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VARIOUS CLASSES OF RAINFALL IN THE COASTAL STATIONS OF TAMIL NADU

1. The present paper aims at studying the nature of distribution of rainfall in various classes, for the post-monsoon season [October, November and December months] in respect of one of the most cyclone-prone areas of India, namely Tamil Nadu Coast.

It is in this season, that considerable percentage of rainfall occurs in most of Tamil Nadu, in comparison with other seasons. Sivaramakrishnan (1983) states that rainfall during this season accounts for 59% of the annual rainfall of Chennai.

The past studies undertaken in this regard are pretty rare. However, some studies have been undertaken with regard to heavy rainfall. For example Jayashree and Anil Kumar [1997] while studying some aspects of daily rainfall distribution over a high range river basin in Central Kerala pointed out that half of the seasonal rainfall which contributes 80% of the total rainfall is of low intensity.

2. For the purpose of this study, the stations chosen in Tamil Nadu coast are Chennai [formerly known as Madras, MDS], Cuddalore [CDL], Nagapattinam [NPT], Adiramapatnam [ARP] and Pamban [PBN]. (Fig. 1) The period of this study covers the post-monsoon season of

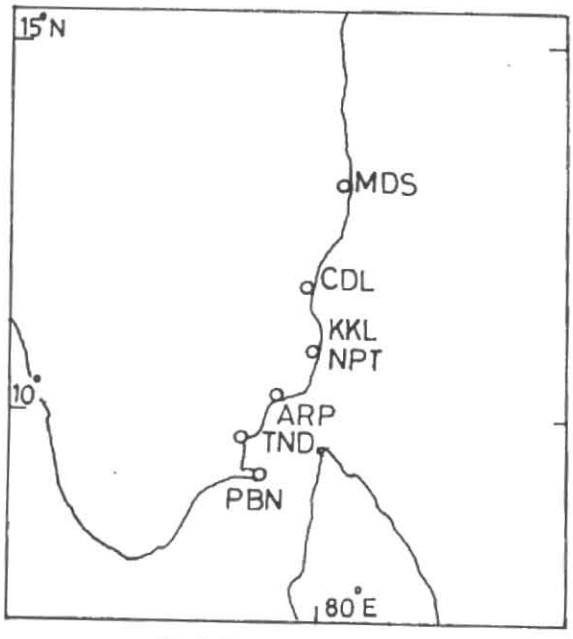

Fig. 1. Location of stations

roughly ninety years starting from 1901. From the data available for each of the standard weeks 40, 41, 42 etc the following information is gathered. The period covering each of the standard weeks are 1-7 October for 40th, 8-15 October for 41st and so on.

(*i*) The total number of rainfall days

(*ii*) The number of various classes of rainfall days.

TABLE 1

An example in respect of percentage frequencies of various classes of rainfall days (Nagapattinam)

Week	L	M	RH	H	VH	Total
40	16.3	9.8	1.7	0.3	0.0	28.1
41	18.4	12.0	2.2	0.5	0.0	33.1
42	20.3	21.3	4.2	3.3	0.5	49.6
43	21.1	21.4	7.8	3.8	1.3	55.4
44	19.3	23.3	7.0	5.0	0.7	55.3
45	18.6	19.3	8.5	6.1	1.2	53.7
46	17.1	19.3	5.5	5.0	1.8	48.7
47	19.3	17.6	5.1	4.0	2.0	48.0
48	18.8	19.3	11.3	4.0	1.0	54.4
49	21.1	15.3	6.6	4.2	2.3	49.5
50	18.8	12.8	3.8	1.7	0.3	37.4
51	19.6	12.0	2.8	1.0	0.8	36.4
52	16.8	11.6	2.0	2.3	1.0	33.7

The criteria defining various classes of rainfall are as follows.

Light (L)	:	0.1 - 7.4 mm
Moderate (M)	:	7.5 - 34.4 mm
Rather heavy (RH)	:	34.5 - 64.4 mm
Heavy (H)	:	64.5 - 124.4 mm
Very Heavy(VH)	:	124.5 mm and above

(*iii*) The percentage frequencies of various classes of rainfall, in respect of various stations. An example is provided in Table 1.

Whenever, on the day of recording of a particular class of rainfall, there is a simultaneous presence of a cyclonic system hereinafter called 'System', (a Depression or a Cyclonic Storm or a Severe Cyclonic Storm) anywhere in the Bay of Bengal, such days are classified as L-system days or LS days for short, and MS days etc.

Similarly L-NS refers to L-Non-system day (a day of occurrence of light rainfall without a system anywhere in the Bay of Bengal) and so on. An example is provided in Table 2.

3. The post-monsoon season for the purpose of this study was divided into three phases.

(*i*) Initial phase [I-phase] Standard weeks 40 and 41.

TABLE 2

Frequencies of a given class R/F system day and a given class R/F Non system day (Nagapattinam)

Standard week	M - days % of total days	M - system days % of total days	M - Non - system % of total days
40	9.8	2.0	7.8
41	12.0	2.3	9.7
42	21.3	2.8	18.5
43	21.4	3.2	18.2
44	23.3	4.5	18.8
45	19.3	4.9	14.5
46	19.3	3.8	15.5
47	17.6	5.8	11.8
48	19.3	3.0	16.3
49	15.3	0.7	14.6
50	12.8	1.0	11.8
51	12.0	0.7	11.3
52	11.6	0.8	10.8

(*ii*) Active phase [A-phase] Standard weeks 42 to 47, both weeks inclusive.

(*iii*) Final phase [F-phase] Standard weeks 48 to 52, both weeks inclusive.

From these data for each phase, for each of the stations concerned, the percentage of rainfall days (Table 1) and that of various classes of rainfall days in the total number of days under study has been worked out.

It is observed that during the I-phase and F-phase, nearly 1/3rd of the total number of days is rainfall days. During the A-phase, it is about 1/2. It is seen that the percentage of [L+M] days in total number of rainfall days [R-days] is about 89 for all the stations concerned in the I-phase. During the A-phase, it declines to nearly 77% for MDS, CDL and NPT. It is about 83% for ARP and PBN. The percentage declines in the A-phase from that in the I-phase by about 12 for northern stations and by about 6 for southern stations while total number of rainfall days [R-days] increased by about 15% for all the stations concerned. During the F-phase, this is about 84% compared to 89% in the I-phase, for all the stations concerned, while the total number of rainy days remained nearly the same as in the I-phase. The L-days is nearly 1.5 times that of M-days in the I-phase and nearly the same as that of M-days in the F-phase. Again it is about 1.5 times that of M-days in the F-phase, except

TABLE 3

Percentage of LS days/L days etc

Phase	Stations	RS days	LS days	MS days	RHS days	HS days	VHS days
		R days %	L days %	M days %	RH days %	H days %	VH days %
I	MDS	19.9	17.1	24.5	23.3	13.2	0
	CDL	16.4	13.8	16.7	18.7	33.3	37.5
	NPT	21.2	19.5	20.2	34.0	67.0	0
	ARP	16.8	19.0	15.6	13.1	10.0	0
	PBN	7.6	4.3	10.7	16.0	25.0	0
A	MDS	23.2	21.7	24.8	29.3	18.0	17.9
	CDL	21.8	21.5	21.0	21.0	27.0	29.2
	NPT	21.1	23.1	20.9	21.0	17.0	28.0
	ARP	21.3	20.9	21.2	19.2	33.3	13.9
	PBN	17.2	18.9	15.6	17.3	21.8	0
F	MDS	14.3	11.8	13.5	18.0	31.6	30.2
	CDL	14.2	11.8	16.3	13.2	20.9	50.1
	NPT	10.9	8.7	8.1	19.0	27.0	29.0
	ARP	13.9	13.1	15.0	19.1	15.2	40.0
	PBN	10.6	9.1	11.0	12.1	15.4	0

in Chennai, where L-days is nearly twice that of M-days in this phase.

The percentage of RH-days in the total number of rainy days is about 9 to 10% in the I and F phases. During the A-phase it is mostly 13%. The percentage of H-days in the total number of rainy days during the I-phase, is about 3% in MDS, CDL and ARP and about 1% for NPT and PBN. During the A-phase, it is about 8% in northern stations MDS, CDL and NPT and about 5% in Southern stations [ARP and PBN] During the F-phase, it is about 3% in MDS, 6% in CDL and NPT and about 4% in ARP and PBN.

The percentage of VH-days in total number of rainydays during the I-phase, is about 0.5% for MDS, CDL and ARP and nil for NPT and PBN. During the A-phase, it is about 3% for the northern stations [MDS, CDL and NPT] and about 1% for ARP and PBN. During the F-phase it is about 2% for Northern stations and 1% for Southern stations [ARP and PBN]. Roughly 2.7%, 8.7% and 6.1% of the rainy days constitute the [H+VH] days in the I, A and F-phases respectively taking all the coastal stations into consideration.

The considerable increase of the % of [H+VH] days in the total number of rainy days [R-days] in the A-phase compared with that in the I-phase is an interesting aspect.

From the details presented in Table 3 and application of t- test it has been noted that during the I-Phase, in respect of each of the stations, the ratios LS-days/L-days, MS-days/M-days do not differ from the values of RS-days/R-days. They are roughly 20%, 16%, 21%, 17% and 8% for MDS, CDL, NPT, ARP and PBN respectively. It may be noted that, though in respect of CDL, NPT and PBN, the percentage of HS-days/H-days appears large in comparison with the RS-days/R-days, under t-test, the difference is not significant.

During the A-phase and F-phase for any of the stations under consideration, the value of LS-days/L-days, MS-days/M-days etc. do not differ from RS/R days. It is seen that about 37 rainfall days occur in a year. About 30-31 days are L+M days, 4 are RH-days and 2-3 are H and VH-days.

Therefore, the general order of the days attributable to the simultaneous presence of a system anywhere in the Bay, being 20% is roughly 6 days for L+M days, 1 day for RH-days and less than 1 day in the case of H+VH days.

The number of H+VH days and hence the quantum of heavy rainfall and very heavy rainfall in any station under study is governed essentially by the non-system-monsoon activity in the October, November and Decem-

ber months. This applies to other classes of rainfall days such as L-days, M-days etc as well.

Since the ratio of LS days/L days, etc. is of the order of 20%, even if there were to be no normal amount of system-induced rainfall, other things being normal, seasonal rainfall of coastal Tamilnadu is not likely to be below normal.

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