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Spatio-Temporal Rainfall Distribution In Marathwada Region

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INTRODUCTION

This paper explores annual trends of rainfall in the Marathwada region over the period between 1980-81 and 2010-11. The climatic variability for an area is referred to the long term change in rainfall, temperature, humidity, evaporation, wind speed and other meteorological parameters. According to intergovernmental panel on climate change reports, frequency of droughts as well as extreme events will increase and rainfall pattern will also change which is a key factor influencing economic growth of regions, especially in the country like India where the 65 percent people are directly or indirectly depend on agriculture. But agriculture is hanging on erratic in nature. It also has great variations in spatio-temporal, those fluctuations extremely damaging agriculture, food security, health and many more. Therefore, the present study has been conducted in order help farmers, researcher, economist and policy makers to make fast decisions for better planning process with variations of rainfall.

STUDY AREA:

The Marathwada region lies in the upper Godavari basin. The absolute location of region is 17°38'53" North latitude to 20°40'51" North latitude and 74°33'28" East longitude to 78°21'12" East longitude.

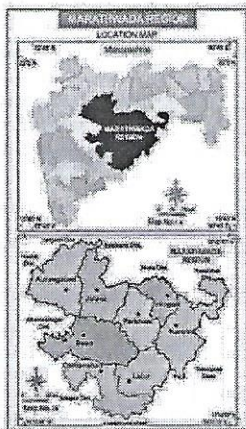
The study region is bounded to the north by Jalgaon, Buldhana, and Washim districts, to the north east by Yavatmal district to the east by Nizamabad and Adilabad districts of Telangana state to the south and south east by Bidar and Gulbarga districts of Karnataka state, to the west by Ahmednagar to the Southwest by Solapur and to the North West by Nasik district. Its shape is roughly triangular. East-West maximum extension of region is 394 Kilometers and North-south extension in of region is 330 Kilometers. Total Geographical area of region is 64434 Square Kilometer which is 20.95 per cent of the state and its population is 1.87 cores which is 16.66 percent of the state as per census of 2011. Administratively study region is divided into eight districts that are further divided into 76 tehasils.

DATA BASE AND METHODOLOGY:

Data has been collected by referring agricultural statistical information of agriculture department of Maharashtra, Pune.

Annual rainfall series of all the 8 district of Marathwada region are developed then computed arithmetic mean (X), Standard Deviation (SD) and rainfall variability for the each district applying coefficient of variation which is expressed as percentage is defined as.

$$\text{Co-efficient of Rainfall Variability} = \frac{\text{S.D.}}{\text{Mean}} \times 100$$



OBJECTIVES:

The main objectives of this paper is analyse to spatio-temporal rainfall distribution in Marathwada region

DISCUSSION:

Rainfall as the primary ecological parameter has created variety of farming enterprises, types or systems in the world. It is the dominant single weather element influencing the intensity and location

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of farming systems and the farmer's choice of enterprises. It also becomes a climatic hazard to farming when it is characterized with scantiness, concentration, intensity, variability, and unreliability, it is more important in the minimal regions, where average or normal rain fall is generally necessary for successful crop production. In such area the system of crop production must be correlated more or less to the moisture factor (*Klages K.H.W.*, 1958). About more than 84 percent of the annual rainfall in the region is received during the south-west monsoon season, the rainiest month being June, July gets the heaviest rainfall in the North east, while during the retreating Monsoon, rainfall in September becomes more important in the East. The South-West monsoon is the pivot around which almost the entire farm life and economy swings. The details of the mean annual rainfall and co-efficient of rainfall variability from 1980-81 to 2010-11 are given in the table No. 1.

The region as whole receives 792.40 MM. annual average rainfall. The mean annual rainfall in the region varies from 710.80 MM. in Aurangabad district to 935.17 MM. in Nanded district. Generally rainfall decreases from East to West in the study region (*Map 2*).

The spatial distribution of rainfall varies from district to district; the high rainfall is found in the eastern part of the study region particularly in Hingoli and Nanded district i.e. above 850. It is moderate in Osmanabad, Parbhani and Latur district i. e. 750 MM. to 850 MM. Whereas it is low in North-western part particularly in Aurangabad, Jalna and Beed district i.e. below 750 MM.

Table No.1: Mean Annual Rainfall, Intensity of Rainfall and Co-efficient of Rainfall Variability in Marathwada 1980-81 to 2010-11

Name of the District	Mean annual rainfall in MM.	Rainy Day	Intensity of Rainfall	Co-efficient of rainfall variability in percent
Aurangabad	710.80	44.2	16.08	28.84
Jalna	725.00	42.5	17.06	28.93
Beed.	734.20	50.4	14.95	29.25
Parbhani	839.53	47.3	17.96	27.94
Nanded	935.17	51.4	20.86	21.30
Latur	788.00	51.3	15.56	27.26
Osmanabad	772.60	47.5	16.25	31.46
Hingoli	873.07	50.4	19.88	21.69
Marathwada	792.40	46.2	17.16	25.92

Source: Computed by the Researcher

INTENSITY OF RAINFALL

The term intensity used in the context of rainfall received during 24 hours period. It is important as it determines the intensity of soil erosion by rain and the usefulness of rain. More ever the intensity of rainfall determines the water regime there by irrigation potentials of the region. In other world higher the intensity of rainfall higher is the degree of erosion, lower is the water regime and irrigation potentials, and vice versa.


The intensity of rainfall is calculated by the following formula (Monkhouse and Wilkinson: 1971)

$$I = \frac{A}{X}$$

- I = Intensity of Rainfall.
- A = Annual Rainfall.
- X = Number of Rainy days.

The table 1, reveals that Marathwada region as a whole has 17.11 mm intensity of rainfall, but spatial distribution varies from district to district. The high intensity of rainfall is recorded only in Nanded district i.e. above 18.23 MM. It is moderate in Hingoli, Parbhani, Osmanabad and Jalna districts ranging from 17 MM. to 18 MM., while it is low in Aurangabad, Beed and Latur district i.e. less than 17 MM.


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RAINFALL VARIABILITY

To understand the spatial organization of agricultural landscape, the study of rainfall variability is very important. The intensity of irrigation, cropping pattern and productivity all are related to variability of rainfall.

Variability of rainfall increases with decrease mean annual rainfall. Variability if excess of 20 percent implies great risk to farming (Williamson, 1925). In this situation, it is essential additional water supplies for successful cropping.

The co-efficient of rainfall variability is calculated by the following formula.

$$\text{Co-efficient of Rainfall Variability} = \frac{\text{S.D.}}{\text{Mean}} \times 100$$

Where,

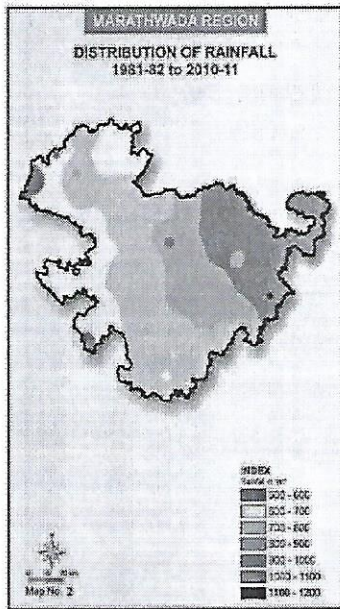
SD = the standard deviation.

Mean = the Arithmetic mean of rainfall during the 30 years.

The table 1 reveals that Marathwada region as a whole has 22.19 percent of rainfall variability, but spatial distribution decrease from West to East high rainfall variability is found in Western part of region in Aurangabad, Jalna, Beed and Osmanabad district i. e. above 28 percent, indicates great risk in farming. Moderate rainfall variability is recorded in central part particularly in Parbhani and Latur district ranging from 25 to 28 percent while it is low in Eastern part. The low rainfall variability is registered in Nanded and Hingoli district i.e. less than 25 percent. The rainfall variability is more than 20 percent throughout Marathwada region indicates that irrigation is very important from the view point of better productivity.

CONCLUSION

The Marathwada region depends on South East monsoon for rainfall, which is concentrated in brief period of 46 days. The rainfall is uneven and uncertain throughout the region. The average annual rainfall is 792 MM. The annual coefficient of variability of rainfall is more than 21 percent in the region, indicates great need of irrigation in all season for better agricultural productivity. The intensity of cropping and agricultural productivity of the study region is related to rainfall variability. The region is divided three agro-climate zones in which rainfall decreased from east to west. The central and western parts receive scanty rainfall and are often affected by draught.



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