. The landslide susceptibility maps and the landslide information are uploaded in OCBIS portal (<http://bhukosh.gsi.gov.in/Bhukosh/Public>) for public viewing and downloading. This database has also been shared with National Disaster Management Authority (NDMA) and other stakeholders including Himachal Pradesh State Disaster Management Authority (HPSDMA) (in GIS format) for use in regional developmental planning of hill areas and further research studies for use in the management of landslide disasters in the country.

Monitoring of snow accumulation and avalanche early warning is carried out by the Defence Geoinformatics Research Establishment (DGRE), erstwhile Snow and Avalanche Study Establishment (SASE), Chandigarh, of the Defence Research & Development Organization (DRDO) for the vulnerable upper reaches of Himalayas in the states of Jammu & Kashmir and Himachal Pradesh. Regular operational avalanche warnings are issued to the Army and civilian population in hitherto snow bound regions of north-west Himalayas.

DGRE is also the nodal agency for studying and developing avalanche mitigation technologies. The methodologies include aerial reconnaissance/ground surveys, which are further used as an input to prepare avalanche hazard maps.

- (c) & (d) Yes Sir. In Himachal Pradesh, Landslide susceptibility assessment in 1: 50,000 scale, to be used in regional planning was initiated during 2014-15 under the National Landslide Susceptibility Mapping Programme for approximately 42093 sq.km area from 2014 to 2020. The susceptibility map provides the susceptibility condition prevailing in the hilly areas of the state defining the slopes into three categories based on the relative proneness (high, moderate and low) of the slopes to landsliding modelled based on the relationships of various geofactors responsible for landslide in the area in the past. During the study period around 17102 landslides have been mapped in the whole state along with 6289 landslides with detail 42-point parameter.

For local landslide management, mesoscale (1: 10,000) scale susceptibility mapping of prioritized sectors has been initiated as per the SOP developed by GSI. Since 2020-21, GSI initiated the mesoscale (1: 10,000 scale) landslide susceptibility mapping in the identified prioritised sectors derived from the high and moderate susceptible areas in 1: 50,000 scale for further subdividing areas into domain-based susceptibility with high density data input and providing landslide management map for use in local landuse planning and mitigation planning. Since 2020-21 GSI has covered 19 sectors identified by NDMA and HPSDMA.

For providing suitable remedial measure for landslides, unstable slopes etc. detailed site-specific landslide investigations on large scale e.g. 1:1000 are being taken up regularly as per the requests of the concerned stakeholders. GSI has completed detailed site-specific studies of 12 landslide sites in Kinnaur district prioritised and requested by HPSDMA and one site in Chamba district.

Currently, work in 06 prioritised sectors on 1: 10,000 scale and one earthquake induce landslide project and post disaster landslide studies (PDLs) in parts of Himachal Pradesh is under progress. As per the request of HPSDMA preliminary studies in the four sectors 1) Shimla town 2) Kalka-Shimla Section along the National Highway (NH), 3) Jeori-Samdo Section along the National Highway. 4) Mandi-Kullu Section along the National Highway is also being initiated.

Besides, GSI has also extended the R & D project on experimental regional Landslide Early Warning System (LEWS) based on rainfall thresholds and initiated work in Kinnaur and Shimla districts of Himachal Pradesh.

As of today, no warning system exists for occurrence of landslides. However, landslide prone vulnerable zones are mapped so as to alert respective local governments to put such areas under watch in association with heavy rainfall warnings as and when issued for such zones. The precautionary measures include the passive control of avalanches viz. to ensure safe mobility, training to the troops (approximately 5000 in number every year) and active control of avalanches by building control structures as a permanent solution.

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