ORIGINAL RESEARCH PAPER

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Probability analysis of rainfall data at Khurda District, Odisha

KEY WORDS:

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ABSTRACT

The rainfall data for eleven years (2006-16) were analyzed. The average annual rainfall at Bhubaneswar is 1501 mm.Further 74.7 % of annual rainfall is received during Kharif season i.e. (June to September). Frequency analysis for maximum annual rainfall data was done by using Flood software developed by IIT, Kharapur. Frequency analysis for monthly, seasonal and annual rainfall was carried out and values at 70% probability level was estimated. The Kharif received 959.4mm rainfall June, July, August and September received 125.5, 234, 244.7 and 223.6 mm rainfall respectively. So cropping pattern may be planned accordingly. At 70 % probability level Rabi and Summer receives 111.6 mm and 132.3 mm respectively, so rabi and kharif crop planning may be done accordingly.The 70 % at different month and annual rainfall may be used for construction of different soil conservation structures.in Khurda district of Odisha for water harvesting.

Introduction

Khurda district is one of the coastal district of Odisha. It is one of the coastal district of Odisha. The erratic rainfall effects the upland crop production of this area , so to eradicate this problem probability analysis of different months, season and annual rainfall was done to planning different soil conservation structures as well as for crop planning of this district.Intensity pattern and distribution of rainfall may be of use to engineers for flood control and irrigation projects. Several workers(1-4) have suggested the use of daily, weekly, monthly, seasonal and annual rainfall probabilities for crop planning where as Subudhi(5) suggested the use of annual rainfall probability analysis for crop planning. Therefore, an effort was made to interpret the annual seasonal, monthly and daily rainfall in a simple and meaningful form to make it more useful. Probability and frequency analysis was done as it may prove more useful than the simple representation of data in diagrammatical form.

The rainfall data were collected from OUAT, observatory (Khurda located at 20.18°N 85.62°E , AMSL 75 m (246 ft) for a period of 11 years (2006-16) and analyzed .The whole year was divided into seasons depending on the monsoon effect, that is, from June to September (Kharif),October to January of next year(rabi) and February to May(summer).

Materials and Methods

Expected monthly, seasonal and annual rainfalls with different probability were worked out. A simple technique of arranging the data in the order of magnitude in descending order without any basis of the year of its occurrence was used. In this method rainfall values are plotted on the ordinates and the percentage of total number of years in which the rainfall was equal to or greater than the rainfall amount as obscissae. Monthly, seasonal and annual rainfall values were used for estimating the corresponding values of rainfall at different percent chances (Table 1).

Thus the average rainfall for is 1501 mm..Further 74.7 % of annual rainfall is received during Kharif season i.e. (June to September). Frequency analysis for maximum annual rainfall data was done by using Flood software developed by IIT, Kharapur. Frequency analysis for monthly, seasonal and annual rainfall was carried out and values at 70% probability level was estimated. The Kharif received 959.4mm rainfall June, July, August and September received 125.5, 234, 244.7 and 223.6 mm rainfall respectively (Table 1 and Fig 1). So cropping pattern may be planned accordingly. At 70 % probability level rainfall in every month from June to September is more than 100 mm. At 70 % probability level Rabi and Summer receives 111.6 mm and 132.3 mm respectively

(Table 1), so rabi and kharif crop planning may be done accordingly. The 70 % at different month and annual rainfall may be used for construction of different soil conservation structures.in Khurda district of Odisha for water harvesting.

Selection of crop varieties with growing period of 4 months from June to September is advisable for Khurda under rainfed conditions .

Conclusion

1. The average annual rainfall of Khurda district is 1503 mm
2. At 70 % probability level the rainfall during June to September is more than 100 mm, so crop planning may be made accordingly.
3. At 70 % probability level Rabi and Summer receives 111.6 mm and 132.3 mm respectively, so rabi and kharif crop planning may be done accordingly.
4. The 70 % at different month and annual rainfall may be used for construction of different soil conservation structures.in Khurda district of Odisha for water harvesting.
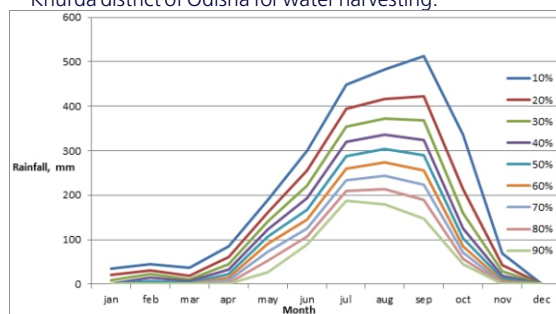

Fig 1 Probabilty analysis of monthly rainfall at Bhubaneswar

Table 1 Probability analysis of monthly rainfall data of Khurda district of Odisha

Mon	Dist	Probability percentage								
		10%	20%	30%	40%	50%	60%	70%	80%	90%
Jan	Pareto	34.91	20.78	8.87	0	0	0	0	0	0
Feb	Gev	45.83	31.36	22	14.28	6.66	0	0	0	0
Mar	Gamma	35.96	19.3	11.24	6.13	2.65	0.41	0	0	0
Apr	Pareto	85.66	60.46	44.51	32.61	23.04	14.98	8.01	1.83	0

May	Ev type iii	189.16	161.23	140.84	123.33	106.94	90.64	73.38	53.66	27.69
Jun	Pareto	300.67	255.33	221.22	192.83	168.06	145.82	125.51	106.17	89.11
Jul	Pareto	447.91	395.25	354.22	319.27	288.25	260.05	233.98	209.62	186.65
Aug	Ev type iii	483.46	416.74	371.59	335.26	303.39	273.75	244.72	214.55	179.97
Sep	Gumbel	512.04	423.18	367.64	325.1	288.96	255.91	223.58	189.21	146.8
Oct	Log pearson	336.49	213.85	158.94	125.73	102.59	84.91	70.38	57.58	45.03
Nov	Pareto	69.05	42.56	28.42	18.95	11.91	6.35	1.78	0	0
Dec	In sufficient data									
Summer	E.V.Type - III	251.6	222.6	201.5	183.5	166.6	149.9	132.3	112.2	86
Kharif	Pereto	1442.4	1369.9	1292.9	1212.7	1130.1	1045.6	959.4	871.7	782.8
Rabi	Logpearson	424.6	306.7	242.5	198.4	164.6	136.4	111.6	88.2	63.6
Annual	GEV	1814.7	1728.8	1657.7	1591.7	1526.2	1457.5	1381.1	1288.5	1155.4

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