GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
LOK SABHA
UNSTARRED QUESTION NO. 4043
TO BE ANSWERED ON WEDNESDAY, 22ND DECEMBER, 2021

BETTER MONITORING OF RAINFALL

4043. SHRI S. JAGATHRAKSHAKAN:

Will the Minister of EARTH SCIENCES be pleased to state:

(a) whether the Government agrees with the view that along with better forecasts, there is a need for better monitoring and reporting of actual rainfall, water levels in rivers and incidents of landslides;
(b) if so, the steps proposed to be taken by the Government in this direction; and
(c) if not, the reasons therefor?

ANSWER
THE MINISTER OF STATE (INDEPENDENT CHARGE) FOR
MINISTRY OF SCIENCE AND TECHNOLOGY
AND EARTH SCIENCES
(DR. JITENDRA SINGH)

(a) Yes, a better forecast is intricately dependent on better monitoring and collection of actual observed data from the ground on rainfall, and impact information such as landslide occurrence date and time etc. for relevant evaluation of the predictive models used in forecast as well as for improving the same in the future.

For more than a century, India Meteorological Department (IMD)is effectively functioning in the country maintaining accurate weather forecasting services along with monitoring services for early detection of natural disasters.IMD is dedicated for monitoring, detection and forecasting of weather and climate including early warning for severe weather events such as, heavy rainfall, extreme temperature, thunderstorms, cyclones etc.

For monitoring and reporting of actual rainfall IMD has dense network of Automatic Weather Stations (AWSs) and Automatic Rain gauges (ARGs) across the country. State-wise are AWS and ARG are given in **Annexure –I**.

Geological Survey of India (GSI) under the LANDSLIP project (www.landslip.org) in collaboration with the British Geological Survey has developed a prototype landslide forecast model based on terrain-specific rainfall thresholds and rainfall forecasts, and is currently testing the same by issuing experimental landslide forecast bulletins for Darjeeling district in West Bengal and Nilgiris district, Tamil Nadu. This regional landslide forecast model is dependent on the spatial and temporal accuracies of the rainfall forecast, which in turn depends on the evaluation with actual rainfall data observed in an area. The forecasting, evaluation, calibration and improving the forecast models with actual observed data therefore remains an evolving and continuous process used for reducing errors, and uncertainty in the forecast models.

(b) Various new initiatives, as mentioned below, have been undertaken by IMD, MoES for betterment of weather monitoring.

- The observational network is being enhanced with installation of more number of Automatic Weather Stations (AWSs) and Automatic Rain gauges (ARGs) across the country.
- 29 Doppler Weather Radars (DWR) are operational across the country to provide adequate warning in the event of approach of Cyclonic Storms, Monsoon Depressions, Thunderstorms etc. DWR network also provides vital information for nowcasting purposes on mesoscale convective weather developments anywhere in the country.
- Multi-Mission Meteorological Data Receiving & Processing System has been established and dedicated to the nation for augmentation of satellite derived products.
- New raingauge stations are being added in the District-wise Rainfall Monitoring Scheme taking the total number of stations to more than 5000.

Geological Survey of India is collecting landslide information and observed daily rainfall data from the districts where regional landslide forecast is being provided for testing. The observed rainfall data is collected by GSI through various sources like IMD's AWSs/ Rainfall Stations, rain gauges maintained by the district authorities, State Disaster Management Authority (SDMA), District Disaster Management Authority (DDMA), Tea/ Coffee Estates etc., and the landslide occurrence data from the district authorities, road/ rail maintaining authorities, PWDs, local community groups, media etc., which are subsequently validated through independent field visits by GSI.

To improve the availability of the above vital data, GSI has also been conducting pre and post monsoon landslide awareness programmes in the districts (Darjeeling/ Kalimpong in West Bengal, and the Nilgiris, Tamil Nadu) for the SDMA/ DDMA/ Block/ Panchayat level officials, and local community groups (till date in the Landslide Early Warning programme-27 awareness programmes have already been conducted down to the block level). The above awareness programs have helped in enabling the local responders to understand the importance of collection of observed data on landslide occurrence and rainfall data and its purpose in model evaluation, and the same has helped GSI in collecting such data at a regular frequency for use in evaluation of such forecast models. To institutionalise the above vital process, GSI has also initiated process of developing MoUs with respective SDMAs during the experimental stage for developing the regional Landslide Early Warning Systems (LEWS) in test states, so that the vital observed data for evaluation can be collected from a single point responsible authority. However, GSI is continuously endeavouring this aspect more on fine-tuning further the modalities of actual data collection through series of discussion/ interactions with state authorities, local community groups, and organising awareness programmes every year.

(c) Doesn't arise.

Annexure –I

Details are AWS and ARG (State-wise)

S NO.	STATE	AWS	ARG
1	ANDAMAN_AND_NICOBAR	2	NIL
2	ANDHRA_PRADESH	32	61
3	ARUNACHAL_PRADESH	18	27
4	ASSAM	34	63
5	BIHAR	43	28
6	CHANDIGARH	2	NIL
7	CHHATTISGARH	28	33
8	DAMAN_AND_DIU	2	1
9	DELHI	12	1
10	GOA	5	5
11	GUJARAT	45	65
12	HARYANA	32	33
13	HIMACHAL_PRADESH	27	71
14	JAMMU_AND_KASHMIR	27	14
15	JHARKHAND	32	28
16	KARNATAKA	39	47
17	KERALA	32	30
18	LADAKH	4	NIL
19	LAKSHADWEEP	1	NIL
20	MADHYA_PRADESH	66	101
21	MAHARASHTRA	63	124
22	MANIPUR	10	8
23	MEGHALAYA	7	10
24	MIZORAM	8	16
25	NAGALAND	10	14
26	ODISHA	47	177
27	PUDUCHERRY	3	1
28	PUNJAB	30	21
29	RAJASTHAN	48	64
30	SIKKIM	5	4
31	TAMIL_NADU	47	80
32	TELANGANA	16	55
33	TRIPURA	5	8
34	UTTARAKHAND	28	21
35	UTTAR_PRADESH	68	132
36	WEST_BENGAL	33	33

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