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A case study: Decadal rainfall variability of Navsari (South Gujarat) for the Year1980 to 2014

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Abstract

Precipitation is an important parameter of the wells of around 100 million people in the Indian region. However, certain extreme precipitation events in different seasons cause catastrophic conditions for some parts. Deagale annual precipitation analysis by Navsari (South Gujarat) showed deviations in annual precipitation (25-30%) and deviations (3.66-17.84%) for normal precipitation. It was also observed that annual precipitation between 1990 and 99 to 2000 was more stable, although it could result in lower precipitation compared to normal rain (1434.3 mm). Precipitation in June, July, August, September and October showed less variation compared to the remaining months.

In seasonal precipitation variations, southwest monson has less variability (CV. 26.9-30). Furthermore, the contribution of rainfall from the northeastern region of 1.1-5.2% of the total CV volume ranged from 1.1-5.2%. The range is 113-124%. Precipitation of 35 MW showed that early sowing of several rabbinic harvests could be performed. On the other hand, normal sowing of rabbin plants can be done at MW 37-40. Weekly probability of precipitation gave rise to a higher initial probability of MW 30 and 31 (middle season), followed by a higher probability of water, followed by rainy weeks, and condemned emergency plant sowing for being able to be performed during these weeks. Rabbian season MW 37-40 had the highest chance of sowing from harvest.

Keywords: Decadal, rainfall, probability

Introduction

Climate change explicitly refers to many global processes that help capture the heat of the sun in the Earth's atmosphere. The observed climate change is characterized by high intensity and frequent, longterm shortening of rainfall, which causes large floods and disasters, such as landslides and landslides, particularly in alpine areas (Bernard, 2017) [11]. In India, there is almost 65% of areas that can be grown in rainy agriculture. Reflections are one of the most important factors determining the success of rain farming in a particular osteost student area where the main part of precipitation is precipitation, indicating clear changes over time (Banze *et al*. 2018, Sharma *et al*. 2018) [2]. Kumar and Jain (2010) [5] reported that high or altered precipitation distributions change the spatial and temporal distribution of drainage, soil moisture, groundwater storage, drought and flood frequency. Although the observed monsoon rains at the national level did not have a significant trend, regional monsoon variations were recorded. Inkrafee trends in monsoon season rainfall have been discovered. The West Coast, North Andhra Pradesh and North West India (+10% of normal for the past 100 years) have been discovered, but a decrease in rainfall during the monsoon season has been observed in eastern Madhya Pradesh. Northeast India and parts of Gujarat and Kerala (6-8% of normal for the past 100 years) (Kumar & Singh 2011, Singh & Kumar 2016) [6, 8]. Indeed, comprehensive knowledge of local rainfall trends and sustainability is extremely important due to the economic impact of rain sensitive operations (Sharma *et al*. 2015, Sharma & Dubey 2013, Jakhar *et al*. 2011) [10, 9, 3]. Considering the above studies, the present study was conducted to analyze precipitation patterns and assessments of various modeling options and predictability in selected study areas.

India is fortunate enough to enjoy strong precipitation spells in all seasons due to tropical and extra tropical weather systems. Summer or Southwest Mont Sun Season (Junior September) is the main rental period for the main actress, contributing about 75-80% of the annual rainfall. In other words, it's a contribution from other seasons. Winter (January-February), before Monsan (March 5), and all Indian rain incident posts or northeastern Monsan (October) are not so important and very important for each region. The main weather systems that will cause precipitation in the area include the monsoon-button pressure region, depression, thunderstorms, tropical cyclones and western disability. Information on top rain strength at stations is critical to examining urban development, disaster management planning, and environmental aspects related to water runoff near stations. Therefore, this study is carried out using station data. The domain is located throughout the Indian region, with all seasons being taken into consideration. (R. M. Khaladkar *et al*., 2009) [4]. Sustainable production systems require management strategies by using equipment to predict projects. This leads to cultivation and association of pest and disease control rate accuracy to reduce input costs and achieve higher profits.

Materials and Methods

In south Gujarat Navsari were chosen for assessment of scare and excess rainfall intensity and frequency with (23.15° N and 69.49° E, Altitude 11.0 m). The monthly and annual rainfall data were used of 34 years (1980-2014). By using monthly rainfall data, monthly mean, seasonal averages, Coefficient of Variation (CV) were computed monthly and season-wise *viz*., Pre-monsoon (March-May), South-west monsoon (June-September), Post-monsoon (October-November) and Winter (December-February). The data were subjected to find out long term trends.

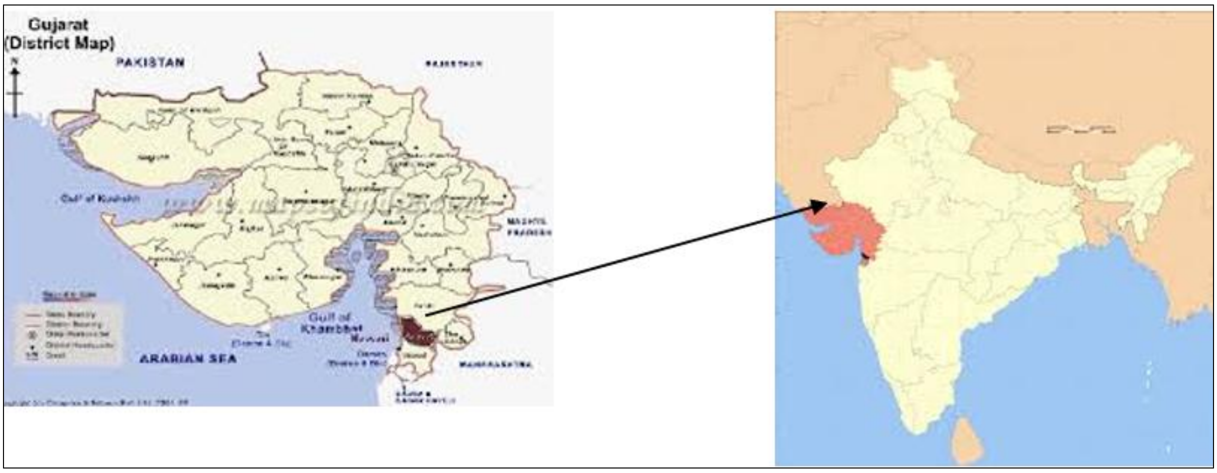

Fig 1: Location of the study

Results and Discussion

The annual precipitation analysis by Navsari (Südgujarat) (Table 1) showed deviations in annual precipitation (25-30%) and deviations (3.66-17.84%) for normal precipitation. It was also observed that annual precipitation between 1990 and 99 to 2000 was more stable, although it could result in lower precipitation compared to normal rain (1434.3 mm). Precipitation in June, July, August, September and October was less variable than in the remaining months. In seasonal precipitation variations (Table 3), southwest monsoon showed a low variability (26.9-30), with precipitation deviations between 453.5 and 1710.5 mm. Furthermore, the contribution of rainfall from the northeastern region of 1.1-5.2% of the total CV volume ranged from 1.1-5.2%. The range is 113-124%. Precipitation of 35 MW showed that early sowing of several rabbi harvests could be performed. On the other hand, normal sowing of rabbi plants can be done at MW 37-40. Weekly probability of precipitation gave rise to a higher initial probability of MW 30 and 31 (middle season), followed by a higher probability of water, followed by rainy weeks, and condemned emergency plant sowing for being able to be performed during these weeks. Rabbi season MW 37-40 were most likely to sow harvests.

Table 1: Annual rainfall variation and deviation at Anand (Middle Gujarat).

Sr. No	Decade	Rainfall (mm)	CV (%)	Deviation from Normal
1	1980-89	1488.8	30.20	-3.66
2	1990-99	1298.9	28.4	10.41
3	2000-2014	1745.8	25.12	-17.84

Table 2: Monthly rainfall variability at Anand (Middle Gujarat)

	1980-89			1990-99			2000-2014		
Month	Rainfall	%.	C.V.	Rainfall	%.	C.V.	Rainfall	%.	C.V.
January	0.6	0.0	194.0	13.5	1.0	222.0	0	0.0	0
February	0.0	0.0	0.0	0.6	0.0	223.0	1.2	0.1	316
March	0.2	0.0	316.0	0.5	0.0	316.0	0.5	0.0	316
April	0.0	0.0	0.0	1.2	0.1	316.0	0	0.0	316
May	1.0	0.1	280.0	5.2	0.4	275.0	1.7	0.1	195
June	232.0	15.6	46.0	235.5	17.8	92.0	277.7	16.2	82
July	654.8	44.0	46.0	531.6	40.1	47.0	717.8	42.0	53
August	351.6	23.6	42.0	245.5	18.5	56.0	485.9	28.4	46
September	171.7	11.5	93.0	241.6	18.2	73.0	204.6	12.0	61
October	62.1	4.2	151.0	41.5	3.1	126.0	17	1.0	164
November	12.9	0.9	161.0	7.8	0.6	168.0	2.6	0.2	238
December	0.5	0.0	316.0	1.3	0.1	316.0	1.1	0.1	220
	1487.4	100		1325.8	100		1710.1	100	

Table 3: Seasonal rainfall variability at Anand (middle Gujarat)

	1980-89			1990-99			2000-2009		
Month	**Rainfall**	**%**	**C.V.**	**Rainfall**	**%**	**C.V.**	**Rainfall**	**%**	**C.V.**
Winter (Jan-Feb)	0.6	0.0	194	14	2.8	194	1.7	0.1	255.4
Hot- Weather (Mar-May)	2.1	0.1	172	18.43	3.7	172	2.3	0.1	140.5
South-West June-Sept	1409.2	94.6	30	453.5	92.3	30	1710.5	98.2	26.9
North- East (Oct-Dec)	77	5.2	124	5.6	1.1	124	28.2	1.6	113
	1488.9	100		491.53	100		1742.7	100	

Table 4: Weekly rainfall variability at Anand (Middle Gujarat).

MW	1980-89		1990-99		2000-14	
	Rainfall	**C.V**	**Rainfall**	**C.V**	**Rainfall**	**C.V**
22	1.0	267.7	17.2	221.0	12.4	320.5
23	20.2	180.8	8.0	218.9	31.7	189.6
24	70.6	109.1	45.2	238.3	63.3	169.0
25	77.0	149.6	131.18	150.5	70.2	181.9
26	75.5	114.3	45.33	110.9	100.8	107.7
27	148.7	109.4	108.53	148.6	166.4	75.9
28	114.0	108.3	115.52	123.8	127.6	101.5
29	175.4	84.4	188.97	83.2	134.7	105.9
30	171.3	111.9	92.78	114.1	160.9	89.8
31	148.2	129.5	62.36	88.2	177.4	116.1
32	88.6	66.2	50.51	32.3	132.8	105.9
33	60.6	118.6	65.843	154.0	74.3	88.8
34	66.1	107.2	41.67	97.7	69.0	105.8
35	27.5	86.3	57.42	104.9	93.1	113.9
36	43.2	154.6	85.86	151.3	102.0	113.0
37	48.5	159.5	51.1	101.7	71.8	115.2
38	31.1	126.9	38.38	138.9	69.3	103.7
39	42.9	179.9	53.33	154.7	53.1	216.7
40	30.0	181.1	15.27	120.4	11.2	156.6
41	26.9	261.7	13.83	239.7	5.6	195.6
42	0.0	0.0	7.96	177.1	0.9	328.9
43	0.4	316.2	4.45	316.2	0.0	0.0
44	8.9	316.2	2.66	316.2	0.5	387.3
45	6.5	287.1	0.8	316.2	1.8	264.1

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