

**GOVERNMENT OF INDIA  
MINISTRY OF EARTH SCIENCES  
LOK SABHA  
UNSTARRED QUESTION NO. 1179  
TO BE ANSWERED ON 9<sup>TH</sup> FEBRUARY, 2022**

**INCIDENCE OF HEAVY RAINS**

1179. DR. SHASHI THAROOR :

Will the Minister of EARTH SCIENCES be pleased to state:

- (a) whether the Ministry has noted an increase in heavy downpour of rains in Kerala in the past five years and if so, the details thereof;
- (b) whether the Ministry has conducted any study on the incidence of heavy rains in Kerala over the next ten years;
- (c) if so, the details thereof, if not, the reasons therefor;
- (d) whether the Ministry has conducted a study on the water holding capacity of soil in the different regions of Kerala, if so, the details thereof;
- (e) whether the Ministry has implemented procedures for improving the water holding capacity of soil in Kerala to reduce the incidence of landslides; and
- (f) if so, the extend of success achieved in this regard?

**ANSWER**

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

- (a) Yes sir. India Meteorological Department (IMD) has noted an increase in heavy downpour of rains in Kerala in the past five years. During this period, the highest number of heavy rainfall incidences was observed in the year 2018. The details of heavy (64.5 mm - 115.5 mm / day), very heavy (115.6 to 204.4 mm / day ) and extremely heavy rainfall ( more than 204.4 mm / day) incidents observed over Kerala since 2015 are given in Annexure I.

The Annual Maximum Probable frequency of Heavy, Very Heavy and Extremely Heavy Rainfall events over various districts of Kerala for the decade 2001 to 2010 and for the decade 2011 to 2020 are given in Figure 1(a) and Figure1(b) respectively. From these figures, it is clear that there is an increase in heavy rainfall events in recent decades over Kerala.

IMD's report on "Climate Hazard & Vulnerability Atlas of India" prepared for the thirteen most hazardous meteorological events in the country, which cause extensive damages including economic, human, and animal losses is available at <https://imd pune.gov.in/hazardatlas/about hazard.html>.

- (b)-(c) As per the recently published MoES report “An Assessment of Climate Change over the Indian Region”, global as well as regional models project an increase in seasonal mean rainfall over India. Frequency of extreme precipitation events may increase all over India, and more prominently so over the central and southern parts, in near future, as a response to enhanced warming.
- (d) Ministry of Earth Sciences (MoES) did not conduct a study on the water holding capacity of soils of Kerala. However, Government of Kerala had published various information on Kerala soils and is available at <http://www.keralasoils.gov.in/index.php/2016-04-27-09-26-39/soils-of-kerala#red-soils>
- (e) MoES did not recommend procedures for improving the water holding capacity of soil in Kerala. The Kerala landslides mainly fall under the type “debris flow”, which occurs due to intense rainfall causing loose soil, boulders and rock pieces to slide along steep slopes. Therefore, the safe and quick passage of surface water through drainage channels without any blockage is preferred rather than increasing the water holding capacity of soil strata of the slopes. The enhanced water retention in slopes increases the weight of overburden, which promotes occurrence of landslides.
- (f) Does not arise.

## Annexure-I

Table 1. The details of heavy, very heavy and extremely heavy rainfall incidents observed over Kerala since 2015.

Heavy Rainfall Events ( 64.5 mm - 115.5 mm / day )													
year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2015			5	29	23	116	61	9	35	44	30	8	360
2016		5	2		34	108	44	4		22	6		225
2017			6	1	27	114	21	48	98	16	20	9	360
2018			3	5	35	147	198	144	8	53	13	1	607
2019				3	3	40	123	184	57	101	14	3	528
2020	2		1	9	27	71	75	132	124	32	10	1	484
2021	11	1	2	8	130	52	107	50	35	112	62	4	574

Very Heavy ( 115.6 to 204.4 mm / day )													
year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2015				7	3	19	6		2	2	4		43
2016					7	16							23
2017			1		2	8	2	3	14	4	2	2	38
2018			1		7	35	34	74	1	7	4		163
2019		1				6	22	71	2	15			117
2020				3	3	16	20	40	26	1	1		110
2021	2			1	51	5	9	4	4	24	14	1	115

Extremely Heavy Rainfall Events ( >204.4 mm / day )													
year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2015						1							1
2016						1							1
2017									1			1	2
2018						3	3	25			1		32
2019							4	29					33
2020					1	1		5	1				8
2021	1				5					5			11

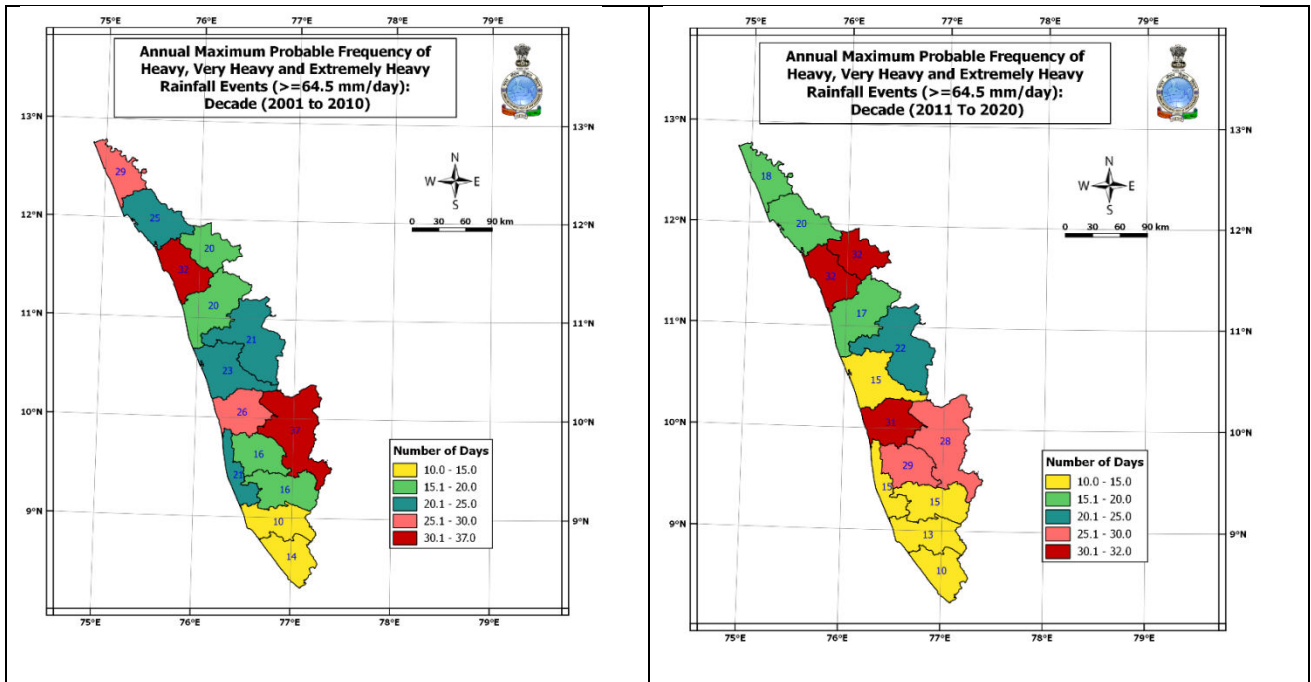


Fig.1. Annual Maximum Probable frequency of Heavy, Very Heavy and Extremely Heavy Rainfall events (Rainfall  $\geq 64.5$  mm/day) over various district of Kerala for the (a) decade 2001 to 2010 and (b) for the decade 2011 to 2020.

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