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Analysis of Rainfall Variability in Kolhapur District

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Abstract:

All living things, including animals, plants, people, and agriculture, depend on water as a basic resource. Water also has an impact on the nation's industrial and commercial sectors. Kolhapur, sometimes referred to as southern region of Maharashtra. The studied area's physical environment, the presence of the Sahyadri highlands, foothills, plains and shifting climatic conditions all contributed to the varied and irregular pattern of rainfall distribution. It has been discovered that while August rainfall is growing in tehsils, the proportion of June, July, and September rainfall to the annual rainfall is declining. In 2023 Kolhapur has received very less rainfall. Also according to tehsil there is diversity in this. Rainfall is more in some tehsils and rain has decreased in more places. So it is necessary to study its details.

Introduction:

It is important to find out if the features of the Indian summer monsoon are altering in relation to climate change. The rainfall during the Indian summer monsoon, which lasts from June to September, is essential for the nation's hydrological planning, disaster relief, and economic growth. Despite the expansion of the service sector, India's economy remains heavily rely on agriculture. The country faces severe challenges from crop failure, drought, and even catastrophic situations like starvation brought on by insufficient or weak monsoons. Consequently, it's critical to keep a careful eye on the country's daily, weekly, monthly, and seasonal rainfall variations.

Humans require water for fundamental needs such as drinking, agriculture, industry, etc. The country's industrial sector, farming practices, and other economic sectors have all been impacted by the distribution of rainfall. Since Indian agriculture depends only on the monsoon, rainfall or precipitation has been the most significant element influencing agricultural productivity and advancement in the Indian subcontinent. Rainfall is distributed unevenly and varies from tehsil to tehsil within the research region. Large-scale precipitation occurs throughout the monsoon season in the studied region. Water use is therefore crucial to agricultural productivity.

Study Area:

The Kolhapur district is a part of Deccan plateau and western Maharashtra and extremely southern part of Maharashtra state is Kolhapur district lies between 15˚ 43' north to 17˚ 17' north latitude and 72˚40' east to 74˚ 42' east longitude. The Kolhapur district comprises 7620 sq. km area which is 2.5 % of the state. The general height of the district is 1000 mtrs and administratively divided into 12 tehsils supports 38, 74,015 population (2011). In general the physiographic arrangement of the district has Sahyadri hills in a north-south direction, plateau area situated to the east of the Sahyadri hills and eastern plain area and Belgum district of Karnataka state in the south. The climate of Kolhapur is generally temperate. Minimum temperature of the district is 14 c and maximum is 36.9 o c. The average annual rainfall is 1881.1 mm. The decadal growth rate (2001-2011) of population is 17.85 per cent. From the Kolhapur district around 70% of total population lives in rural area.

Objectives:

1) To study the rainfall distribution in Kolhapur district.
2) To study the tehsil wise variability of rainfall distribution in Kolhapur district.

Data Base And Methodology:

The socioeconomic abstract of the Kolhapur district (2020) provided the majority of the secondary data used in this study, which also employed the annual rainfall dada for the years 2023 to conduct its inquiry. For basic information, the Kolhapur district gazetteer is also utilized. In addition to using basic statistical methods like mean and percentage to understand the distribution of rainfall and its properties, tehsil-wise variability is determined by calculating the departure from average rainfall. The choropleth map technique was also used to display the variability of rainfall.

Discussion:

The rainfall distribution in Kolhapur district for 2023 is depicted in the bar graph above. Additionally, Gaganbavada tehsil (3444.1mm) has recorded the most rainfall during this time, followed by Bhudargad tehsil (1715.6mm) and Shahuwadi (1487.6mm), respectively. Karveer tahsil, Kagal received average 750 mm rainfall. Ajara, Chandgad and Radhanagri tehsils received 1000mm to 1400mm rainfall. The least amount of rainfall received by Shirol tehsil (494.9 mm).

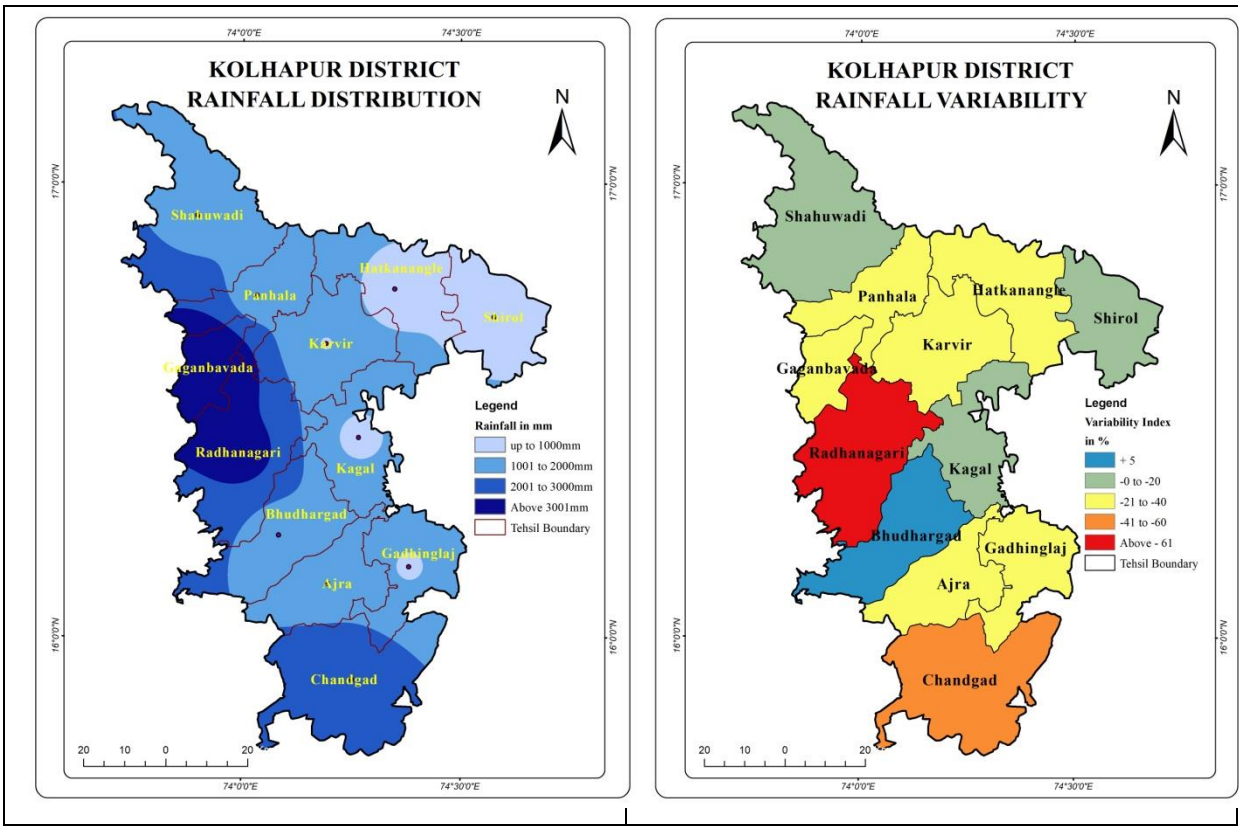
Rainfall distribution in Kolhapur district (2023)

Sr. No.	Tehsil	Normal Rainfall	Actual Rainfall	% To Normal
1	Hatkanangle	668.0	512.5	76.7
2	Shirol	570.6	494.9	86.7
3	Panhala	1611.6	1067.5	66.2
4	Shauwadi	1787.4	1487.6	83.2
5	Radhanagari	3574.5	1348.3	37.7
6	Bavda	5507.9	3444.1	62.5
7	Karveer	982.6	757.9	77.1

8	Kagal	792.0	756.8	95.6
9	Gadhinglaj	932.9	659.7	70.7
10	Bhudargad	1592.0	1715.6	107.8
11	Ajara	1874.4	1354.7	72.3
12	Chandgad	2783.3	1424.0	51.2
Kolhapur District		1881.2	1048.2	55.7

Source- *Indian Metrological Department (IMD), Pune*

Rainfall distribution and Rainfall variability in Kolhapur district (2023)



Source- *Indian Metrological Department (IMD), Pune*

The rainfall distribution in Kolhapur district for 2023 is depicted in the bar graph above. Additionally, Gaganbavada tehsil (3444.1mm) has recorded the most rainfall during this time, followed by Bhudargad tehsil (1715.6mm) and Shahuwadi (1487.6mm), respectively. Karveer tahsil, Kagal received average 750 mm rainfall. Ajara, Chandgad and Radhanagri tehsils received 1000mm to 1400mm rainfall. The least amount of rainfall received by Shirol tehsil (494.9 mm). Kolhapur District's average rainfall being around 1881.2 mm. Using a choropleth map, it displays the rainfall distribution by tehsil in the Kolhapur district for 2023. There has also been rainfall of up to 3000 mm in the tehsils of Gaganbavada (3444.1). The range up to 1000 mm rainfall presented in the Hatkanagale (512.5), Shirol (494.9), Karveer (757.9), Kagal (756.8) , Gadhinglaj (659.7).

Rainfall Variability: Rainfall data for 2023 for each tehsil in the Kolhapur district is computed to determine rainfall variability. Additionally, variability was computed using the following method, which compared the average rainfall of the district to the average rainfall of the tehsil.

Variability of Rainfall = X - % of precipitation from mean x100

Here,

X = Mean of Rainfall of Kolhapur district

Kolhapur District: Tehsil wise Rainfall Variability in Percentage (2023)

Sr. No.	Tehsil	Actual Rainfall	% To Normal	Variability in %
1	Hatkanangle	512.5	76.7	-23.3
2	Shirol	494.9	86.7	-13.3
3	Panhala	1067.5	66.2	-33.8
4	Shauwadi	1487.6	83.2	-16.8
5	Radhanagari	1348.3	37.7	-62.3
6	Bavda	3444.1	62.5	-37.5
7	Karveer	757.9	77.1	-22.9
8	Kagal	756.8	95.6	-4.4
9	Gadhinglaj	659.7	70.7	-29.3
10	Bhudargad	1715.6	107.8	+7.8
11	Ajara	1354.7	72.3	-27.7
12	Chandgad	1424.0	51.2	-48.8
Kolhapur District		1048.2	55.7	-44.3

Source- *Compiled by researcher*

The Kolhapur district's tehsilwise rainfall variability is seen in this figure. Additionally, it has demonstrated how rainfall occurs unevenly and differs from tehsil to tehsil. Kolhapur district has -44.3 % rainfall variability. Devgad tehsil (37.7) has the least amount of rainfall or the biggest variability, which is almost -62% of the district's normal rainfall. The rainfall variability in Chandgad tehsil is high—48.4%. The Kagal tehsil had the lowest variability, at -4.4%. Shirol tehsil (-13.3%). One of the tehsil has received more rainfall than normal that is Bhudargad tehsil (107.8%) and variability is +7.8 %. Where there is less rainfall, there is more unpredictability in the rainfall, but here there is also variability from the monsoon and the presence of the ocean.

Conclusion:

The research area has a wide range of rainfall, and because the monsoon's intensity and regularity fluctuate, so does the rainfall's spatial distribution from tehsil to tehsil. The monthly and yearly rainfall is displayed in several ways. It was shown that the Gaganbavada tehsil has the most rainfall. Shirol tahsil receives the least amount of rainfall, with Kolhapur District's average rainfall being around 1048.2 mm. The Radhanagari tehsil has the greatest rainfall variability, with rainfall there varying by almost -62% above the district average. The rainfall variability in Chandgad tehsil is high—48%. The Bhudargad tehsil has the lowest variability in 2023.

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