

## Decade versus Decade Rainfall Trend Analysis in Nagapattinam Coastal Zone, South India, Tamilnadu

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### Abstract

*The present study involves intensive rainfall data assessment of the Nagapattinam district during 1951-2010 using graphical statistical method. The six decade rainfall data amount was made in general and correlated among the data as 1951-61, 1961-71, 1971-81, 1981-91, 1991-2001 and 2001-2010. The above correlation reveals that similarity during the period. Even so, the clear deviation of rainfall pattern was noticed in the last one decade. In 2001-10, the rainfall has not followed a regular pattern of sinusoidal array, and it is greatly disturbed by the complicated climate system.*

**Key words:** Rainfall, Decadal interrelations, Cyclones.

### 1. Introduction

The monsoons and cyclones have been affected the coastal areas greatly. In Tamil Nadu, Nagapattinam coast is one of the dynamic and frequently affected by the cyclones in recent years. Cyclones brought up heavy rainfall in very high intensity: it was repeatedly reported in Nagapattinam at last decade. This paper discusses the rainfall trends in past six decades and the correlation with the past decades.

Seetharam (2013) studied the rainfall regime and pattern in past and future trends in the rainfall pattern for the drought monitoring and management. Venkatraman et al., (2013) have studied the Rainfall of Dindigul district and reveals the variation in the trends. The rainfall distribution and trend for salem district were analysed in Gurugnanam et al., (2010), and they have used the GIS tool to map the spatial distribution of rainfall. The result shows the variation with the amount of precipitation in the particular domain.

As the rainfall trends of Tamil Nadu has been studied by many authors, the influence of climate change on precipitation pattern in last 50 years has studied, and the domain characterizations were done by Suhatharahima et al., (2013). The rainfall history had utilized to define climate change in Coloroda by Mckee et al.,(1993) and also Parthasarathy et al., (1993) studied homogenous Indian Monsoon rainfall series over the period 1971-1990. Iwashima et al., 1993; Karl et al., 1995; Mason et al., 1999 have revealed the importance of rainfall study and they had used daily rainfall and extreme rainfall records to investigate changes in the frequency of extreme rainfall.

### 2. Data and Methodology

The rainfall data have collected from Department of Economics and Statistics, Chennai. The mean annual rainfall has analysed graphically, and the rainfalls received in the past decades have correlated with each other. The trends of the rainfall data were taken into Excel for each decade has represented and analysed by a graphical and statistical method.

### 3. Result and Discussion

In the last decade (2001-10) (Fig.1), the temporal distribution of rainfall has been fluctuated greatly and the minimum rainfall (717.3 mm) reported in 2002, and the maximum rainfall (1400mm) has reported in 2005. The amount of the rainfall shows the wet and dry periods. During the year 2001-10, Nagapattinam, coastal region was attacked by cyclones often and rainfall crossed average level. In 2003 to 2005 and 2007 to 2011 the rainfall amount reached higher level. (Fig.1)

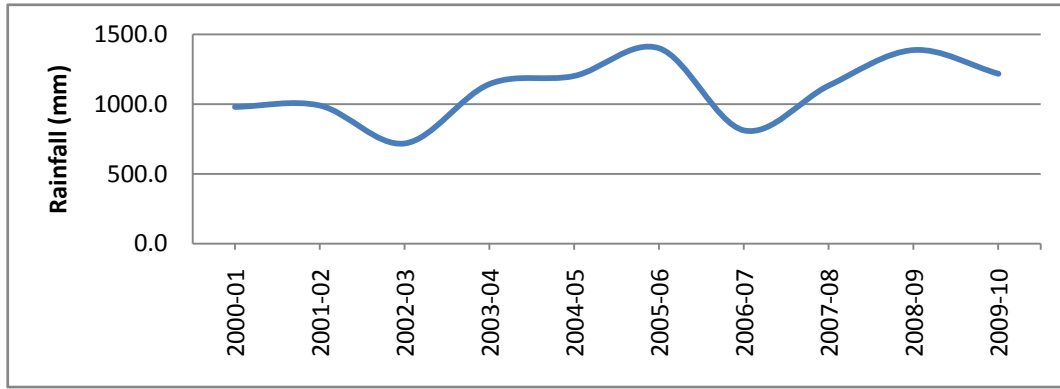


Fig.1.Rainfall in 2001-10

**3.1. Decadal analysis of rainfall**

Rainfall data from 1951 to 2010 years have analysed in this study. The rainfall amounts have analysed as individual decades and those values are compared decade to decade, and the trends also studied (Fig.2). The correlation of each decade has made and the findings have listed below.

From fig.2., among six decades, the fourth decade (1980-90) brought out huge amount of rainfall, reaches up to 1818 mm. Subsequently, the rainfall pattern of all decades similarly fluctuated and among those years, the least amount reported (368 mm) in the middle of the 1951-60. But, the trend of the rainfall in 2001-10, has not shown the historic resemblance, as it compared to 1950 to 2000. In this decade, the annual mean precipitation has reached the maximum amount (1201 mm) in the year of 2006. The trend of the last ten years has varied from the past decades. In all decades except 2001-10, the rainfall followed a sinusoidal pattern that the precipitation has upraised and fell down every time.

But in last decade, the rainfall pattern has been deviating from the historical records during the period 2003-2010. The rainfall pattern of 2001-10 has reached a maximum amount in 2003- 2006 and stabilized with the normal precipitation level (811 mm) in other years. In 2001-10, the rainfall trend has not followed a regular pattern and the cyclones have reported repeatedly in Nagapattinam coast. Because the coastal climate system is the most complicated system, which brings hurricanes, storms, Cyclones, monsoon and several natural disaster phenomenon.

**3.2. Trends of the Rainfall**

The linear trend lines have interpreted from the rainfall patterns (Fig.3). In 1951-60 the rainfall trend followed a lower level and this is the least level of precipitation in the six decades, but the trend line shown ascending pattern. Rainfall of 1971-80 and 1991-2000 has also shown upraised trends. The trends of 1961-70 and 1981-90 have decreased and the rainfall reaches minimum level. The trend of 2001-10, is an escalating design and it reached the highest level. This decade has greatly influenced by the cyclones and delayed monsoonal effects.

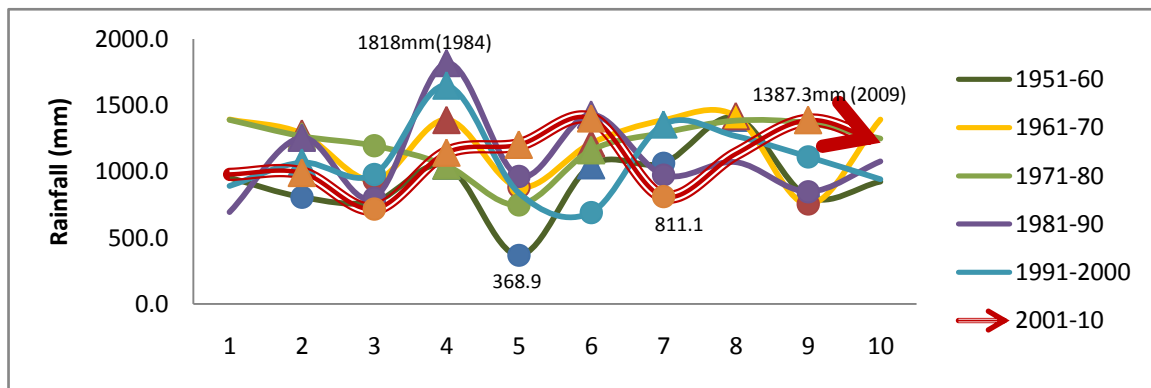


Fig.2.Rainfall in 1951 - 2010

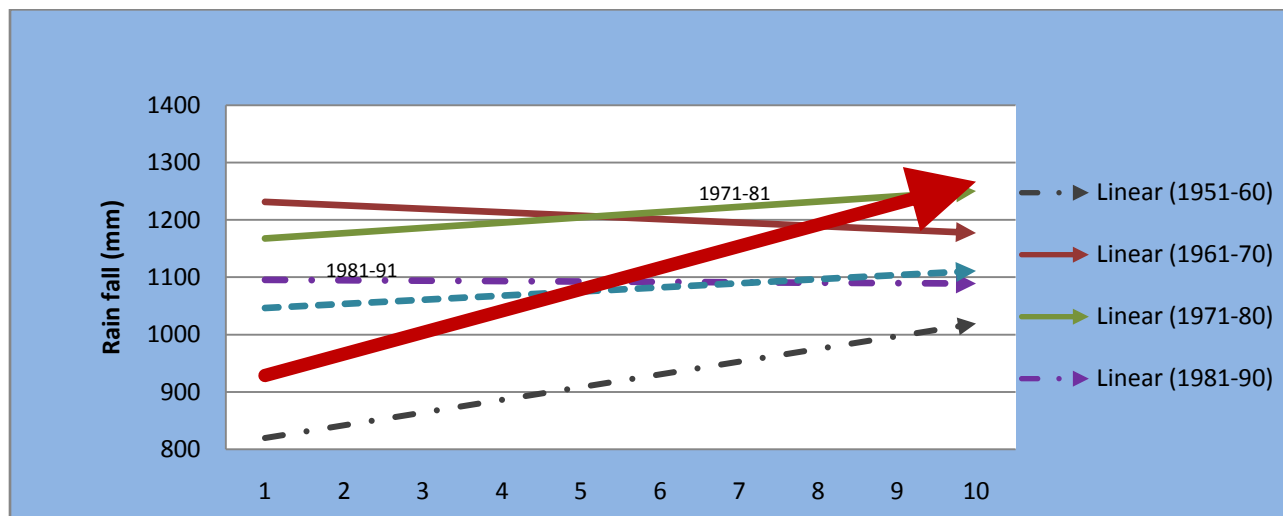


Fig.3.Rainfall Trends lines

#### 4. Summary & Conclusion

The rainfall data were analysed graphically and found out the rainfall variations in last six decades. This paper reveals the uniform trend of rainfall in 1951-2000 and the rainfall trend of 2001- 2010 deviated from the uniform sinusoidal fluctuation. The result of the paper that the climate of the coastal environment controls the rainfall pattern in the study area and it may increase in future.

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