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Trend Study of Meteorological Parameters for the Selected Site in Southern Zone of Tamilnadu

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Abstract

The meteorological parameters information is useful for the future climatic conditions and agriculture problems. The study was carried out to examine the trend of important weather parameters and their effect on the south zone of Tamil Nadu. Yearly long trend has been identified for the eleven years of data. There are both increasing and decreasing trends of meteorological parameters obtained by least square method, suggesting over all significant change in the study location. The result shows that the air temperature has a increasing trend and relative humidity is in the decreasing trend which shows the inverse relation between them. However, apart from the weather parameters used for this study definitely have a role in understanding climatic change.

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Key words*: Air Temperature, Relative Humidity, Trend analysis, meteorological parameters*

1. INTRODUCTION

Climate change generally refers to any change in climate over the time caused naturally or by anthropogenic responses. The climate change and its extensive variability

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due to anthropogenic impacts have got a special attention by (IPCC, 2001). In another sense, climate change means the shifting of climatic or meteorological parameters viz. precipitation, maximum temperature, minimum temperature, solar radiation, relative humidity, wind speed etc. and many other factors whereas global warming or cooling which refers the changes of the surface temperature (Back and Bretherton, 2005). Temperature variations play a major role in climate variability, as such the need to continue to monitor the trends of temperature even in locations where temperature pattern has been established is necessary. Climate Change has been a focus of research due to the fact that the consequences of the impact of Climate Change affect human activities and the natural environment significantly, resulting in have all over the world (Oyewole 2015, Zoellick 2009). The relation between man and climate is reciprocal in the sense that man responds to variation in climate by insulating buildings, heating and air-conditioning. Man's aim is to be comfortable despite the climate, and this gives rise to the notion of thermal comfort. Thermal comfort has been studied since the start of 20^{th} century, and improvements in building techniques, as well as discoveries in central heating and air conditioning systems have led to improved comfort in indoors, even in the hottest and coldest climates (Brager and de Dear, 1998). With global increase in temperature, especially from the 1960s and the tendency for further warming (Le Treutet al., 2007), as well as the concern for the increased urbanization in developing countries, concerns for thermal comfort have become important in the programme of the World Meteorological Organization (WMO) (Jauregui, 1997). Relative humidity (RH) is the ratio of the partial pressure of water vapor to the equilibrium vapor pressure of water at a given temperature. Relative humidity depends on temperature and the pressure of the system of interest. The same amount of water vapor results in higher relative humidity in cool air than warm air. Climatic change is affecting the temperature as well as rain fall patterns in the densely populated regions that would have enormous significance for live hood and well of the region. Climate change will have environmental and social impact that will likely increase uncertainty in water supplies and agriculture production for people across India. The cascading effects of raising temperature are already affecting water availability, biodiversity, ecosystem boundaries, and global feed backs (Amin et al 2004). The aim of this study is thus to provide figure as well as average curves for the main meteorological parameters and identify possible relationship between temperature and humidity.

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2. METHODOLOGY

2.1 **Study Area**

The first experimental site belongs to Western Ghats is the Horticultural Research Station , Pechiparai is located in Vilavancode Taluk of Kanyakumari District. The hill region of the district lies 35 km away from the coast and spreads from the east to the west. This site is situated in the natural surroundings at the foot hills of Western Ghats about 10 km away from Kulasekharam, 23 km from Marthandam, 45 km from Nagercoil and 75 km from Trivandrum. It is situated on the bank of Pechiparai main canal about 1.5 km away from the Pechiparai dam. The study area is geographically situated at 8.08°N and 77.57°E with an altitude of 76 m above MSL. The next experimental site is geographically situated at 8˚46 North latitude and 77˚4 East longitude with an altitude of 40 m above MSL. The mean annual rainfall of the farm is 736.7 mm which is being received in 40 rainy days. The Research Institute farm has a total extent of 480 hectares comprising red laterite of sandy soil. Thamiraparani river flows towards the region providing the water resource for irrigation other than rainfall

2.2 Method of Least Squares

Method of least squares is the mathematical method and with its help a trend line is fitted to the data in such a manner that the following two conditions are satisfied.

(1) The sum of deviation of the actual values of Y and the computed values of Y_c is zero.

$$\sum (Y - Y_c) = 0 \text{ ---------- (1)}$$

(2) The sum of the squares of the deviation of the actual and computed values is least.

$$\sum (Y - Y_c)^2 = \text{least value ---------- (2)}$$

From this line and hence the name is given as method of least squares. The line obtained by this method is known as the “line of best fit”. The method of least squares may be used either to fit a straight line trend or a parabolic trend. The straight line trend is represented by the equation is,

$$Y_c = a + bx \text{ ---------- (3)}$$

Where,

Y_c → Trend values
a → Y intercept
b → Slope of the trend line

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x → Variable in time series analysis

In order to determine the values of the constants, **a** and **b** the following two normal equations are to be solved.

$$\sum Y = na + b\sum x \quad \text{---------- (4)}$$

$$\sum XY = a\sum X + b\sum x^2 \quad \text{---------- (5)}$$

Where,

n → Number of years or months for which data are given

The arithmetic straight line trend fitted by the method of least squares is the most widely applied trend curve. This particular trend curve is applicable for those series in which period to period changes are constant in absolute amount. If increase in one set of data causes the other set to increase, then the trend shown is called as a positive trend. If increase in one set of data decrease the other set then the trend is called as a negative trend. In this work the trend analysis is analyzed using the method of least squares.

3. RESULT AND DISCUSSION

One of the most important tasks before analysis is to make estimate for the future. The first step in making estimates for the future consists of gathering information from the past. In this connection we use with statistical data which are collected, observed or recorded at successive intervals of time. Such datas are generally referred to as 'Time Series'. The trend variation of Relative Humidity and Air Temperature for the selected regions were calculated and discussed here.

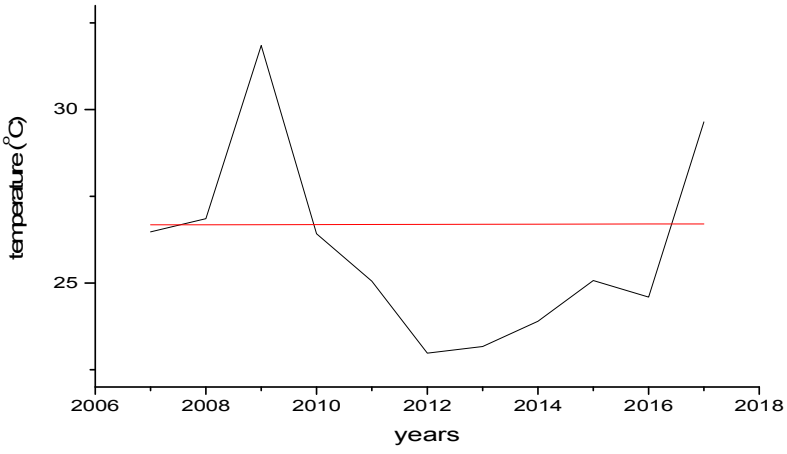

Fig (1) Trend of Air Temperature in region I

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Figure 1 shows the annual mean Air Temperature 2007-2017 in the region I. Based on the 11 years data the Air temperature increases from 2008-2010. After 2010 it goes on decreasing to the year 2012.After that it increases up to 2016 than it get rapid increment in the year 2017. The trend line shows the positive value. The air temperature values ranges from31.85ºC to 22.98ºC.

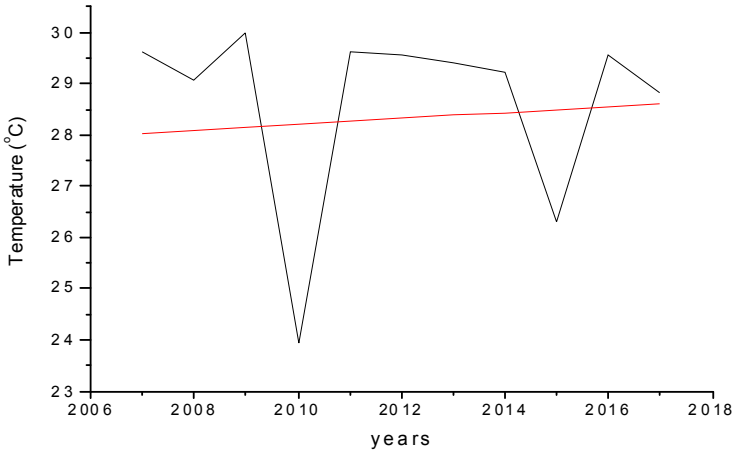

Fig (2) Trend of Air Temperature in region II

Figure 2 revealed that annual mean air temperature during the study period varied from 19.33°C to 29.98°C.The lowest mean air temperature (19.33°C) was recorded in the year 2010 and the highest mean air temperature recorded in the year 2009 .The positive trend was observed in annual analysis for air temperature under study period.

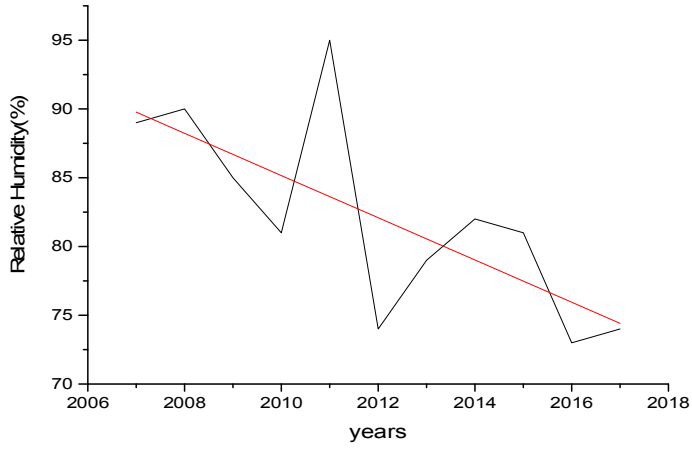

Fig (3) Trend of Relative Humidity in region I

Figure 3 shows the annual variation of relative humidity the study varied between 73%which was recorded in the year 2016 to 95% which was recorded in the year

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2011.This indicates the humidity was more in the year 2011(95%) and less in the year 2016 (73%).The negative trend was observed

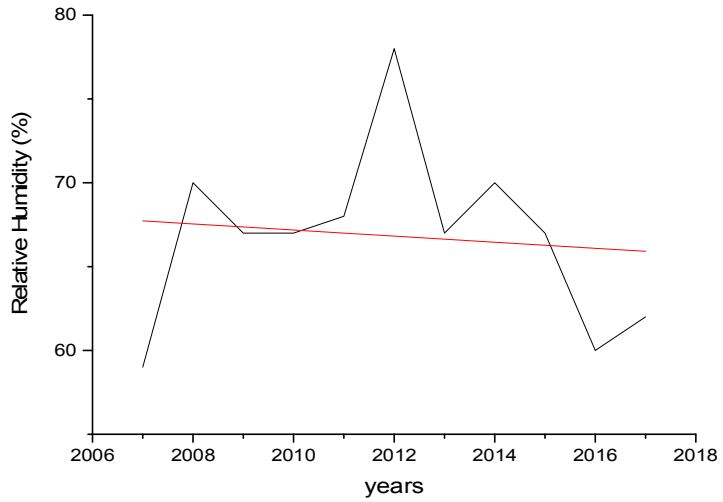

Fig (4) Trend of Relative Humidity in region I

Figure 4 presents the variation of the relative humidity in the study area. The ups and down in the graph shows the maximum value of relative humidity occurred in the year 2012 (78%) and minimum value of relative humidity occurred in the year 2007(59%).Also the graph shows the negative trend in the region II

4. CONCLUSION

In the present study the variation of climatic parameters have been investigated at the Southern zone of Tamil Nadu. The least square method test represents both positive and negative long term meteorological trends in the study area. The relative humidity is a response for the rising temperature in the study area. The analysis shows significant trend of the selected weather parameters over time during the study period under study as perceived that temperature has increasing trend and relative humidity has decreasing trend region II. From the analysis the air temperature value is higher in overall, the study suggests the change in weather parameters, which are influencing the climatic change.

5. REFERENCES

1. Amin, MGM, Ali, MH, Islam AKMR 2004, ‘ Agro Climatic analysis for crop planning in Bangladesh’, Bangladesh J.Agri Engg, vol. 15, no.1&2, pp.1-40.

ISSN:0971-1260
Vol-22-Issue-4-October-December-2019

2. Back LE, and Bretherton, CS 2004, ' The relationship between wind speed and precipitation in the pacific Itcz', Department of Atmospheric Sciences University of Washington, Seattle Journal of Climate, vol. 18, pp.4317 – 4328**.**

3. Brager GS, de Dear RJ. 1998. Thermal adaptation in the built environment: a literature review. Energy Buildings27: 83 – 96.
4. IPCC 2001, Third assessment report, The Scientific Basis, Vo1.1, Cambridge University Press.
5. Jauregui E. 1997. The last Ms for 40thanniversary issue. Aspects of urban human biometeorology.Int. J. Biometeorol.40: 58 – 61.
6. Le Treut H, Somerville R, Cubasch U, Ding Y, Mauritzen C, MokssitA, Peterson T, Prather M, Qin D, Manning M, Chen Z, Marquis M,Averyt KB, Tignor M. 2007. Historical overview of climate change.Earth1: 93 – 127.
7. Oyewole CI. Climate Change: Mitigating Effects of Climate Change by Evolving Sustainable Agricultural System in Nigeria. Int J Sci 2015; 4(6).
8. Zoellick RB. A Climate Smart Future, The Nation Newspapers. Lagos, Nigeria: Vintage Press Limited 2009; p. 18.