GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
LOKSABHA
UNSTARRED QUESTION NO. 3270
TO BE ANSWERED ON WEDNESDAY, 9TH AUGUST, 2023

FORECASTING OF LANDSLIDES

3270. SHRI ABHISHEK BANERJEE:

Will the Minister of EARTH SCIENCES be pleased to state:

(a)   the number of landslides that has occurred in the past five years, year-wise;
(b)   the major reasons for the same;
(c)   the monitoring system in place for the same; and
(d)   the number of these landslides that were forecasted?

ANSWER
THE MINISTER OF EARTH SCIENCES
(SHRI KIREN RIJIJU)

(a)   The Geological Survey of India (GSI) under the administrative control of Ministry of Mines collects data and keep records of major landslides that occurred in different States/ UT, which have impacted lives and/ or infrastructure. The onsite field investigations are mainly carried out in response to the requests received from the concerned State Governments. The study involves various geoparametric attributes of each landslide, including studying its impacts, future vulnerability etc. All the above data are also used for updating GSI's existing national landslide inventory. The details of Post disaster landslide studies carried out by GSI in last 5 years is given in Annexure-I.

GSI has also carried out the National Landslide Susceptibility Mapping (NLSM) Programme since 2014-15 and prepared 1: 50,000 scale landslide susceptibility mapping of the total area of 4.3 lakh sq. km. in different landslide prone States/ UTs (Annexure-II). During NLSM, GSI also collected historical information on major landslides polygons using both remote sensing (RS) and field-based source data, out of which,many landslides have already been field validated by GSI. This huge historical national landslide inventory is continuously being updated with the new landslide data collected year-wise as part of Post-disaster studies.

(b)   From the post disaster investigations of the landslides, it is revealed that major trigger of landslides is due to unprecedented high rainfall. The other important geo-factors such as terrain character, slope forming material, geomorphology, land-use /land-cover in different terrain etc. are the preparatory factors for initiation of landslides. The anthropogenic causes such as unprotected slope cuts, blocking of drainages etc. has also been reported in many of the slides.

(c)   No site-specific landslide monitoring project has been taken up by GSI.

(d)   GSI as part of the LANDSLIP project (www.landslip.org) has developed an experimental regional Landslide Early Warning System (LEWS) based on rainfall thresholds pilot study areas viz. Darjeeling district of West Bengal and the Nilgiris district of Tamil Nadu. Since 2020 monsoon, GSI started issuing daily landslide forecast bulletins during monsoon to the district administrations in these two pilot areas. Now GSI is in the process of extending the similar endeavour in multiple landslide-prone states in India. In this connection, GSI has already extended the Landslide Early Warning System in Kalimpong district, West Bengal and Rudraprayag district, Uttarakhand and started issuing daily landslide forecast bulletins during monsoon to the district administrations. (Kalimpong - from July 2021; Rudraprayag from August 2022). The feedback on 883 landslide information have been received during the last two monsoon seasons from these districts for evaluation of the forecast model.

GSI has also initiated R & D activities for developing regional landslide Forecasting systems (LEWS).

Year-wise details of post disaster major landslide studies carried out by GSI

Year	Post disaster landslide studies completed	State
2017-18	70	Arunanchal Pradesh, Assam, Meghalaya, Mizoram, Tripura, Manipur, Nagaland, Sikkim, Himachal Pradesh, Uttarakhand, Maharashtra
2018-19	2210	Arunanchal Pradesh, Assam, Meghalaya, Mizoram, Tripura, Manipur, Nagaland, Sikkim, Himachal Pradesh, Jammu & Kashmir (UT),Ladakh (UT), Uttarakhand , Karnataka, Tamil Nadu, Kerala, Maharashtra
2019-20	386	Arunanchal Pradesh, Assam, Meghalaya, Mizoram, Nagaland, Sikkim, Himachal Pradesh, Jammu & Kashmir (UT), Ladakh (UT), Uttarakhand , Karnataka, Tamil Nadu, Kerala, Maharashtra, West Bengal
2020-21	845	Arunanchal Pradesh, Assam, Meghalaya, Manipur, Nagaland, Sikkim, Himachal Pradesh, Jammu & Kashmir (UT), Ladakh (UT), Uttarakhand , Karnataka, Tamil Nadu, Kerala, Maharashtra, West Bengal
2021-22	156	Arunanchal Pradesh, Assam, Meghalaya, Mizoram, Manipur, Nagaland, Sikkim, Himachal Pradesh, Jammu & Kashmir (UT),Ladakh (UT), Uttarakhand , Karnataka, Kerala, Andhra Pradesh, Maharashtra, West Bengal
Total	**3667**	

Status National Landslide Susceptibility Mapping (NLSM) Programme

State/ UT	Target area completed so far (km^2)	Landslide polygons mapped (Nos.)	Landslides field validated (Nos.)
Assam	24144	527	598
Meghalaya	22601	1525	791
Mizoram	21864	4221	2003
Tripura	1367	57	56
Manipur	23250	2405	1548
Nagaland	17294	2742	1554
Sikkim	4979	3379	651
Himachal Pradesh	42108	17127	6420
Jammu & Kashmir (UT)	28890	7465	2174
Ladakh (UT)	40065	838	166
Uttarakhand	39009	14782	4927
Karnataka	31323	1248	1278
Goa	3546	76	76
Tamil Nadu	10549	782	863
Kerala	19301	1396	3016
Andhra Pradesh	1124	29	29
Maharashtra	29191	1134	1152
West Bengal	2980	1554	1529
Arunanchal Pradesh	71228	25172	907
Total	**434813**	**86459**	**29738**

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