

A Study on the Rainfall Changes of Orathanadu Taluk Thanjavur District Tamil Nadu Using GIS

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Abstract: Agriculture is the most fundamental activity of mankind. This study is mainly based on agriculture, which is affected in a major way by rainfall changes. Orathanadu taluks is located in the Eastern part of Thanjavur district in TamilNadu. The winter season (Jan- Feb) summer season (Mar-May) and Rainfall changes are analyzed. Two sets of data have been taken (2000 and 2009). The three sets of rainfall stations are Neivasal, Orathanadu and vettikadu. In 2000, during the Winter season Neivasal received 22 mm, Orathanadu received 3.7 mm the minimum rainfall and vettikadu 50 mm the maximum rainfall. In 2000, during the summer season Neivasal received 54.7 mm the minimum rainfall, Orathanadu received 287.2 mm the maximum rainfall and vettikadu received 211 mm rainfall. In 2009, winter rainfall and summer rainfall received by Neivasal was 24 mm the minimum of the season and 94.7 the maximum of the summer rainfall respectively. In 2009 Orathanadu received 1894 mm the maximum rainfall of the season 2.6 mm the minimum of winter rainfall and 234.3mm the maximum of summer rainfall. Orathanadu Taluk has received a total annual rainfall of 628.6 mm in 2000. The maximum rainfall of 552.6 mm was received during the summer season (Mar –May) and the minimum rainfall of 75.7 mm was received during 2000 winter (Jan- Feb).

Keywords: Mean annual Rainfall changes in winter and summer seasons Orathanadu taluk Thanjavur district

1. Introduction

Rainfall is a key factor determining the sustainability and conservation of living Species on the earth. In dry farming areas, where rainfall is the source of water for crops, changes in both quantity and distribution of rainfall during the year could affect the economy of an area (Ramos, 2001). Climate change is very likely to have a major impact on hydrological cycle and consequently on available water resources, flood and drought frequencies, ecosystem, society and economy (Evans,1996). Jagannadhasarma (2005) analyzed the rainfall pattern of the coastal zone of Krishana Godavary River Basin, Andhra Pradesh, India. He has analysed the annual, monsoon and non monsoon rainfall and spatial and frequency distribution of rainfall intensity. Tripathi (2009) analyzed the rainfall for crop planning to study the weekly rainfall for the critical growing period for the rice, sugarcane, groundnut, fodder, potato, wheat, etc in Uttarakhand. Prasad (2005) analyzed the extreme rainfall event of July, 2005 in Mumbai, West coast, India. He has made analyzed the annual, monsoon and non monsoon rainfall and spatial and frequency distribution of rainfall intensity and G.Vennila (2007) has analysed rainfall

variation analysis of Vattamalaikarai sub basin, Tamil Nadu, India.

2. Study Area

Orathanadu block is one among the blocks of Thanjavur district is formed in 1986. It is located is to eastern part of Thanjavur district in Tamil Nadu, it extends latitudinal from 10°33' N to 11° 13' N and Longitude from 78°15' E to 79° 10' E. It is barded by Pudukkottai and Trichy district in the west Thanjavur Taluk in South Panpansam and Valan gaiman in North. Orathanadu block covered area of 409.59 sqkm, the population of 1, 63,742. It consists of 65 Villages and it has a plain topography Anicut river and Grand Anicut canal is the main sources for the development of agriculture in and around. The location maps are given fig. 1.1. Physiographical the land forms are plain area topography. The slopes are west to East. So the ground water potential is high. The main sources of Grand Anicut canal. Orathanadu has an average elevation of 7ft. The city lies on the south bank of the Cauvery River, 223 miles (359km) south of Chennai.

LOCATION MAP OF THE STUDY AREA

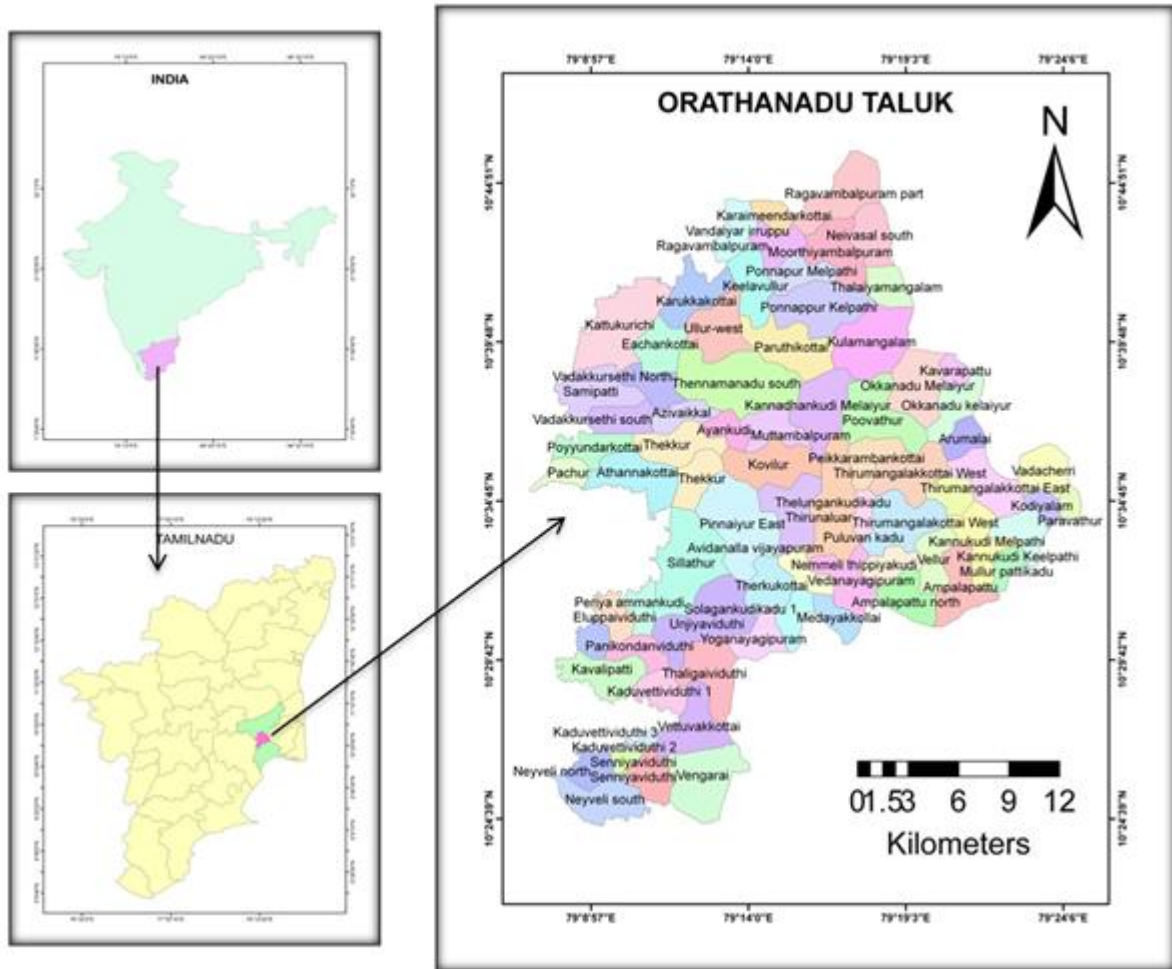


Figure 1

3. Aim of the Study

The aim of the present study is to understand the distribution of rainfall in the Orathanadu taluk of Thanjavur district in the past ten years is from 2000 to 2009.

4. Material and Methodology

The main rainfall of data has been collected from secondary data's of statistical offices. The study area toposheets has been totally 2 toposheets. The Survey of India toposheets scale has been 1:50,000 scale. The data relating to the maps are prepared by using GIS techniques. The survey of India Topo sheets of 58 N/ 2 and N/6 in 1:50,000 scale of taluk is registered with the help of GIS software version (10.1). The present study of the aim is going to analyze the rainfall changes in Orathanadu taluk in Thanjavur district.

5. Mean Annual Rainfall

The mean annual rainfall of the Orathanadu Taluk is 8089.7mm. The maximum rainfall recorded at Orathanadu. Which is 1717.1mm and minimum 162mm at Neivasal. Orathanadu taluk these plain region the heavy rainfall and Western Ghats invariably feeds the Cauvery and helps greatly for the vast cultivation of the delta area the region fall under following zones.

- 1) High rainfall zone: [above 1000mm]: In the northern side in Neivasal.
- 2) Medium rainfall zone: [1000-500mm] In the centre part of the Orathanadu.
- 3) Low rainfall zone: [below – 500] In the southern side of the Vettikkadu.

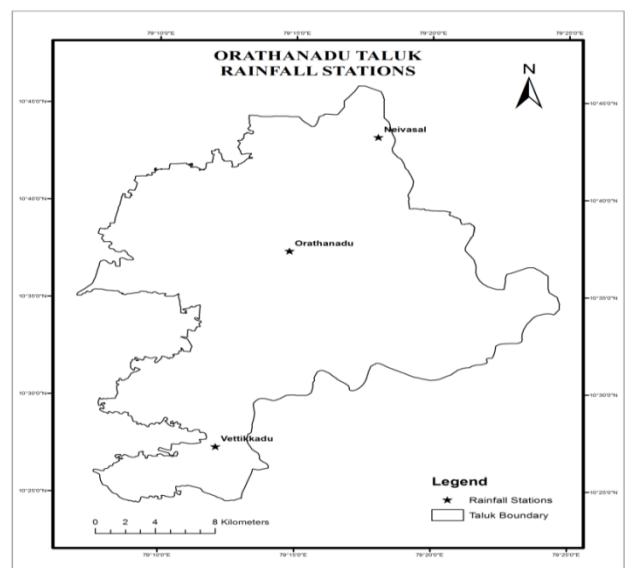


Figure 2: Location map of rainfall stations

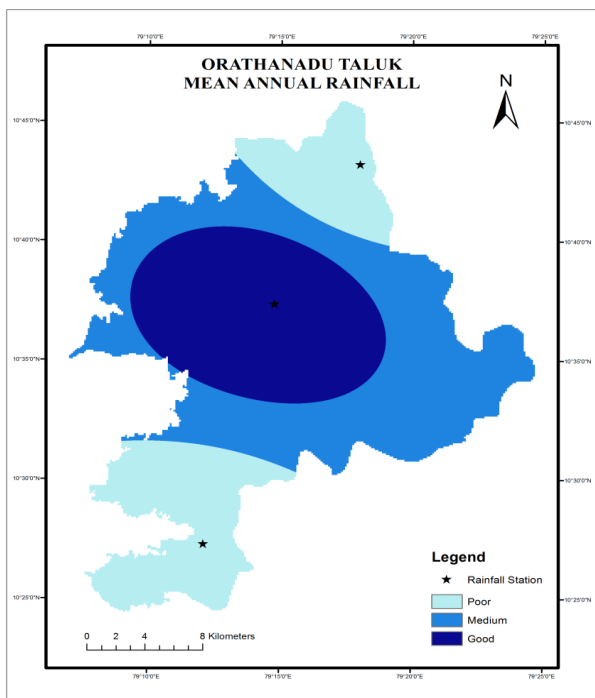


Figure 3: Mean annual rainfall

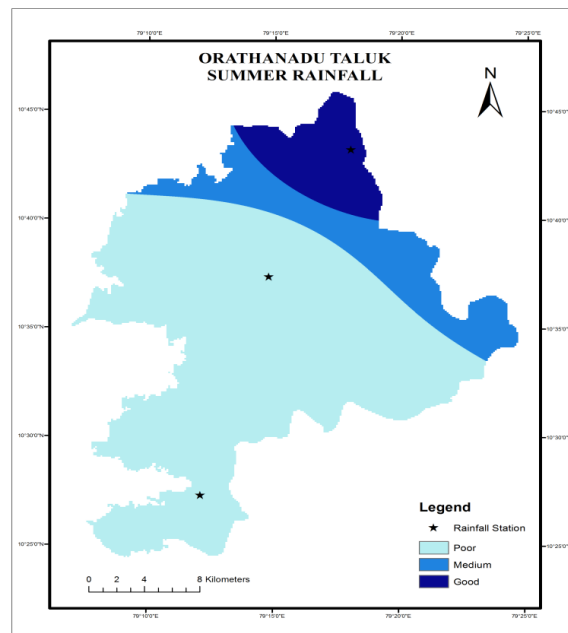


Figure 5: Image showing rainfall in summer

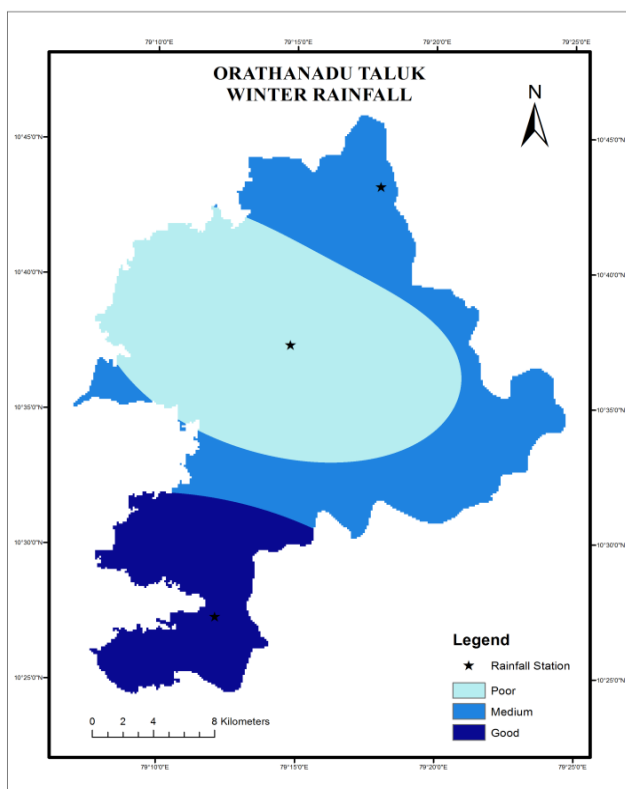


Figure 4: Image showing rainfall in winter

a) Observations Seasonal Rainfall In-2000

Orathanadu taluk received a total annual rainfall of 628.6 mm during the year of 2000. In this year 2000 the highest rainfall of 552.9mm in summer (Mar – May) season and the lowest rainfall of 75.7mm in winter (Jan-Feb) season was recorded in this taluk. During the winter season Orathanadu taluk recorded an average rainfall of 25 mm. During this season the highest rainfall of 50 mm was recorded in Vettikkadu rain gauge station and the lowest rainfall of 37mm was recorded in Orathanadu rain gauge station in this taluk. During the summer season Orathanadu taluk recorded an average rainfall of 184 mm. During this season the highest rainfall of 287.2 mm was recorded in Vettikkadu rain gauge station and the lowest rainfall of 54.7mm was recorded in Neivasal rain gauge station in this taluk.

b) Observation Seasonal Rainfall In -2001

Orathanadu taluk received a total annual rainfall of 446.9mm. During the year of 2001. In this year 2001 the highest rainfall of 421.2 mm in summer (Mar-May) season and the lowest rainfall of 25.7 mm in winter (Jan-Feb) season was recorded in this taluk.

During the winter season Orathanadu taluk recorded an average rainfall of 9 mm. During this season the highest rainfall of 17.7 mm was recorded in Neivasal rain gauge station and the lowest rainfall of 0 mm was recorded in Vettikkadu rain gauge station in this taluk. In the summer season Orathanadu taluk recorded an average rainfall of 140 mm. During this season the highest rainfall of 196 mm was recorded in Orathanadu rain gauge station and the lowest rainfall of 109 mm was recorded in Vettikkadu rain gauge station in this taluk.

c) Observation Seasonal Rainfall In -2002

Orathanadu taluk received a total annual rainfall of 1444 mm. During the year of 2002. In this year 2002 the highest rainfall of 1180 mm in Winter (Jan-Feb) season and the lowest rainfall of 264 mm in summer season (Mar –may) season was recorded in this taluk. During the winter season

Orathanadu taluk recorded an average rainfall of 393 mm. During this season the highest rainfall of 431 mm was recorded in Vettikkadu rain gauge station and the lowest rainfall of 364 mm was recorded in Orathanadu rain gauge station in this taluk.

In the summer season Orathanadu taluk recorded an average rainfall of 140 mm. During this season the highest rainfall of 196 mm was recorded in Orathanadu rain gauge station and the lowest rainfall of 109 mm was recorded in Vettikkadu rain gauge station in this taluk.

Table 1: Seasonal Rainfall in - 2000 To 2009

Years	STATION NAME						Annual
	Vettikkadu		Orathanadu		Neivasal		
	winter	summer	winter	summer	Winter	Summer	
2000	50	211	3.7	287.2	22	54.7	628.6
2001	0.0	109	8.0	196	17.7	116.2	446.9
2002	431	116.4	364	85.0	385	62.2	1443.6
2003	0.0	70	0.0	56	0.0	36	162
2004	0.0	432.8	0.0	623	0.0	661.3	1717.1
2005	0.0	258	0.0	164	11.8	139	572.8
2006	0.0	128	0.0	214	0.0	103	445
2007	1	95	8	188	0.0	108	400
2008	30	171	2.6	234.3	24	94.7	556.6
2009	0.0	432.8	0.0	623	0.0	661.3	1717.1
Total	512	2024	386.3	2670.5	460.5	2036.4	8089.7
Mean	51.2	202.4	38.63	267.05	46.05	203.64	808.97

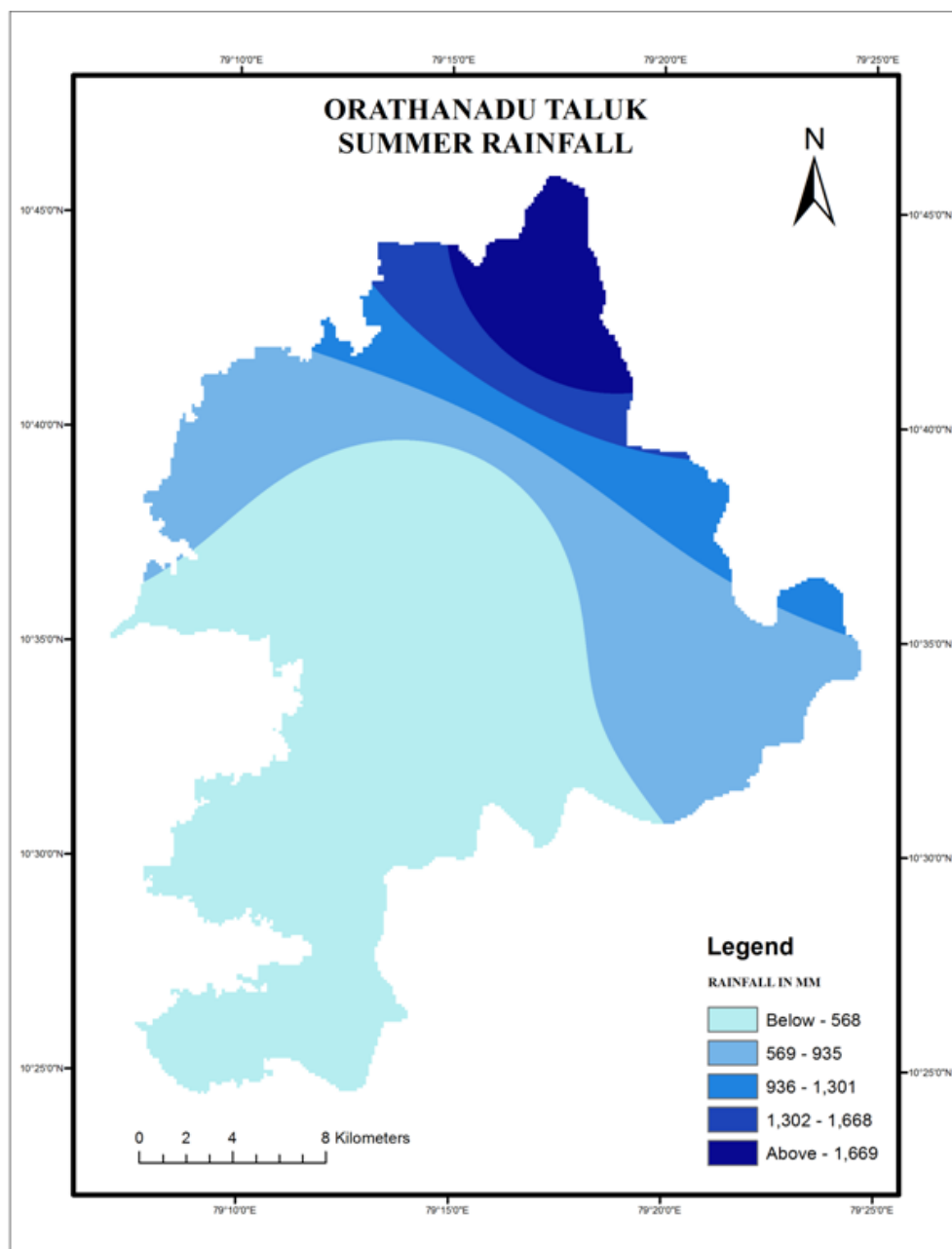


Figure 6: Summer Monsoon Rainfall

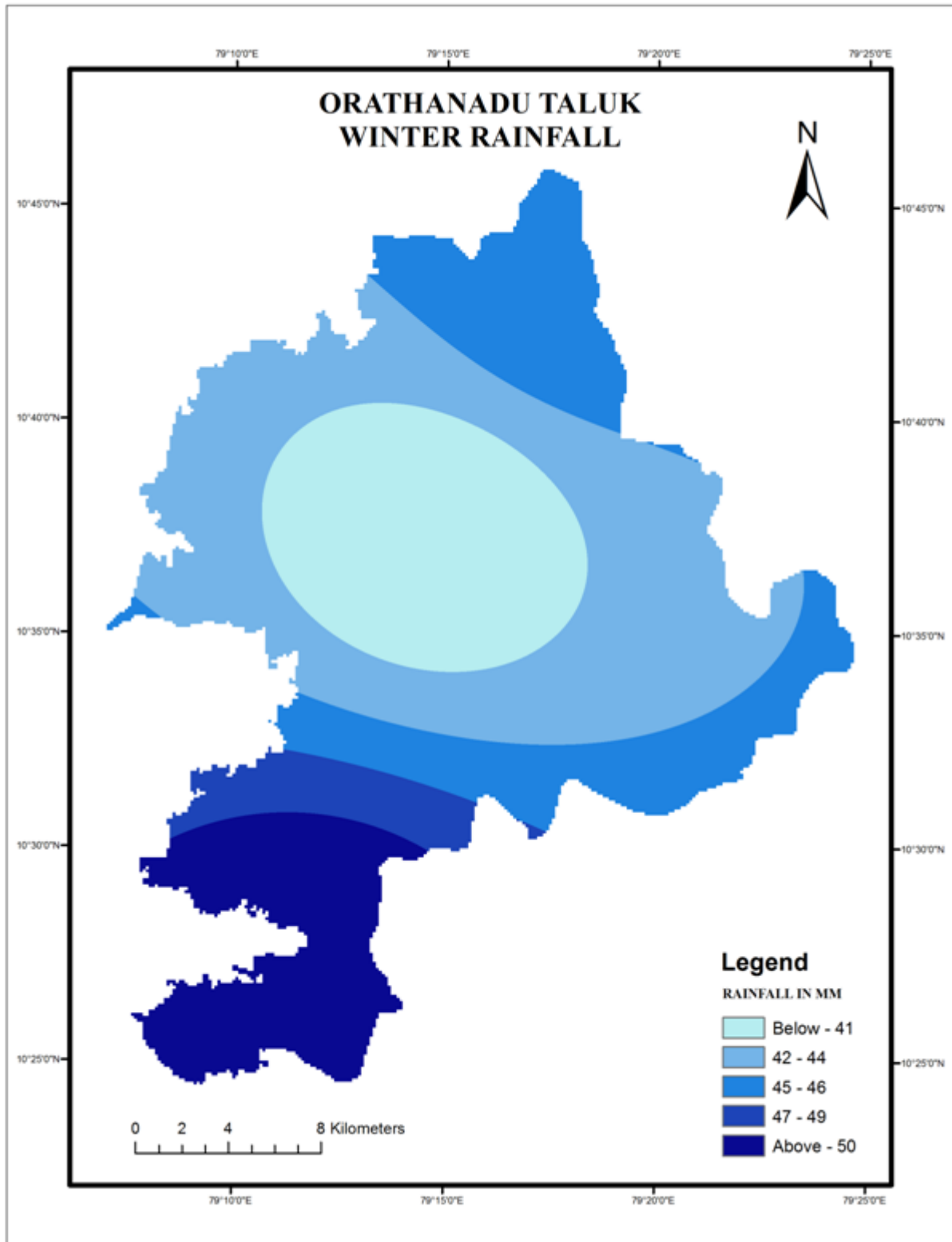


Figure 7: Winter Monsoon Rainfall

Observation Seasonal Rainfall In - 2003

Orathanadu taluk received a total annual rainfall of 162 mm. During the year of 2003. In this year 2003 the highest rainfall of 162 mm in summer season (Mar-May) and the lowest rainfall of 0 mm in winter season (Jan- Feb) season were recorded in this taluk. In the winter season Neivasal rain gauge station, Orathanadu rain gauge station and Vettikkadu rain gauge station rainfall is absent. During the summer season Neivasal rain gauge station, Orathanadu rain

gauge station and Vettikkadu rain gauge station rainfall is absent.

d) Observation Seasonal Rainfall In - 2004

Orathanadu taluk received a total annual rainfall of 1717.1 mm. During the year of 2004. In this year 2004 the highest rainfall of 1717.7 mm in summer (Mar-May) season and the lowest rainfall of 0 mm in winter (Jan-Feb) season were recorded in Orathanadu taluk. During the winter season Orathanadu taluk recorded an average rainfall of 0 mm.

During this season the highest rainfall of 0mm was recorded in Orathanadu taluk. In the summer season Orathanadu taluk recorded an average rainfall of 572 mm. During this season the highest rainfall of 661.3 mm was recorded in Neivasal rain gauge station and the lowest rainfall of 432 mm was recorded in Vettikkadu rain gauge station.

e) Observation Season Rainfall In -2005

Orathanadu taluk received a total annual rainfall of 573 mm. During the year of 2005. In this year 2005 the highest rainfall of 561 mm in summer (Mar- May) season and the lowest rainfall of 12 mm in winter (Jan-Feb) season were recorded in this taluk. During the winter season Orathanadu taluk recorded an average rainfall of 4 mm. During this season the highest rainfall of 100 mm was recorded in Neivasal rain gauge station and the lowest rainfall of 0 mm was recorded in Vettikkadu rain gauge station in this taluk.

In the summer season Orathanadu taluk recorded an average rainfall of 187 mm. During this season the highest rainfall of 258 mm was recorded in Orathanadu rain gauge station and the lowest rainfall of 139 mm was recorded in Neivasal rain gauge station in Orathanadu taluk.

f) Observation Season Rainfall In -2006

Orathanadu taluk received a total annual rainfall of 445 mm. During the year of 2006. In this year 2006 the highest rainfall of 445 mm in summer (Mar-May) season and the lowest rainfall of 0 mm in winter season (Jan -Feb). In the winter season Orathanadu taluk recorded an average rainfall of 0 mm. During the summer season Orathanadu taluk recorded an average rainfall of 148 mm. During this season the highest rainfall of 214 mm was recorded in Orathanadu rain gauge station and the lowest rainfall of 103 mm was recorded in Neivasal rain gauge station in Orathanadu taluk.

g) Observation Season Rainfall In -2007

Orathanadu taluk received an total annual rainfall of 400 mm. During the year of 2007. In this year 2007 the highest rainfall of 391 mm in summer (Mar-May) season and the lowest rainfall of 9 mm in winter (Jan-Feb) season were recorded in Orathanadu taluk.

During the winter season Orathanadu taluk recorded an average rainfall of 3 mm. During this season the highest rainfall of 8 mm was recorded in Orathanadu rain gauge station and the lowest rainfall of 1 mm in Vettikkadu rain gauge station.

During the summer season Orathanadu taluk recorded an average rainfall of 130 mm. During this season the highest rainfall of 188 mm was recorded in Neivasal rain gauge station and the lowest rainfall of 95 mm was recorded in Vettikkadu rain gauge station.

h) Observation Season Rainfall in -2008

Orathanadu taluk received a total annual rainfall of 556.6 mm. During the year of 2008. In this year 2008 the highest rainfall of 500 mm in summer (Mar-May) season and the lowest rainfall of 56.6 mm in winter (Jan-Feb) season were recorded in Orathanadu taluk. During the winter season Orathanadu taluk recorded an average rainfall of 19 mm. During this season the highest rainfall of 30 mm was

recorded in Vettikkadu rain gauge station and the lowest rainfall of 2.6 mm in Orathanadu rain gauge station.

In the summer season Orathanadu taluk recorded an average rainfall of 167 mm. During this season the highest rainfall of 234.3 mm was recorded in Neivasal rain gauge station and the lowest rainfall of 94.7 mm was recorded in Vettikkadu rain gauge station.

i) Observation Season Rainfall in -2009

Orathanadu taluk received a total annual rainfall of 1717.1 mm. During the year of 2009. In this year 2009 the highest rainfall of 1717.1 mm in summer (Mar-May) season and the lowest rainfall of 0 mm in winter (Jan-Feb) season were recorded in this taluk. During the summer season Orathanadu taluk recorded an average rainfall of 4 mm. During this season the highest rainfall of 661.3 mm was recorded in Neivasal rain gauge station and the lowest rainfall of 432.8 mm was recorded in Vettikkadu rain gauge station in this taluk. During the winter season Neivasal rain gauge station, Orathanadu rain gauge station and Vettikkadu rain gauge station rainfall is absent.

6. Summary and Conclusion

This project work has been done with the data collected from Orathanadu taluk, Thanjavur district and the nearest places. The data gathered for the years 2000-2009. There are slight variations. The graphical representations are used to differentiate the changes like Increase and Decrease. The comparison diagram is drawn by using GIS. This work can be carried out further with more data from different places. This study is mainly based on agriculture, which is affected in a major way by rainfall changes. Orathanadu taluks is located in the Eastern part of Thanjavur district in TamilNadu. The winter season (Jan- Feb) summer season (Mar-May) and Rainfall changes are analyzed. Two sets of data have been taken (2000 and 2009).

The three sets of rainfall stations are Neivasal, Orathanadu and vettikadu. In 2000 Neivasal received 199 mm the minimum rainfall of south west monsoon rainfall whereas Orathanadu and vettikadu received 505 mm the maximum rainfall and 302 mm respectively, during this period. In 2000 Neivasal received 979 mm of North East monsoon rainfall whereas Orathanadu and vettikadu received 1594 mm the maximum rainfall and 919 mm minimum rainfall respectively, during this period. In 2000 Winter season Neivasal received 22 mm, Orathanadu received 3.7 mm the minimum rainfall and vettikadu 50 mm the maximum rainfall. In 2000 summer season Neivasal received 54.7 mm the minimum rainfall, Orathanadu received 287.2 mm the maximum rainfall and vettikadu received 211 mm rainfall. In 2009, winter rainfall and summer rainfall received by Neivasal was 24 mm the minimum of the season and 94.7 the maximum of the summer rainfall respectively. In 2009 Orathanadu received 234.3 mm the maximum of summer rainfall 2.6 mm the minimum of winter rainfall. Orathanadu Taluk has received a total annual rainfall of 628.6 mm in 2000. The maximum rainfall of 552.6 mm was received during the summer season (Oct -Dec) and the minimum rainfall of 75.7 mm was received during 2000 winter (Jan-Feb).

As a whole, Orathanadu taluk has received a total annual rainfall of 5127 mm in 2002. The maximum rainfall of 431 mm was received during the winter season (Jan- Feb) and the minimum rainfall of 62.2 mm was received during 2002.

The variations in the rainfall is in certain in 2000 to 2005 places it had been greater and it had been lesser in 2005 to 2009 and vice versa is due to human activities like deforestation emission of vehicular, smoke, industrial smoke etc. Affecting the eco-system hereby altering the onset of monsoon rains and global warming also has its say in these fluctuations. The El-Nino and La-nino phenomenon affects the climate and rainfall globally and these have their effects in the study area also.

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