

**“South-West Monsoon Rainfall Fluctuation and Drought
Susceptible Tahsils in
Nashik District of Maharashtra, India”**

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Abstract:

Climate is a main role player in economic development of the country especially rainfall matters must in the Agricultural development and the rural and Urban areas basic water needs .Now a day's Earth is facing unevenness of the overall rainfall pattern due to some physical and human made interruptions and wrong agricultural and industrial practices. In Maharashtra most of the area having rainfall scarcity, most of the Tahsils are affecting badly in the vicious circle of the drought and its dangerously connected with the Crime, Unemployment, Low living of Standard ,Slums ,Migration, unhealthy environment etc.We are trying to identify the problem and try to give some suggestion for betterment of Societies Well Being.

Key Words: Drought, Susceptible, Rainfall Fluctuation, Well-Being, Monsoon, Variability.

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Introduction:

Drought Susceptible areas in Nashik District are identified from this research paper by examining the rainfall trend over district about 37 years; we have got maximum temporal data to analyze the character of the rainfall. The district influenced by the South-West Monsoon Season meanwhile followed by post monsoon season rainfall distribution is mainly from western parts having excess rainfall while middle part of the district having moderate rainfall and eastern and south eastern part having scarcity of rainfall. Nashik District is not regular, consistent, or equal natural relief and other geographical features. As well as District is located on the Deccan trap of the Maharashtra, Godavari, Tapi, and Girna River Basins are part of the district. Having all the natural wealth over here but due to some manmade calamities District faced some Environmental Challenges like increasing drought Prone Areas.

Study Region:

Nashik district lying between 19°35'18" North latitude to 20°53'07" North latitude and 73°16'07" East longitude to 74°56'27" East longitude, with an area 15530 sq.km. and population of 6,109,052, as per the 2011 census. There are 15 Tahasil and 66 revenue circles are in the Nashik district.

Nashik district is situated in the Deccan trap of Maharashtra which is partly in the Tapi Basin and partly in the upper Godavari Basin. The main stream of hills in the Sahyadri which is runs North-South in the western proportion of the district. Ajanta range which runs right across the district. It acts as a watershed between the Girna and its tributaries which drain towards the Tapi to the north and the Godavari and its tributaries to the south. More area of this region is in the rain shadow zone which is called as rain fed area. Drought is the phenomenon which affects the cropping pattern and agricultural development. So we are interested to find out some concrete solution for the agricultural development of this region.

Objectives:

- 1) To find out South-West Monsoon Trend of the Nashik District from 1980 to 2016
- 2) To evaluate spatial and temporal change in Rainfall
- 3) To Identify Drought susceptible Tahsils in Nashik District

Methodology:

This study is depending upon last 37 years data of rainfall which is obtained from 'India Meteorological Department, Pune and Hydrological Department, Nashik. We are using following Statistical methods for analysis of Drought prone areas of the District.

1. Mean is calculated by using the following formula.

$$\bar{x} = \frac{\sum x}{n}$$

Where, \bar{x} = mean $\sum x$ = is the sum of the rainfall value

n = total number of values.

2. Trend Analysis by Statistical Technique

3. Geoinformatics (Arc-GIS) for Mapping Drought Susceptible Areas

Connotation:

Drought is the result of Variability of Climate. Climatology is the scientific study of Spatio- temporal characteristics and variation of climatic elements like rainfall, temperature, evapotranspiration, humidity, pressure, winds and air masses. The climate is the average study of weather. The standard average periods for climatic analysis are 30 years defined by the World Meteorological organization (WMO). Here we are Concern with the Rainfall as a one major component of the Climate and directly connected with the droughts.

A.South-West Monsoon Rainfall Characteristics

Here we are discussing the South-West Rainfall Characteristics of Study Area Mainly for Monthly and seasonally for better understanding of Rainfall fluctuations during the 37 Years.

Sr. No.	Tahsil	Months											
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	Surgana	5.14	3.14	15.34	35.68	57.36	678.14	800.74	832.14	512.36	166.32	89.12	6.32
2	Peth	4.25	3.25	20.14	41.23	62.35	704.15	936.14	879.41	402.36	145.32	78.1	7.14
3	Trimbak	6.32	4.25	29.36	52.31	57.64	806.25	1100.14	976.14	415.37	198.65	73.56	5.69
4	Igatpuri	9.32	5.69	21.03	78.36	64.25	945.17	1324.56	1000.23	391.25	276.35	92.36	12.36
5	Nashik	3.56	3.14	14.68	41.23	40.12	547.36	700.14	568.94	287.36	198.32	66.32	7.31
6	Dindori	3.01	2.14	15.36	34.12	41.25	541.02	600.25	501.23	275.63	178.24	54.36	6.32
7	Satana	3.14	2.36	17.36	24.31	32.14	438.12	546.23	500.69	300.1	145.36	56.17	2.36
8	Kalvan	2.14	2.47	17.69	20.14	25.1	406.58	547.90	481.23	278.36	166.33	42.37	3.01
9	Niphad	2.69	2.14	14.2	21.03	28.34	400.12	412.35	469.36	398.65	145.26	47.65	2.13
10	Sinner	2.00	1.56	9.36	15.36	25.36	356.12	314.17	457.16	298.21	110.02	43.27	3.01

11	Yeola	1.12	1.02	10.24	18.36	21.03	304.25	356.21	354.12	201.54	98.36	28.64	2
12	Chandvad	0.46	0.7	10.23	16.35	21.48	289.36	300.14	289.65	233.66	87.32	30.14	2.14
13	Nandagaon	0.78	0.8	11.25	17.25	18.23	450.17	278.65	247.36	146.35	84.21	28.36	1.24
14	Malegaon	0.49	0.45	6.35	17.36	17.12	301.47	307.69	268.14	200.01	79.36	22	0.98
15	Deola	0.14	0.36	7.32	12.14	14.23	248.32	294.15	276.35	188.66	66.32	17.24	0.76
Nashik District		2.97	2.24	14.67	29.69	35.08	494.4	588	540.1	288.7	143.1	51.32	4.189

Table: 1 Monthly Average Rainfall Nashik District Year: 1980-2016

Above table (**Table: 1**) shows the monthly rainfall characteristics of the rainfall for the period from 1980 to 2016 .Mainly the distribution of rainfall is uneven in all the Tahsils in the month of December, January and February rainfall is very less for all the Tahsils During March, April and May having Moderate and During October and November it was normal. During June, July, August and September that is South West Monsoon Period Rainfall is Excess to Normal in The District.

If we are considering rainfall During June, July, August and September that is South West Monsoon Period Surgana, Peth, Trimbak and Igatpuri Tahsils having more than average rainfall among them Igatpuri Tahsil having excess rainfall .While Nashik, Dindori, Satana, Kalvan and Niphad having normal rainfall but Sinner, Yeola, Chandwad, Nandgaon, Malegaon and Deola Tahsils are having Scarcity of Rainfall compare to others .That's why they are more susceptible for Drought in the Study region.

Sr.No.	Tahsil	South -West Monsoon Season Average Rainfall in MM (June-Sept.)
1	Surgana	705.849
2	Peth	640.8895
3	Trimbak	824.48025
4	Igatpuri	915.30925
5	Nashik	525.9555
6	Dindori	479.535
7	Satana	446.2935
8	Kalvan	428.52325
9	Niphad	420.12475
10	Sinner	356.4215
11	Yeola	304.0355
12	Chandvad	278.20775
13	Nandagaon	280.6395
14	Malegaon	269.330475
15	Deola	251.87325
Total Average		471.8311983

Table: 2 South -West Monsoon Season Average Rainfall Nashik District Years: 1980-2016

Above table(**Table: 2**) shows the South-West Monsoon rainfall characteristics for the period from 1980 to 2016 rainfall During June, July, August and September Surgana (705.849mm), Peth (640.8895mm), Trimbak (824.48025mm) and Igatpuri (915.30925mm)Tahsils having more than average rainfall among them Igatpuri Tahsil having excess rainfall .While Nashik, Dindori, Satana, Kalvan and Niphad having normal rainfall but Sinner (356.4215mm), Yeola (304.0355mm), Chandwad (278.20775mm), Nandgaon (280.6395mm), Malegaon (269.330475mm) and Deola (251.87325mm) Tahsils are having Scarcity of Rainfall compare to others .That's why they are more susceptible for Drought in the Study region.

Trend Graph (**Fig.: 1**) also shows the clear picture of the uneven distribution of the rainfall over the study region during whole period average. Igatpuri Tahsil SW region of Study area having high Rainfall while Deola Tahsil having low Rainfall which is situating North Eastern of study region. Following Malegaon NE region, while Nandgaon, Yeola and Sinner SE region of study region having low trend of rainfall.Remaing Tahsils namely Nashik, Dindori, Satana, Kalvan and Niphad having Moderate Trend of rainfall distribution over the study region during the Year 1980 to Year 2016.

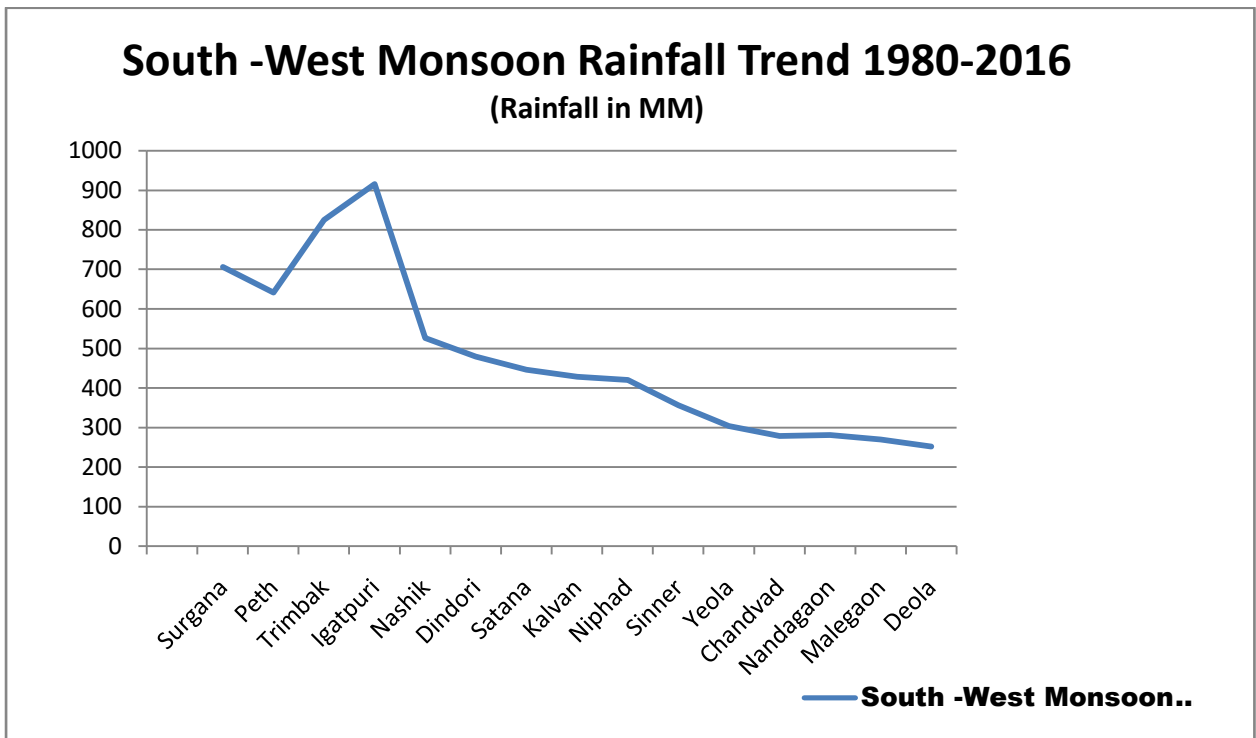


Fig.: 1 South -West Monsoon Season Rainfall Trend

B. Drought Susceptible Tahsils in Nashik District

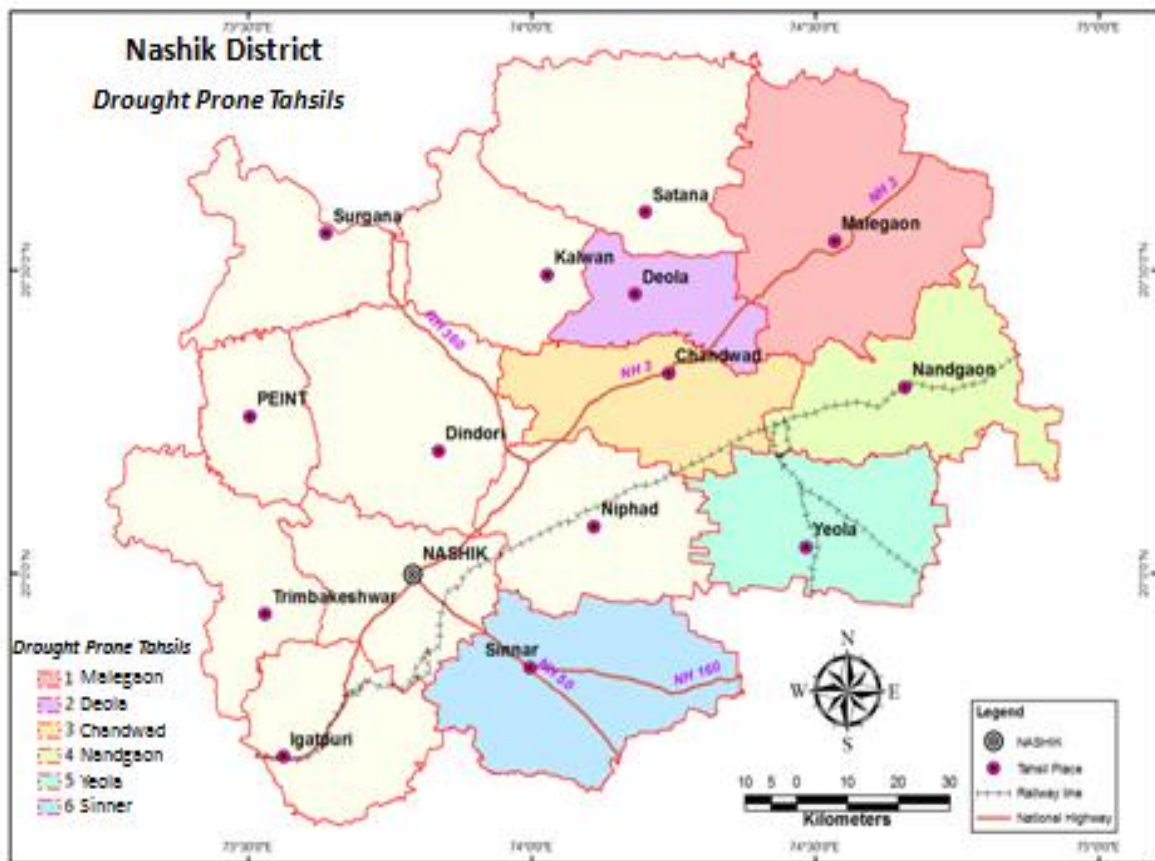


Fig.:2 Drought Susceptible Tahsils in Nashik District

Above Map (**Fig.:2**) shows the drought prone/Susceptible Tahsils in Nashik District Mainly North East, South West and Eastern Part of the District having more vulnerable to the drought because of unfavorable physical setting of the area and wrong industrial and agricultural practices. Also this part belongs to the Rainfed area. The main stream of hills in the Sahyadri which runs North-South in the western proportion of the district. Ajanta range which runs right across the district. It acts as a watershed between the Girna and its tributaries which drain towards the Tapi to the north and the Godavari and its tributaries to the south. Mainly because of Ajanta and Sahyadri ranges Western part of district have more than average rainfall but opposite of the Sahyadri ranges and Monsoon wind the area not get proper condensed clouds that's why this area belongs to drought prone area.

Conclusion:

More area of this region is in the rain shadow zone which is called as rain fed area. Drought is the phenomenon which affects the cropping pattern and agricultural development. The present study will help to understand the relationship between Droughts and Rainfall Pattern, the influences of other factors, like Soil, water supply and technology, represented by mechanization, pest and disease control, and the other agricultural management aspects. Although these factors are crucial in agriculture and crop yield. Scientific crop planning is possible through an understanding of Agroclimatic potential of the Study Region. The region is facing problems of the Deforestation, wild life is becoming rare, soil erosion is common, water level is very deep, and soil fertility has been reduced in some of the Drought Prone Tahsils in Nashik. Most of the region having uneven Climatic and Physiographic Condition. There is regional imbalance in water resource and management. Some parts of Region having wrong Agricultural Practices. Lack of Awareness within the farmers and civilians is on climate change issues for further adaptation and mitigation. There is a Scope for Sustainable Development of the Region.

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