



## A GEOGRAPHICAL STUDY OF RAINFALL DISTRIBUTION IN AHMEDNAGAR DISTRICT, STATE OF MAHARSHTRA

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### ABSTRACT:

Climate plays an important role in the development of any region. Rainfall and temperature are the two important climatic factors which determine the climatic condition of any place. Ahmednagar district is a drought-prone area and it is situated in the central part of Maharashtra state. Intergovernmental Panel on Climate Change (IPCC, [5]) reports, frequency of droughts as well as extreme events will be increase and rainfall pattern will also change which is a key factor influencing economic growth of the regions, especially in the country like India where the 70 percent people are directly or indirectly depends on agriculture. But agriculture is hanging on Monsoon, erratic in nature. It also has great variations in spatiotemporally, those fluctuations extremely damaging agriculture, food security, health and many more. Therefore, the present study has been conducted in order to help farmers, researchers, economists, and policymakers to make fast decisions for better planning propose with variations of rainfall.

**Key words:** - *Climate, Rainfall distribution, Variability.*

### INTRODUCTION:

Climate plays an important role in determining the agricultural, industrial and economic growth of any region. Climate includes factors like Temperature, Rainfall, Pressure, Wind, Humidity, Precipitation, etc. Temperature and Rainfall are the most important factors which directly affect the climate condition of any region. There is a slow and steady increase in the temperature which has a direct impact on rainfall. Rainfall is the cheapest source of water provided it is timely and adequate in quantity. But rainfall in the greater part of India is uncertain and highly unevenly distributed. Rainfall is the major parameter influencing the agriculture activity of man. In India agricultural economy entirely depends on the amount of rainfall received during monsoon season. Rainfall is the dominant single weather element influencing the intensity and location of the farming system and the farmer's choice of enterprise. It also becomes a climatic hazard to farming when it is characterized by

scantiness, concentration, intensity, variability, and unreliability.

Such a study would help in the selection of crops and in short-range weather forecasting. In order to obtain an optimum yield from agriculture, it requires proper knowledge about the agro-climatic situation that helps for cropping patterns and crop management.

### STUDY AREA:

The present study deals with the geographical perspectives of the rainfall distribution in Ahmednagar district. Ahmednagar is the largest district of Maharashtra State with a geographical area of 17418 sq. km. which is 5.66% of the area of Maharashtra State. It lies between 18° 2' to 19° 9' N latitude and 73° 9' to 75° 5' E longitude with covering 14 tehsils. The population of district is 4543157 (2011) and Out of total workers 75. 42% are engaged in agriculture. The district has 1256500 ha Net Cropped Area (NCA) out of 330000 ha area (26.27 %) is under canal and well

irrigation and remaining about 926500 ha. (73.73 %) the area is rain-fed.

Therefore, agricultural operations mainly depend on south-west Monsoon, but rainfall in the district is highly erratic. The average annual rainfall in the district is 447 mm (2017). The climate of the district is hot and dry, the average of temperature 90c to 410c. The district is mostly in the rain shadow region to the east of Western Ghats. From the western border of the district, the rainfall decreases rapidly towards the east. About 77% of the annual rainfall in the district is received during the south-west monsoon season, September is the rainiest month and remaining months receiving unevenly with showing monthly as well as annual rainfall variability.

#### **OBJECTIVES:**

Present paper has an attempt to make an assessment of the rainfall variability of Ahmednagar District and to identify the assured rainfall zone in the study region.

#### **DATABASE AND METHODOLOGY:**

The study is based on the rainfall data collected from Indian Meteorological Department for twenty-five years, for the period 1993 to 2017. For the data analysis following formula has used. Presentation of result choropleths cartographic method is used. CV = Coefficient of variability of rainfall, SD = Standard deviation of rainfall, X = Mean of rainfall

$$C.V. (\%) = \frac{SD}{x} \times 100$$

CV = Coefficient of variability of rainfall, SD = Standard deviation of rainfall, X = Mean of rainfall.

The present study is based on secondary data. Secondary data will be collected from social economic review, district census handbook of Ahmednagar district. The data has been obtained

from the related articles, research papers, reports, policies and plan documents of Government of India and Maharashtra. Some data has been obtained from websites of Govt. of India and Govt. of Maharashtra, Ahmednagar, Nic. in, was undertaken to know the environmental status. The rainfall data for 14 stations in and around the study area were collected and analysed. Rainfall conditions were studied season wise and Annual Rainfall was computed and used to draw the maps.

#### **RESULTS AND DISCUSSION:**

Table No. 1 indicates the mean annual rainfall of the study region. The present study analyzed rainfall conditions of Ahmednagar district and demarked district in low, medium and high rainfall zones. Coefficient of Variation (CV) has been calculated, it was highly variable running between 23.93 to 40.43 percent during 1993 to 2017. There are 14 rain gauge stations located in different places in the study area, and these stations measure the precipitation throughout the year. The lowest rainfall (below 500 mm) observed in most parts of Shirampur, Nevasa, Shrigonda, Parner, Sangamner, and Kopargaon tehsil. Due to the scarcity of water most of sectors are affecting especially agriculture. Medium rainfall (500 – 600 mm.) zone covers a large area including Nagar, Rahuri, Shevgaon, Pathardi, Karjat, and Rahata tehsil. Akole and Jamkhed tahsil has experienced high rainfall (above 600 mm) but a concentration of rainfall within only South-West Monsoon while remaining months is hot and dry, is creating a water scarcity problem. (Map No. 2).

#### **RAINFALL DISTRIBUTION:**

The distribution of rainfall in Ahmednagar district is uneven, therefore the coefficient of variation (CV) is also varied (Fig.2).

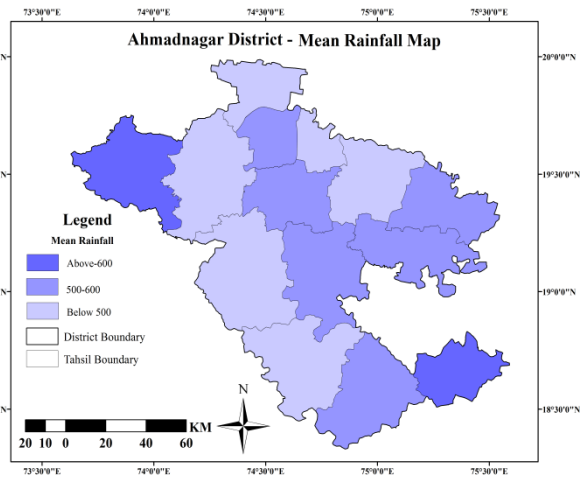
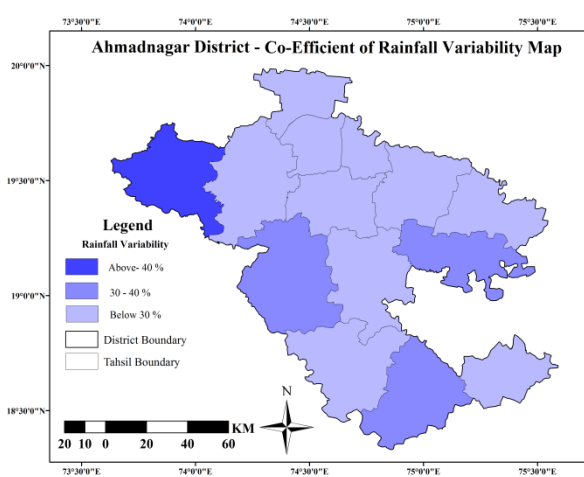
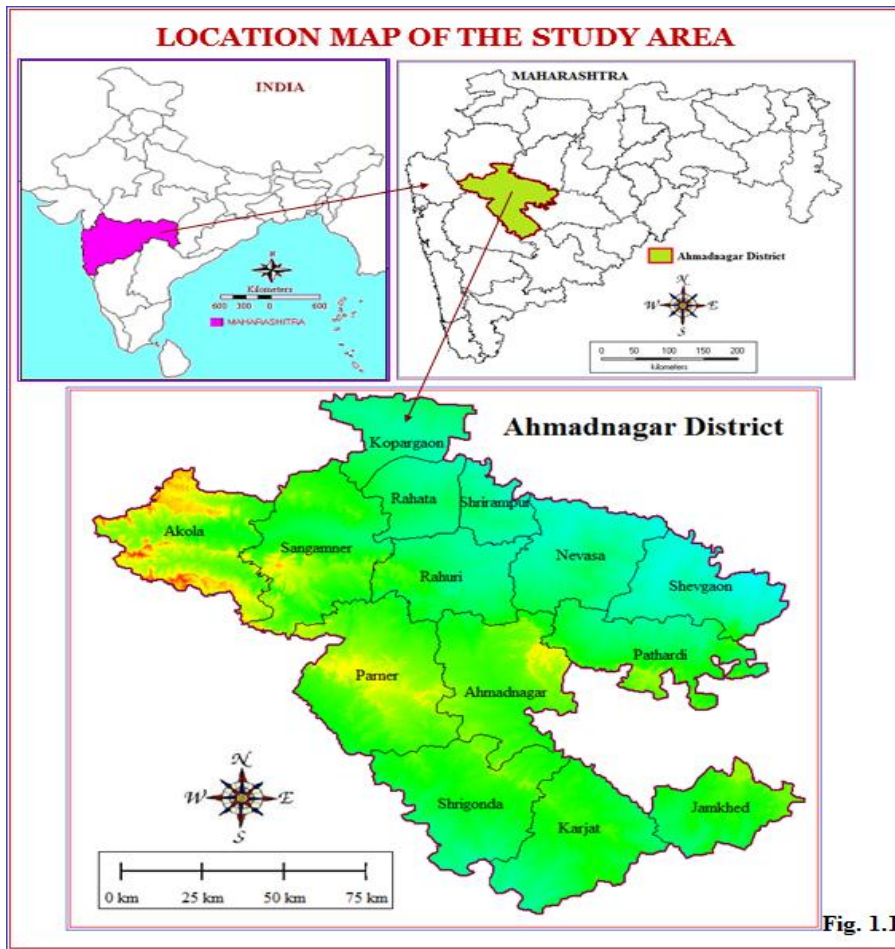
The coefficient of variation (CV) is defined as the ratio of the standard deviation to the mean. The coefficient of variation has been calculated, it running between 23.93percent to 42.43 percent from 1993 to 2017. The highest variations in rainfall were observed in Akole tahsil (42.43 %), that clearly shows that trends and the pattern of rainfall are highly changing during the last 25 years, damaging the agriculture, health, business; the lowest variations was observed in Nevasa tehsil (23.93%). Study also shows that one tahsil covered by 'high', three tahsil is 'medium' and ten tehsils is 'low' variation.

#### **CONCLUSION:**

Mean annual rainfall and variability of rainfall is not uniform in all parts of the Ahmednagar District. Jamkhed Tehsil received the highest (621mm) mean annual rainfall; whereas Kopargaon tehsil has received the lowest (428mm) mean annual rainfall. Rainfall variability affected agriculture practices in Ahmednagar District. There is a need for artificial water supply for agriculture development and increase agriculture production.

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**Table No. 1 Tehsil wise mean annual rainfall and variability of rainfall of Ahmednagar district 1993-2017**

Tahasil Year	Nagar	Rahuri	Shrirampur	Nevasa	Shevgaon	Pathardi	Jamkhed	Karjat	Shrigonda	Parner	Akole	Sanganner	Kopergaon	Rahata
1993	655	548	566	447	519	720	823	651	496	696	636.3	435	408	NA
1994	531	455	464	531	585	572	583	493	359	487	510	417	440	NA
1995	372	642	508	664	363	533	570	498	460	259	374	290	321	NA
1996	710	555	611	623	782	932	922	514	497	656	620	566	537	NA
1997	347	345	312	312	226	448	427	328	531	361	587	402	290	NA
1998	730	585	819	681	780	1095	1070	920	610	702	814.5	489	582	NA
1999	479	581	315	461	366	360	409	405	571	245	403	348	384	NA
2000	580	587	354	516	531	471	661	400	392	456	439	528	428	525
2001	380	358	341	312	349	332	333	495	352	384	473	337	360	413
2002	394	302	391	305	449	502	561	436	334	438	445	459	366	385
2003	199	299	313	219	320	476	460	281	87	190	489	380	280	249
2004	518	509	485	508	715	595	570	565	527	695	1074	570	428	490
2005	491	465	541	479	464	451	634	606	484	524	1080	518	396	588
2006	798	777	745	629	703	751	906	746	505	843	1090	576	557	690
2007	631	656	583	391	450	488	628	401	675	388	913	478	587	523
2008	648	651	503	591	473	625	715	763	448	388	1006	487	401	385
2009	563	551	485	456	633	620	615	710	499	464	549	329	333	337
2010	791	866	853	860	824	932	770	729	710	604	829	572	644	814
2011	374	589	636	474	741	614	712	413	326	368	500	240	455	395
2012	648	496	402	408	513	503	548	225	276	250	248	245	258	345
2013	767	378	413	504	501	489	690	563	668	622	544	676	777	682
2014	733	392	373	491	322	337	327	429	379	414	176	344	268	464
2015	437	360	383	383	415	469	510	490	460	419	409	308	351	567
2016	437	360	383	383	415	469	510	490	460	419	409	308	351	567
2017	494	417	440	440	470	531	563	550	524	480	474	449	505	626
<b>X</b>	<b>548</b>	<b>509</b>	<b>489</b>	<b>483</b>	<b>516</b>	<b>573</b>	<b>621</b>	<b>524</b>	<b>465</b>	<b>470</b>	<b>604</b>	<b>430</b>	<b>428</b>	<b>502</b>
<b>S,D(6)</b>	<b>156.8</b>	<b>143.2</b>	<b>149.1</b>	<b>137.1</b>	<b>161.2</b>	<b>184.3</b>	<b>176.8</b>	<b>159.0</b>	<b>133.6</b>	<b>161.0</b>	<b>256.3</b>	<b>113.8</b>	<b>125.4</b>	<b>141.7</b>
<b>C. V.</b>	<b>28.61</b>	<b>28.13</b>	<b>28.39</b>	<b>23.93</b>	<b>28.13</b>	<b>32.16</b>	<b>28.47</b>	<b>30.34</b>	<b>28.73</b>	<b>34.25</b>	<b>42.43</b>	<b>26.46</b>	<b>29.30</b>	<b>28.23</b>

Source: Metrological Department computed by Author