

## Short Communication

### Rainfall variability over Kerala

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Kerala is one of the highest monsoon rainfall regions in India. Understanding the variability and trend in seasonal and annual rainfall is important for deciding the cropping system in this changing climate era. There are few studies available in the rainfall and temperature variability of Kerala. (M.K Soman *et al.*, 1988; P. V. Joseph *et al.*, 2005; Krishnakumar *et al.*, 2008; Indrani pal *et al.*, 2009; and Archana nair *et al.*, 2014). However, recent changes in rainfall trends in different districts of Kerala have not been studied. Hence, an attempt is made to understand the recent trends in rainfall in various districts of Kerala.

Spatial and temporal variation in annual and seasonal rainfall over Kerala, during the period from 1992-2012 is studied in detail. Mann-Kendall, a non parametric statistical trend test was used to find the significance of the trend in the annual and seasonal rainfall of all the fourteen districts of Kerala. Rainfall data of 36 stations in Kerala was collected from IMD Thiruvananthapuram, for the past 21 years (1992-2012). The annual mean rainfall of all districts in Kerala and its coefficient of variation were calculated. Mann-Kendall test was used to find the significance of the trend in the annual and seasonal rainfall of all the fourteen districts of Kerala. The mean rainfall of all the stations in one district has been considered as district mean rainfall. The mean of all the district rainfall is considered as Kerala's mean rainfall.

The results of the study show that the mean annual rainfall for the State as whole is  $2956.4 \pm 391.9$ mm. with coefficient of variation (CV) of 13.3%. Among the 14 districts of Kerala, Idukki district receives the highest annual rainfall (4203.1mm) and Thiruvananthapuram district receives the minimum (1807.3mm). There is a significant decreasing trend (significant at 10%) in Pathanamthitta district of southern zone and Alappuzha of problem area zone. Except for central zone districts, Thrissur, Ernakulam and Palakkad and southern zone district Kollam, the annual rainfall of all other districts shows a decreasing trend (Table 1).

The SWM rainfall shows a significant (at 5%) decreasing trend. Normally districts in Northern zone

(Kasargode, Kozhikode, Kannur and Malappuram) and districts in high range zone such as Idukki and Wayanad receives good amount of rainfall during the SWM season. Districts in southern zone such as Pathanamthitta, Thiruvananthapuram and Kollam receive comparatively less rainfall during this season. All the districts except Palakkad show a negative trend in SWM rainfall. Significant decreasing trend in rainfall is observed in Pathanamthitta and Alappuzha districts.

During northeast monsoon season Kerala receives  $514.3 \pm 123.8$  mm rainfall with the cv of 24.1%. A decreasing trend is observed in the northeast monsoon rainfall of Kerala with Mann-Kendall trend value -1.1. Normally southern districts of Kerala receive good amount of rainfall during this season comparative to the northern districts. Post monsoon rainfall is highest in the southern zone where the southwest monsoon rainfall is lowest. There is a decreasing trend observed in northeast monsoon rainfall for all the districts of which Kasargod and Malappuram shows significant decreasing trend.

During summer Kerala receives 397.8mm rainfall which is 13.5% of the State's annual rainfall, with high variability (CV=42.5%). Even though the southwest monsoon and north east monsoon rainfall is diminishing in Kerala, summer rainfall shows an increasing trend. The Mann-Kendall trend test indicates that there is significant positive trend with trend value of 1.6 which is significant at 10% level. Except for Malappuram and Kottayam districts, the summer rainfall is increasing in all the other districts. Palakkad district shows the highest and significant increasing trend.

During winter season Kerala receives 61.0mm which is highly variable in all the districts of Kerala. The mean winter rainfall is maximum (130.0mm) in the Pathanamthitta district of south zone and minimum in Kasargode district (18.0mm). Over all in Kerala, winter rainfall is showing an increasing trend.

**Table 1:** Mean, coefficient of variation (CV) and annual and seasonal rainfall in different districts of Kerala with Mann-Kendall Trend value and its significance

Districts	Annual			SW monsoon			NE monsoon			Summer			Winter		
	Mean (mm)	CV (%)	Trend value	Mean (mm)	CV (%)	Trend value	Mean (mm)	CV (%)	Trend value	Mean (mm)	CV (%)	Trend value	Mean (mm)	CV (%)	Trend value
Kasargode	3457.2	12.4	-1.1	2814.3	16.3	-0.8	354.2	36.7	-1.9**	270.9	86.3	0.9	18.0	170.5	-0.6
Kozhikode	3129.1	19.1	-0.3	2257.3	25.6	-0.2	473.3	27.1	-0.9	364.5	58.4	0.2	24.2	136.4	0.5
Kannur	3126.1	15.1	-0.5	2438.9	18.9	-0.6	403.8	36.0	-0.2	256.7	69.1	0.2	26.6	130.7	-0.0
Malappuram	2659.3	16.6	-1.5	1883.2	22.6	-1.4	447.0	27.0	-1.8*	304.0	50.1	-0.3	24.9	120.2	-0.9
Ernakulam	2938.9	14.8	0.3	1977.7	20.5	-0.3	501.4	38.7	-0.3	411.5	44.8	0.8	48.0	86.8	-0.0
Palakkad	2505.2	21.0	1.2	1685.8	26.9	0.9	487.1	32.6	0.3	301.8	41.3	2.4**	30.3	103.3	0.9
Thrissur	2854.4	19.4	0.8	2071.6	23.6	-0.2	428.4	44.0	-0.9	323.8	56.6	0.5	29.7	141.3	0.2
Pathanamthitta	3167.1	16.9	-1.7*	1637.1	20.1	-2.2**	726.7	37.3	-2.0**	672.3	33.0	0.3	130.0	75.7	1.1
Thiruvananthapuram	1807.3	16.5	-0.0	784.1	29.0	-1.2	549.4	31.3	-0.6	363.4	41.5	0.6	108.0	87.9	1.5
Kollam	2285.9	19.2	0.0	1189.1	25.2	-0.7	568.9	37.2	-1.4	443.7	35.9	1.1	84.0	102.0	1.1
Idukki	4203.1	22.7	-0.9	2937.7	26.6	-1.1	702.1	28.7	-0.9	496.5	63.9	1.2	89.0	84.1	1.0
Wayanad	3015.5	18.9	-0.8	2381.5	24.8	-1.1	316.3	31.1	0.3	283.4	61.1	1.0	33.8	125.6	0.2
Kottayam	2940.5	15.9	-0.1	1716.3	21.2	-0.1	588.2	39.3	-0.8	551.4	34.8	-0.4	89.4	82.5	1.1
Alappuzha	2752.9	12.8	-1.6*	1627.2	17.0	-2.1**	564.6	30.6	-1.2	466.1	35.3	1.3	90.6	75.1	1.4
KERALA	2956.4	13.3	0.8	1994.9	18.3	-1.9**	514.3	24.1	-1.1	397.8	42.5	1.6*	61.0	65.8	1.5

\*\* - Significant at 5% level \* - Significant at 10% level

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