



Trend Analysis of Rainfall of Junagadh District

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ABSTRACT

Rainfall studies are of utmost utility for understanding nature & hence the behavior of climate changes. Time series is a set of observations taken at specified times usually at equal interval. Thus a set of data depending on time is called a Time series. Here, Rainfall series represent the time series. The time series analysis is helpful to compare the actual performance and analyze the cause of variations. By comparing different time series we can draw important conclusion. | There are many types of Trends, the series may be increasing or decreasing at various rate. These variables are observed over a long period of time and any changes related to time or noted and calculated and a Trend of these changes is established. Some remain relatively constant and reverse from growth to decline or from decline to growth over a period of time. | In the present study secular changes in the annual rainfall of rain gauge stations of Junagadh for the period of 25 years from 1985–2011 in India have been studied. We present test to detect the best suitable trend for the rainfall time series. |

Keywords : Time Series, Trend, Variations, Precipitation, Rainfall pattern.

INTRODUCTION

Today, Changing precipitation pattern, and its impact on surface water resources, is an important climatic problem facing society. Associated with global warming, there is strong indication that rainfall changes are already taking place on both the global and regional scales. Variation in the monsoon rainfall has both social and political impact as in India, agriculture largely depends on rain. For observed data that exhibit high seasonality, methods to analyze trends should be those that incorporate the seasonal component. Spatial differences in trends can occur as a result of spatial differences in the changes in rainfall and temperature and spatial differences in the catchment characteristics that translate meteorological inputs into hydrological response (Burn and Elnur, 2002).

Trend is present when a time series exhibits steady upward growth or a downward decline, at least over successive time periods. Trend may be loosely defined as "long-term change in the mean level", but there is no fully satisfactory mathematical definition. But trend analysis helps in finding 'forecasting'. The base of scientific forecasting is statistics.

Trend analysis was carried out to examine the long term trends in rainfall over different subdivisions. The rainfall trend is very crucial for the economic development and hydrological planning for the country.

II. Details of Data and Processing

The study area covers various meteorological sub divisions of Junagadh district. From different rain gauge stations for the period 1985-2011, we have considered Junagadh district for the present analysis. The district rainfall is calculated as the arithmetic average of rainfall data of stations. Thus the rainfall data series is constructed as spatially and temporally homogeneous.

Rainfall is a key input and any change in this variable can influence on sustainable management of water resources, agriculture and ecosystems. In Junagadh mainly water supply is done based Determining trend of rainfall (especially)

will be useful for better water management in the study area. The Rainfall data are given in table 1.

TABLE - 1
Average Annual Rainfall Data

AVG. ANNUAL RAINFALL DATA FROM 1991 TO 2011					
SR. NO.	YEAR	RAINFALL IN MM	SR. NO.	YEAR	RAINFALL IN MM
1	1985	409	15	1999	428
2	1986	747	16	2000	472
3	1987	178	17	2001	785
4	1988	1402	18	2002	400
5	1989	802	19	2003	941
6	1990	536	20	2004	1008
7	1991	358	21	2005	974
8	1992	731	22	2006	1008
9	1993	467	23	2007	1592
10	1994	1093	24	2008	1131
11	1995	731	25	2009	1167
12	1996	764	26	2010	1535
13	1997	750	27	2011	1067
14	1998	1029			

III. Trend Analysis

The mean of annual rainfall is done manually as shown in table to know the average annual rainfall rate. The annual rainfall series of rain gauge stations of Junagadh were tested for the presence of trends by 'Least squares' method.

A. Least Square Method

The least square method is used to identify the trends in rainfall pattern using conventional approach. The graph of rainfall data from 1985 to 2011 A.D. of Junagadh district is shown in

figure-1 which variation in rainfall yearly.

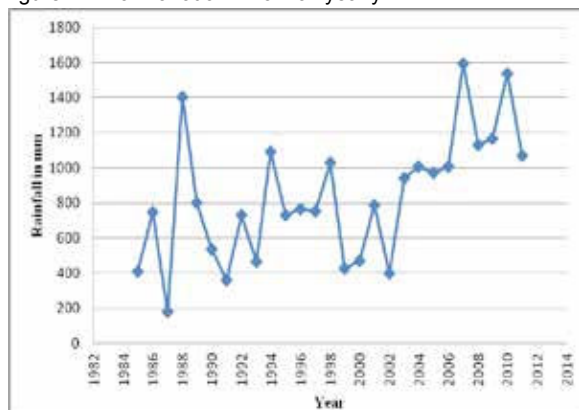


FIGURE- I
RAINFALL DATA FROM 1985-2011

Now, to modify the conventional approach of trend analysis, the data is broke into various windows. Each window is then taken as a separate data set and analyzed for the behavior of trend. These trends are then used for extrapolation/forecasting purposes. In the present study a window size of 5 yrs is used. By breaking the data into 5 years packages there is a difference in trend calculations. This trend shows vari-

ation based on rainfall rate every year. The Graph of trends observed in rainfall pattern of Junagadh is shown below in

Figure-2.

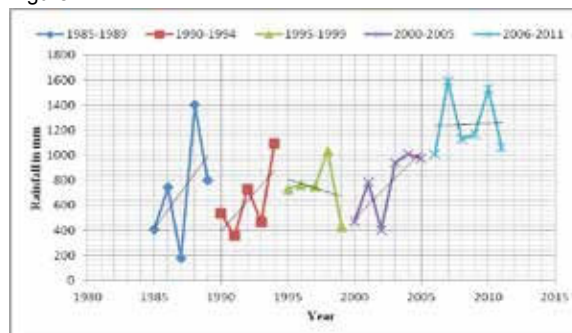


FIGURE- Rainfall Data Showing trend

IV. Conclusion
Here, trend analysis is done for analyzing rainfall pattern by least square method which gives accurate understanding of rainfall pattern. The sequence of period 1985-1989, 1990-1994, 2000-2005 shows increasing trend & 1995-1999 shows decreasing trend. The sequence of period 2006-2011 shows major variations in trend. Compare to previous years rainfall rate has tremendously increased since 2005.

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