GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
LOK SABHA
UNSTARRED QUESTION NO. 1384
TO BE ANSWERED ON WEDNESDAY, 4TH DECEMBER, 2024

IRREGULAR WEATHER PATTERNS IN KERALA

1384. DR. SHASHI THAROOR:

Will the Minister of EARTH SCIENCES be pleased to state:

(a) whether the Government has commissioned a study to understand the causes of volatile and irregular weather patterns like flooding and heatwaves in the State of Kerala in recent years;
(b) if so, the details thereof and if not, the reasons therefor;
(c) whether the Government maintains a nationwide record of extreme weather events to facilitate the prevention and mitigation of natural disasters;
(d) if so, the details thereof and if not, the reasons therefor;
(e) whether the Government has come up with a national strategy to deal with urban flooding and advised States regarding the same; and
(f) if so, the details thereof and 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.

(b) Due to climate change, the annual temperature is increasing globally, and the impact is reflected in irregular weather patterns such as floods and heatwaves in various parts of the globe, including India. The India Meteorological Department (IMD) regularly publishes the country's annual climate summary, including State-wise. In addition, IMD published a monograph on heatwaves that provides comprehensive information on heatwaves over India (https://mausam.imd.gov.in/responsive/met2.php). Further, a summary of temperature and extreme rainfall over Kerala is given in Annexure-1.

(c) Yes.

(d) IMD maintains a nationwide record of extreme weather events to facilitate the prevention and mitigation of natural disasters.Every year, IMD prepares "Annual Climate Summary" for the Indian region, which contains information regarding various extreme weather events observed within the country. The reports are available at (https://www.imdpune.gov.in/Clim_Pred_LRF_New/Reports.html). In addition, IMD also brings out a publication on "Disastrous weather events" every year, which is available at https://imdpune.gov.in/library.php. Recently, IMD brought out the "Climate Hazard & Vulnerability Atlas of India", prepared for the thirteen most hazardous meteorological events, which cause extensive damages to economic, human, and animal losses. The same can be accessed at https://imdpune.gov.in/hazardatlas/abouthazard.html. This atlas helps IMD as a reference to issue impact-based forecasts for various extreme weather events.

The climate hazard and vulnerability atlas will help the State Government authorities and Disaster Management Agencies plan and take appropriate action to tackle extreme weather events. A climate data portal has been operational since April 2024 with the availability of earlier historical extreme temperatures and rainfall over a station/city: https://dsp.imdpune.gov.in.

(e)-(f) Forecasting urban weather is increasingly important to manage disasters, decision-making in the public sector, and urban planning purposes, etc. in this regard, various steps have been taken:

(i) In coordination with its centers, the ministry has operationalized an integrated flood warning system in Mumbai and Chennai. This system provides early warnings for flood situations in cities by considering many parameters and forecasts for rain.

(ii) The Ministry of Home Affairs (MHA) has come up with a national strategy to deal with urban floods. It includes:

- Guidelines of Urban Flood Early Warning Systems by the National Disaster Management Authority
- A project has been launched for the establishment of an urban flood warning system for 7 cities: Mumbai, Chennai and Kolkata, Bengaluru, Hyderabad, Ahmedabad, and Pune.

Annexure-1

Summary of temperature and extreme rainfall over Kerala:

Temperature: The time series analysis of annual mean temperature over Kerala reveals a significant increasing trend of +1.1 °C/100 years based on the data of 1901-2023. It was more pronounced in terms of maximum temperature(+1.7 °C/100 years) and relatively less pronounced in terms of minimum temperature(+0.47 °C/100 years).Details of observed changes in temperature are provided in the table below:

Trend Values in °C/100 years (1901-2023)			
States	Maximum Temperature	Minimum Temperature	Mean Temperature
Kerala	+1.7	+0.47	+1.1

Rainfall: The district-wise trend in annual rainfall of Kerala for 1951-2022 indicates that over some adjoining southern districts of the State, viz. Idukki, Kottayam, Pathanamthitta, and Kollam observed a significant increasing trend in rainfall, while the rest of the districts showed a significant decreasing trend.Details of heavy rainfall events occurred from 2019-2023:

State	Year	June			July			August			September		
		H	VH	EH	H	VH	EH	H	VH	EH	H	VH	EH
Kerala	2019	40	6	0	123	22	4	184	71	29	57	2	0
Kerala	2020	71	16	1	75	20	0	132	40	5	124	26	1
Kerala	2021	51	5	0	107	9	0	49	4	0	35	4	0
Kerala	2022	25	3	0	127	4	0	104	27	4	20	7	0
Kerala	2023	25	6	0	151	42	2	8	1	0	81	10	0

H – Heavy: 64.4 mm -114.4 mm, VH – Very Heavy: 115.6 mm- 204.4 mm, and EH – Extremely Heavy: > 204.4 mm

The average number of heatwave days in Kerala during 2022-2024: No heatwave days were reported in 2022 and 2023.

Year	Month	**Kerala**
2024	March	Nil
	April	6
	May	Nil
	June	Nil

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