

**GOVERNMENT OF INDIA  
MINISTRY OF EARTH SCIENCES  
LOK SABHA  
UNSTARRED QUESTION NO. 2554  
TO BE ANSWERED ON WEDNESDAY, 7<sup>TH</sup>AUGUST, 2024**

**UNUSUAL HEAVY RAINFALL**

†2554. SHRI SATPAL BRAHAMCHARI:

Will the Minister of EARTH SCIENCES be pleased to state:

- (a) whether the Government has proposed/is proposing to conduct a study on unusual heavy rainfall during the last five years;
- (b) if so, the details thereof and if not, the reasons therefor;
- (c) the details of the deaths caused by heavy rainfall in the country during each of the last five years, year, State and district-wise; and
- (d) whether the emerging technologies like Artificial Intelligence (AI) is used/being used to improve weather forecasting in the country at present, if so, the details thereof, State/district-wise?

**ANSWER**

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

- (a) Yes.
- (b) The India Meteorological Department (IMD) has classified heavy rainfall events into three major categories (heavy rainfall: 64.5 mm to 115.5 mm, very heavy rainfall: 115.6 mm to 204.4 mm, extremely heavy rainfall: 204.5 mm and above).

IMD routinely analyzed all heavy rainfall events observed nationwide, and the causes are published as the weekly, monthly, and monsoon season end reports (<https://impune.gov.in/reports.php>). At the end of each year, the Annual Climate Summary (<https://www.impune.gov.in/cmpg/Product/acs.html>) summarizes all significant events.

Also, IMD analysed the changing rainfall pattern in the country and extremes in the recent 30 years at different spatial scales (States and Districts). A total of 29 reports on "Observed Rainfall Variability and Changes" for various States/UTs were published by IMD in January 2020, and it is available at the following (<https://www.impune.gov.in/Reports/rainfall%20variability%20page/raintrend%20new.html>).

- (c) The latest details are given in Annexure-1 as per the National Crime Record Bureau (NCRB), Ministry of Home Affairs (MHA).
- (d) Yes. Artificial intelligence (AI) is being used to improve weather, climate, and ocean forecasting skills for the entire country, at various institutes under the ministry. Some of these works include:
- Improvement of the short-range precipitation forecast in 1-day, 2-day, and 3-day lead times with a reduction in bias
  - Development of high-resolution (300 meters) urban gridded meteorological datasets for temperature and precipitation
  - Development of the time-varying Normalized Difference Urbanization Index with a spatial resolution of 30 meters from 1992-2023
  - Development of very high-resolution precipitation datasets for verification purposes

## Annexure-1

### Deaths due to Heavy Rains during 2018-2022:

Torrential Rains						
S. No.	State/UT	2018	2019	2020	2021	2022
1	ANDHRA PRADESH	0	0	7	0	0
2	ARUNACHAL PRADESH	0	0	0	0	0
3	ASSAM	0	0	1	0	1
4	BIHAR	59	13	1	5	0
5	CHHATTISGARH	0	0	0	0	3
6	GOA	0	0	0	1	0
7	GUJARAT	0	1	0	0	2
8	HARYANA	0	0	0	0	0
9	HIMACHAL PRADESH	16	1	0	0	2
10	JAMMU & KASHMIR	0	0			
11	JHARKHAND	8	3	10	12	1
12	KARNATAKA	3	6	2	10	12
13	KERALA	5	2	0	0	0
14	MADHYA PRADESH	1	1	1	0	2
15	MAHARASHTRA	3	5	5	8	2
16	MANIPUR	0	0	0	0	0
17	MEGHALAYA	0	0	6	0	0
18	MIZORAM	0	0	0	0	0
19	NAGALAND	0	0	0	0	0
20	ODISHA	0	0	0	0	0
21	PUNJAB	0	0	0	0	0
22	RAJASTHAN	0	3	3	9	3
23	SIKKIM	0	0	0	0	1
24	TAMIL NADU	0	5	1	2	0
25	TELANGANA	0	0	0	0	0
26	TRIPURA	0	4	0	0	0
27	UTTAR PRADESH	3	17	0	0	31
28	UTTARAKHAND	3	7	0	16	14
29	WEST BENGAL	0	1	0	0	0
	TOTAL (STATES)	101	69	37	63	74
	UNION TERRITORIES					
30	A & N ISLANDS	0	0	0	0	0

31	CHANDIGARH	0	0	0	0	0
32	D & N HAVELI	0	0	5	0	0
33	DAMAN & DIU	0	0	1	0	0
34	DELHI (UT)	0	0	0	0	15
35	JAMMU & KASHMIR			0	0	0
36	LAKSHADWEEP	0	0	0	0	0
37	PUDUCHERRY	0	0	0	0	0
	TOTAL (UTs)	0	0	6	0	15
	TOTAL (ALL INDIA)	101	69	43	63	89

Source: National Crime Record Bureau (NCRB), Ministry of Home Affairs (MHA)

\*\*\*\*\*