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STATISTICAL ANALYSIS OF RAINFALL DATA OF SANGLI DISTRICT

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Abstract:-In this paper we report statistical analysis of the rainfall for different stations of Sangli district. We consider rainfall data of 32 years (1981-2012) collected over ten stations of Sangli District in Maharashtra State. Descriptive statistics were obtained for these ten stations for rainy days. It includes average rainfall, median rainfall, maximum rainfall, minimum rainfall, number of rainy days and coefficient of variation of rainfall over these stations. We also study the season wise distribution of rainfall in the study area. Distribution of rainfall in winter season, pre-monsoon, monsoon and post monsoon is studied. The distribution of dry days and rainy days is also studied. Some interesting findings are discussed.

Keywords:Rainy days, Dry days, coefficient of variation.

1.INTRODUCTION

Rainfall has potential impact on biodiversity and human life. Now-a-days rainfall has become a major issue for research, since the crop pattern is mainly depends upon it. Our study area is Sangli district of Maharashtra state. Sangli district is divided in to ten Tehsils viz. Shirala, Walwa, Miraj, Tasgaon, Kavathe Mahankal, Jath, Khanapur, Atpadi, Kadegaon and Palus. Out of these Kavathe Mahankal, Jath, Khanapur, Atpadi, Kadegaon and Palus and east region of Tasgaon are draught prone areas. There is lot of variation in the rainfall and it results in to variation in the crop pattern also. Since some of the Tehsil of the Sangli district are drought prone, state government initiated some water schemes for the purpose of irrigation. For example Maihshal Scheme, Tembu scheme, Arphal scheme and Wakurde scheme. Some of the schemes are completed and some of the schemes are in progress.

It is in the interest of society to investigate trend in the rainfall in Sangli district. Data recorded by India Meteorological Department Pune, is used. Based on the data exploratory data analysis is carried out.

2. DATA AND METHODOLOGY

Day wise rainfall data for 32 years, for the period 1981 to 2012 are collected from India Metrological Department, Pune, recorded at ten stations of Sangli district namely Shirala, Islampur, Kasegaon, Sangli, Miraj, Tasgaon, Jath, Kavathe Mahankal, Palus and Atpadi. The mean rainfall values of all ten stations were considered to represent the rainfall of the district. Table 1 gives the status of availability of daily rainfall data of each station of Sangli station.

Table 1: Availability of Rainfall data for the construction and analysis

Sr. No.	Station	Availability	Missing Data Year
1	Shirala	1981-2012	1989
2	Kasegaon	2006-2012	-----
3	Islampur	1981-2012	1985, 1989
4	Tasgaon	1981-2012	1983, 1986, 1989
5	Miraj	1981-2012	1989
6	Sangli	1981-2012	2007, 2008, 2009, 2012
7	Jath	1981-2012	1984, 1989
8	K. Mahankal	1981-2012	1989
9	Palus	1998-2012	-----
10	Atpadi	1981-2012	1989

From the available data the mean rainfall for all the station is obtained. The Figure 1 shows mean rainfall in mm for the different stations of the Sangli district. From the Figure 1 we see that Shirala station receives maximum rainfall (1004.94mm) where as Palus station receives minimum rainfall (339.81mm). Islampur and Kasegaon receive 732.80mm and 678.61mm rainfall respectively. Atpadi and

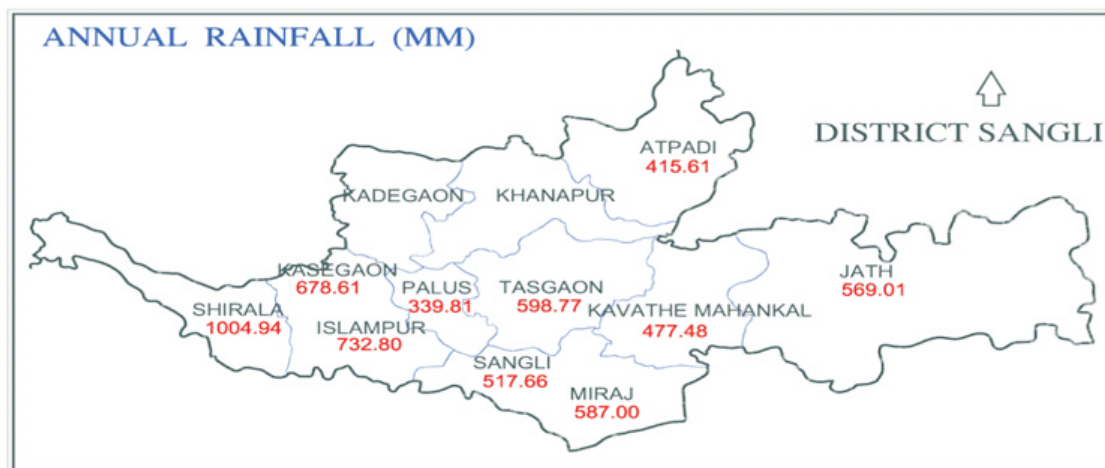


Figure 1 : Mean Rainfall in mm of the Sangli District

Kavatthe Mahankal receives 415.61mm and 477.48mm rainfall respectively. From the figure we observe that west region of the Sangli district receives more rainfall as compared to east region. There is lot of variation of rainfall among these stations of Sangli district.

2.1 Rainy days and Dry days

The number of rainy days and dry days play important role in the study of rainfall data. A particular day is said to be rainy day if on that day total rainfall at that station is 2.5 mm or more otherwise it is a dry day. A particular week is said to be wet week if in that week 20mm or more rainfall occur otherwise it is called as dry week. Pandharinath (1991) and Das & Senapati (1992) have taken 20mm or more rainfall in a week as a wet period and less than 20mm a dry period. Robertson (1982) has used 30mm or more rainfall in 10 days duration as a wet spell and less than 30mm rainfall as a dry spell. Here we consider 2.5mm or more rain in a day as rainy day, otherwise dry day. To find average rainy days we take the average of rainy days of all year understudy. Table 2 gives station wise dry days, rainy days and percentage of dry days and percentage of rainy days.

Table2: Station wise dry days, rainy days and percentage of dry days and rainy days

Sr. No.	Station	Average Dry days	Dry days in %	Average Rainy Days	Rainy Days in %
1	Shirala	302	82.78	63	17.22
2	Kasegaon	313	85.87	52	14.13
3	Islampur	318	87.08	47	12.92
4	Tasgaon	323	88.18	42	11.82
5	Miraj	327	89.57	38	10.43
6	Sangli	328	89.93	37	10.07
7	Jath	330	90.45	35	9.55
8	K Mahankal	331	90.57	34	9.43
9	Palus	333	91.11	32	8.89
10	Atpadi	337	92.21	28	7.79

The average rainy days for the Shirala station are 63 days. Shirala station has maximum number of rainy days among these stations. Atpadi station has only 28 average rainy days and is least among these stations. From the above Table 2 we see that the percentage of rainy days varies from 7.79 to 17.22. The maximum percentage of rainy days is at the Shirala station and is 17.22, where as the minimum percentage of rainy days is at the Atpadi station and is just 7.79. The percentage of dry days varies from 82.78 to 92.21.

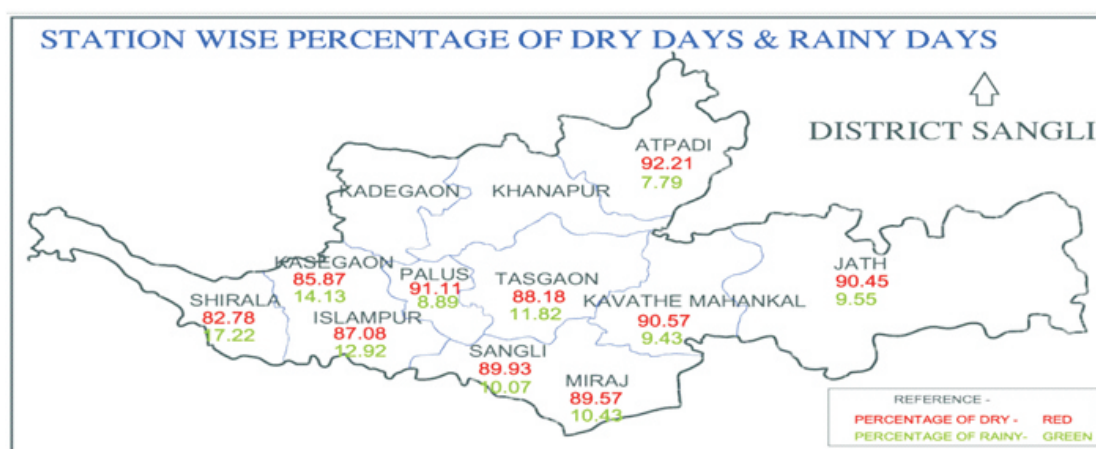


Figure 2 : Station wise percentage of Dry and Rainy days.

2.2 Descriptive statistics

Descriptive statistics were obtained for these ten stations for rainy days. It includes average rainfall, median rainfall, maximum rainfall, minimum rainfall, number of rainy days and coefficient of variation of rainfall over these stations. From the availability of the data for the ten stations of Sangli district the mean rainfall of these stations is obtained.

Table 3 gives the average descriptive statistics of rainfall for rainy days during 1981-2012. Here Shirala station has 62.84 days as average rainy days which is maximum among the all station. Atpadi station has only 28.35 days as average rainy days. Shirala station receives 15.37mm rainfall in average per rainy day, where as Palus station receives only 9.21mm rainfall in average per rainy day. There is high degree of positive correlation between number of rainy days and total average rainfall and is found to be 0.91

Table 3: Average Descriptive Statistics (in mm) for rainy days

Sr. No.	Station	Average rainfall per Rainy day	Minimum rainfall per rainy day	Maximum rainfall per Rainy day	Median rainfall per Rainy day	Average Rainy days	Total Average Rainfall
1	Shirala	15.37	3.00	85.03	8.94	62.84	1000.14
2	Kasegaon	12.36	3.00	50.71	6.89	51.57	678.61
3	Islampur	14.64	3.00	73.17	8.93	47.03	653.02
4	Tasgaon	12.99	2.91	62.20	7.89	43.52	597.20
5	Miraj	14.71	2.97	69.17	8.75	38.29	590.23
6	Sangli	13.00	2.80	71.69	7.85	37.04	528.01
7	Jath	15.63	2.83	77.03	9.04	34.97	569.53
8	K. Mahankal	13.26	2.90	58.36	8.24	34.84	469.84
9	Palus	9.21	2.99	31.93	6.66	32.60	339.51
10	Atpadi	14.10	3.10	55.38	9.67	28.35	498.19

As rainfall is purely seasonal, we classify the rainfall data according to four seasons, namely winter season (January- February), pre-monsoon (March- May), Monsoon (June- September) and post monsoon (October-December).

For the sake of convenience here we consider the total rainfall. Most of the rainfall occurs in the monsoon season. During winter season all the stations of Sangli district receives very low rainfall (even much less than 6 mm). During pre-monsoon season maximum rainfall occurs at the Miraj station and it receives 64.48mm (10.98%) in average where as Palus station receives only 14.37mm (4.22%) in average which is minimum among all the stations. Most of the rain occurs in the Monsoon season. Shirala station receives 823.75mm rainfall in average in Monsoon which is 81.97% to the total rainfall. In Monsoon season Palus station receives only 258.61 mm in average which is 76.10% to the total rainfall. In Post-Monsoon season Islampur station receives in average 142.58mm rainfall which is 19.45%, where as Palus station receives only 66.70mm rainfall in Post-Monsoon season which is 19.62% to the total rainfall. Table 4 gives season wise average rainfall with percentage for all the stations of Sangli district.

Table 4: Season wise Mean rainfall (mm) over the stations of Sangli district (Bracketed quantities shows %)

Sr. No.	Station	Winter	Pre-Monsoon	Monsoon	Post Monsoon	Average Rainfall
1	Shirala	3.77(0.37)	53.45(5.31)	823.75(81.97)	123.96(12.33)	1004.94
2	Kasegaon	0.00(0.00)	25.86(3.81)	549.47(80.96)	103.29(15.22)	678.61
3	Islampur	5.40(0.73)	53.15(7.25)	531.67(72.55)	142.58(19.45)	732.80
4	Tasgaon	4.97(0.83)	59.23(9.89)	421.51(70.39)	113.06(18.88)	598.77
5	Miraj	3.52(0.59)	64.48(10.98)	398.23(67.84)	120.76(20.57)	587.00
6	Sangli	4.00(0.77)	47.28(9.13)	365.58(70.62)	100.80(19.47)	517.66
7	Jath	2.59(0.45)	49.54(8.70)	385.91(67.82)	130.97(23.01)	569.01
8	K Mahankal	2.81(0.58)	48.39(10.13)	307.46(64.39)	118.82(24.88)	477.48
9	Palus	0.13(0.03)	14.37(4.22)	258.61(76.10)	66.70(19.62)	339.81
10	Atpadi	3.83(0.91)	36.45(8.68)	286.17(68.19)	93.15(22.20)	415.61

Figure3 gives season wise mean rainfall for the stations of Sangli district.

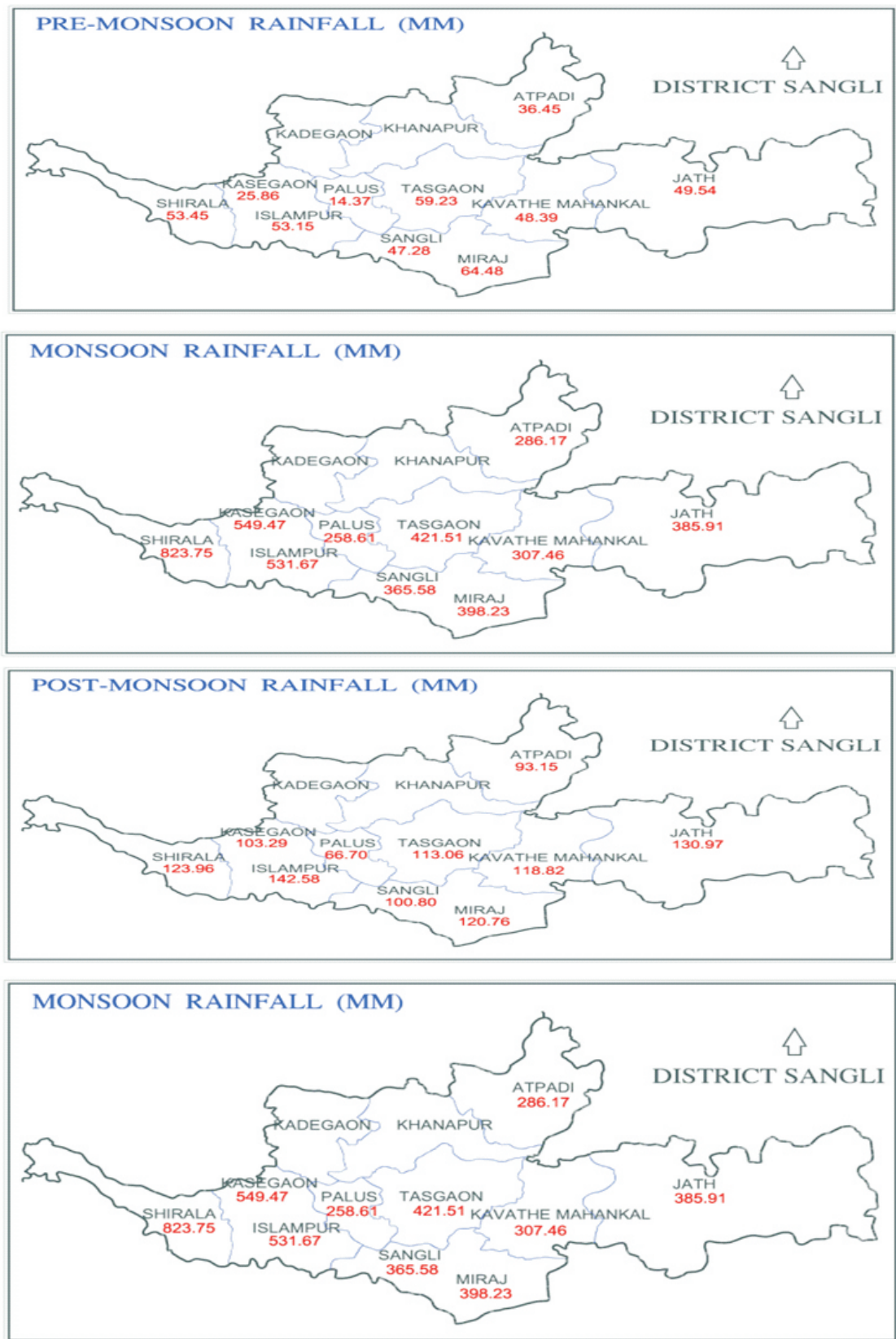


Figure 3: Mean Rainfall (mm) over the Sangli district for the four seasons.

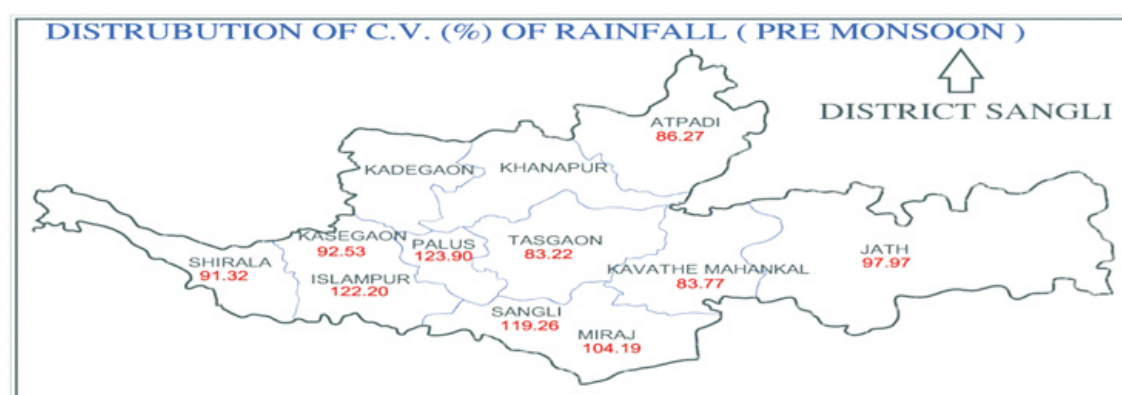
2.4 Coefficient of Variation

In addition to mean rainfall pattern, the knowledge of variability of rainfall is of great use for hydrological planning and management. Table 5 Shows the distribution of coefficient of variation for the four seasons and the coefficient of variation for annual rainfall. Very less amount of rainfall is being received during the winter season and the variability is very high in all the stations of Sangli district. Maximum variability (387.30%) is over Palus and the lowest variability (199.46%) is over Kavathe Mahankal. Variability decreased as the monsoon set in and again it increased in the post-monsoon season. During monsoon season, in spite of very high rainfall, coefficient of variability of monsoon rainfall is very high in Sangli (58.73%). At the same time the coefficient of variation is low in Shirala (31.44%). During monsoon season, western part of Sangli district gets excessive rain whereas eastern parts of Sangli district get comparatively less rain.

Table 5: Distribution of coefficient of variation (%) of rainfall over the Stations of Sangli District for four seasons and annual rainfall

Sr. No.	Station	Winter	Pre-Monsoon	Monsoon	Post Monsoon	CV for Mean annual rainfall
1	Shirala	278.79	91.32	31.44	60.39	25.20
2	Kasegaon	NA	92.53	33.25	64.58	29.00
3	Islampur	276.16	122.20	38.32	64.93	31.25
4	Tasgaon	345.10	83.22	38.54	66.77	35.04
5	Miraj	267.83	104.19	41.86	71.28	32.61
6	Sangli	266.58	119.26	58.73	109.71	60.77
7	Jath	312.88	97.97	38.19	77.29	34.45
8	K Mahankal	199.46	83.77	41.01	65.89	34.15
9	Palus	387.30	123.90	43.48	88.48	46.45
10	Atpadi	210.82	86.27	55.07	72.21	45.52

Figure 4 shows the spatial distribution of coefficient of variation for the four seasons while Figure 5 is for coefficient of variation of annual rainfall



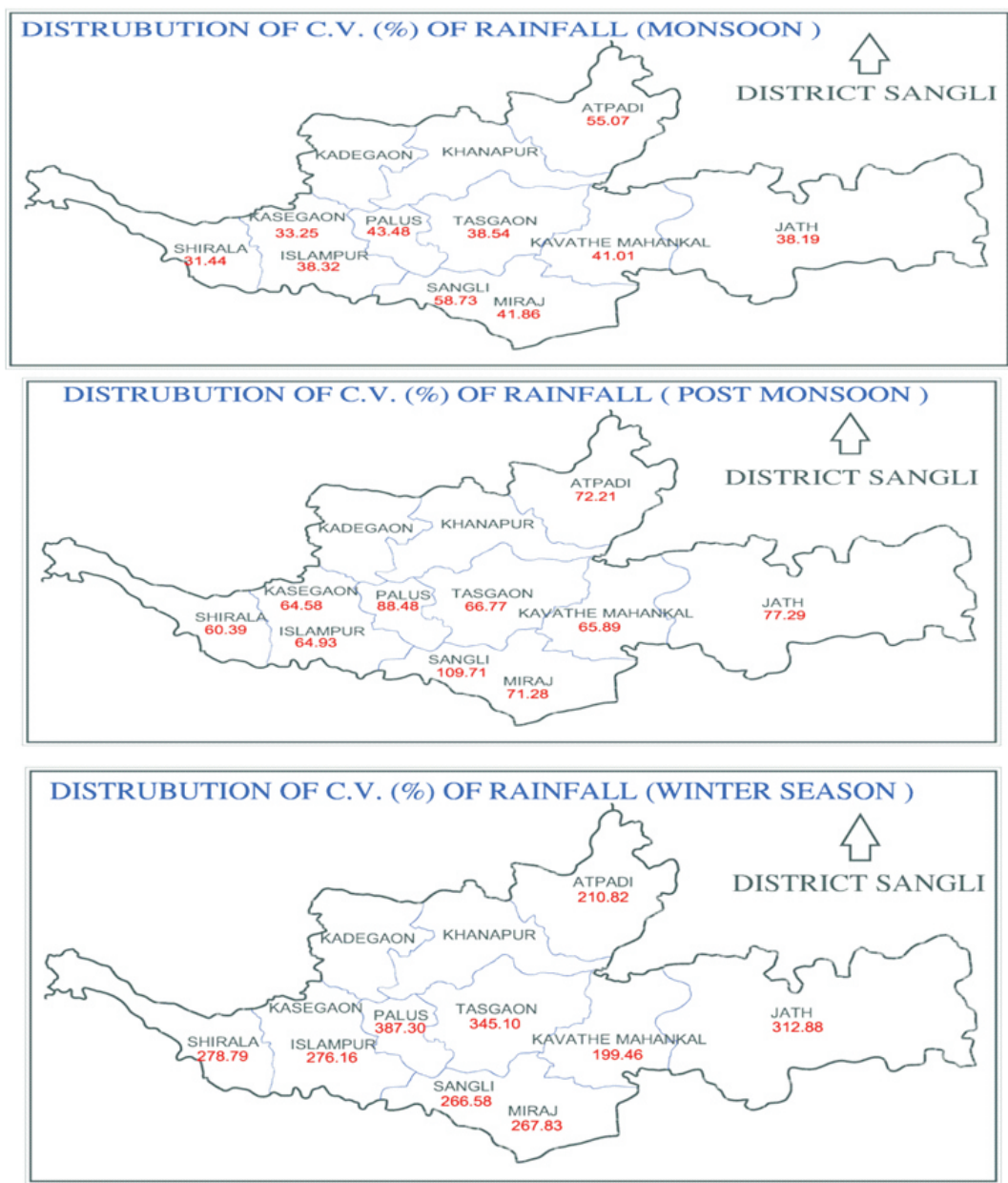


Figure 4: Distribution of coefficient of variation (%) of rainfall during the four seasons

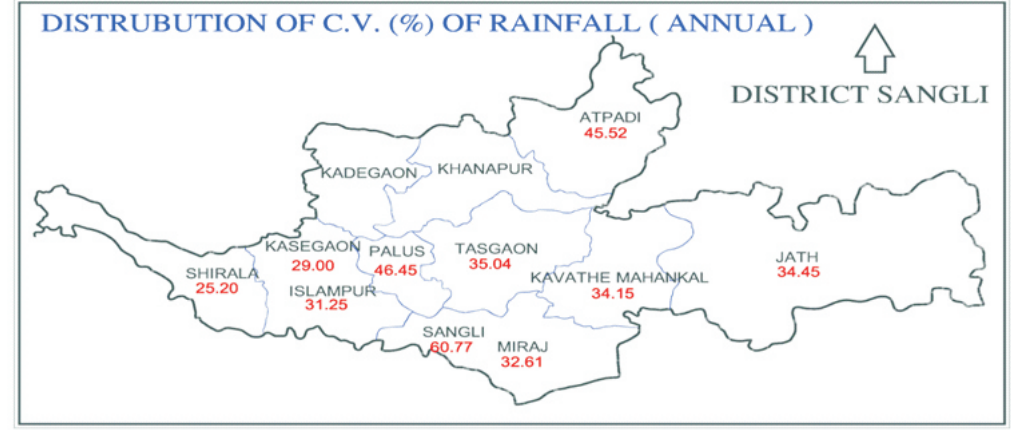


Figure 5 : Distribution of coefficient of variation (%) of annual rainfall

2.5 Result and Conclusion

- a) The percentage of rainy days in Sangli district varies from 7.79% to 17.22%. Maximum rainy days are at Shirala station (63 days) and Atpadi station has only 28 days as rainy days.
- b) The average maximum rainfall in rainy days occurs at Shirala station (1004.94mm), whereas Palus station receives an average 339.51mm rainfall. There is a lot of variation in the rainfall at different stations of Sangli district.
- c) Most of the rainfall occurs in the monsoon season. The percentage of rainfall in the monsoon season varies from 64.39% to 81.97%. The percentage of rainfall in the winter season is very low. It varies from 0.00% to 0.77%. In the pre-monsoon season the percentage of rainfall varies from 4.22% to 10.98%. In the post-monsoon season the percentage of rainfall varies from 12.33% to 24.88%.
- d) Coefficient of variation in rainfall is maximum in the winter season and is minimum in the monsoon season. In the monsoon season the coefficient of variation varies from 31.44% to 58.73%. The coefficient of variation for mean annual rainfall varies from 25.20% to 60.77%.

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REFERENCES :

1. Das, M. K. and P.C. Senapati (1992). Forecasting of Dry and Wet spell at Bhubaneswar for Agricultural Planning. Indian J. Soil Cons., 20(1 & 2), 75-82.
2. G. C. Sharma, (2011). Probability Analysis of Dry and wet Spells at Hyderabad and Maximum Rainfall Distribution. Int. J. Agricult. Stat. Sci., Vol 7, No. 2, pp. 517-525
3. Nath D. C., and Mwachary D.D., A study on Rainfall Trends in Kokrajhar District of Assam, India. International Journal of Research in Chemistry and Environment. Vol.3 Issue 1, January 2013
4. Pandharinath, N. (1991) Markov chain model of dry and wet weeks during monsoon period over Andhra Pradesh. Mausam, 42(4), 393-400
5. Robertson (1982). W.M.O., Technical Note No. 179, 149-158
6. Rainfall data of ten stations of Sangli district - National Data Centre, India Meteorological Department, Pune



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