

Vol 5 Issue 10 July 2016

ISSN No : 2249-894X

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*Monthly Multidisciplinary  
Research Journal*

*Review Of  
Research Journal*

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# Review Of Research



## HYDROMETEOROLOGICAL CONDITIONS OF THE ARKAVATHY CATCHMENT AREA

Rekha H. V

Guest Teaching Faculty , Centre for Geoinformatics ,  
DOS in Geography, MGM, UOM , Mysuru.

### ABSTRACT:

**H**ydro meteorological study deals with the interconnection between the meteorological influences and hydrology. Meteorology deals with temperature, humidity, evaporation, wind speed, sunshine and so on. Studying the hydro-meteorological conditions of the area



enlightens us with complete information about both past and present.

**KEY WORDS:** EHydro meteorological , Arkavathy Catchment area, Data Collection .

### LOCATION OF THE STUDY AREA

The Arkavathy is a tributary which flows through Banga-

lore Urban and Bangalore Rural in the general direction from north to south. The Arkavathy Catchment lies between latitudes 12° 55' 44.505" N and 13° 22' 47.346" N and longitudes 77° 19' 26.11" E and 77° 41' 16.047" E. cover the area of 987.58 km<sup>2</sup>.

**Objective** To identify the hydro-meteorological conditions of the Arkavathy Catchment area

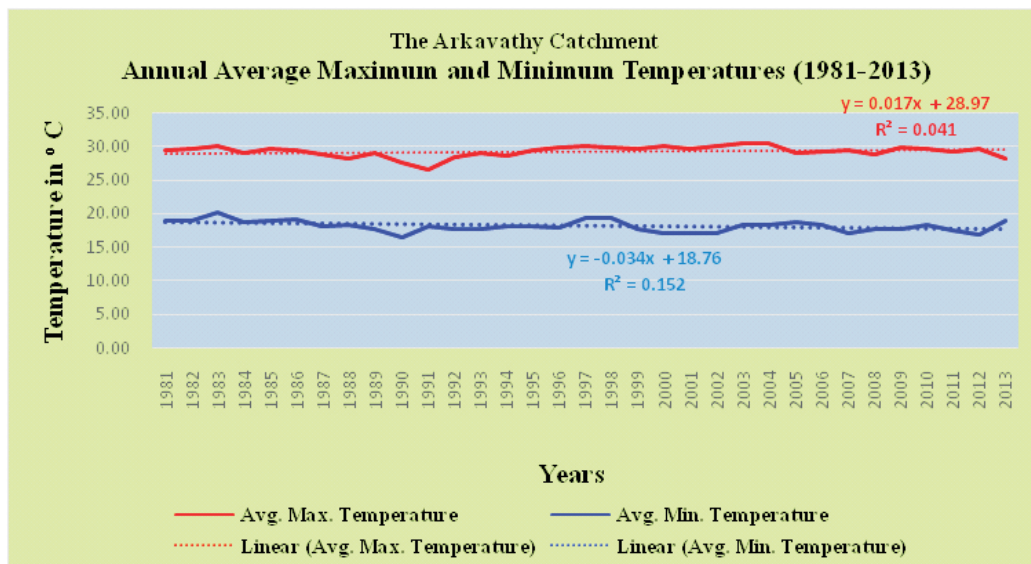
The study of historical hydro-meteorological data helps us to understand the trends and patterns of the meteorological conditions of the study area. This study has been carried out for the period 1980 to 2013 and the data of 35 years have thus been analysed.

**DATA COLLECTION AND METHODOLOGY**

Hydro-meteorological analysis has been carried out, based on the rainfall and meteorological data. The rainfall data have been collected from the Indian Meteorological Department (IMD, Bangalore) from 1981 to 2013. The minimum and maximum temperature, relative humidity, wind speed, and evaporation data have also been collected from the Indian Institute of Horticulture (IIHR), Hesaraghatta, Bangalore North, and Bangalore. The statistical analysis and interpretation have been carried out for the collected data and presented in figures.

**TEMPERATURE**

The Arkavathy catchment does not have its own meteorological parameters and they are obtained from observatories located in Hesaraghatta village, Bangalore North (IIHR) as they are considered as representative of the Arkavathy catchment. Here, the IMD data are not taken because IMD meteorological station is located at Bengaluru city and is not in the study area. As the Hesaraghatta Lake is a part of the study area, it has been taken as the meteorological observatory station. But still IMD climatic normal are taken and interpreted. Further interpretation is based on IIHR data. Usually, April is the hottest month with an average daily maximum and minimum temperatures of 33.72° C and 20.52° C, respectively. During the summer season, sometimes, the temperature even goes up to 35.7° C. December is the coolest month and the mean daily maximum and minimum temperatures are 26.39° C and 15.55° C, respectively. Annual average maximum and minimum temperature is studied from 1981 to 2013 to know the trend, the maximum temperature range from 26.57° C (1991) to 30.45° C (2003), and the minimum temperature ranged from 16.47° C (1990) to 20.25° C (1983). More or less the maximum and minimum trend shows the same, the difference between lowest and highest temperature is around 4° C only. Finally the study area experiencing same standard of temperature from 1981 to 2013. Due to the urbanisation and industrialization urban centres may have more temperature compared to rural, but due to the lack of meteorological stations data is not available in the study area

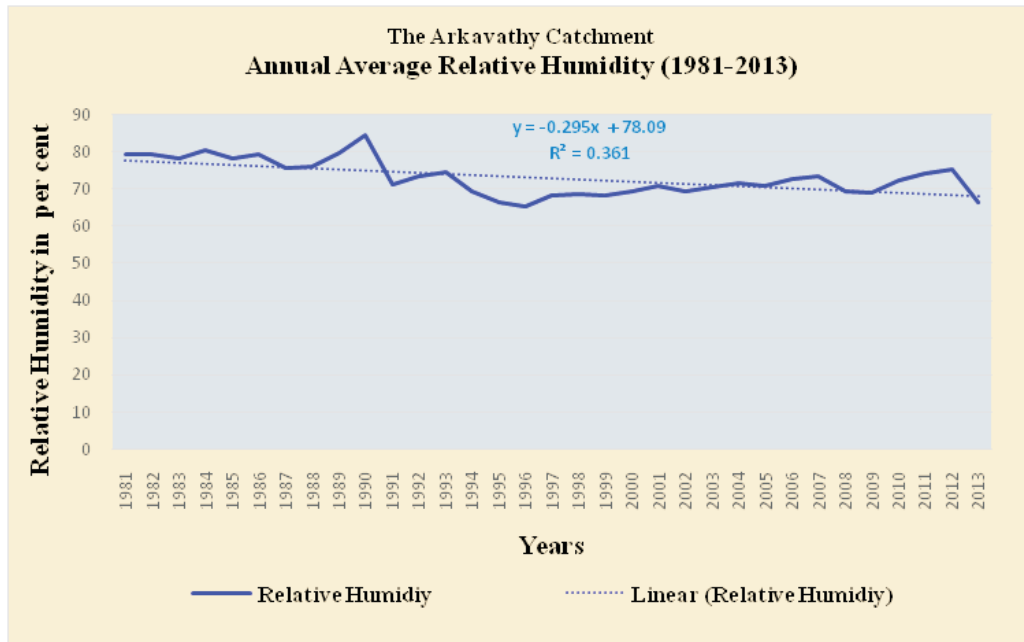


**Relative Humidity**

The Arkavathy catchment is characterised by having high relative humidity during the period of July to October. In this period humidity ranges from 80 per cent to 82 per cent and from November onwards it decreases and reaches to 74 per cent. Minimum daily average humidity is recorded in March

with 58 per cent humidity.

Figure indicates the trends in annual average relative humidity for 1981 to 2013. The annual average relative humidity trends show a decreasing line from 79.25 per cent (1981) to 66.48 per cent (2013). In between, in 1989, it reached the maximum level of relative humidity at 79.70 per cent and in 1996 the minimum relative humidity recorded was 65.37 per cent. More or less the maximum and minimum temperatures remained at the same level, but humidity was reduced almost by 12.77 per cent, during 1981- 2013. Relative humidity is a very important meteorological variable, which influences the precipitation conditions in the study area. The minimum relative humidity recorded in 1995 was 66.29 per cent and the maximum relative humidity recorded in 1990 was 85.46 per cent.

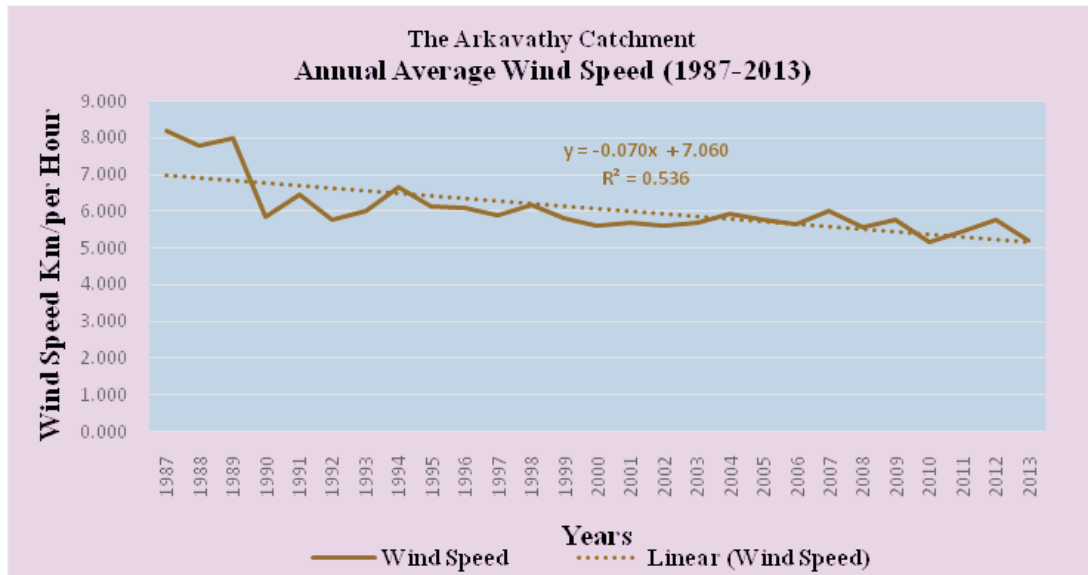


**Wind Speed**

In Figure, the mean monthly wind speed recorded at the Observatory located at IIHR, located at Hesaraghatta, shows that the wind speed was marked by two maximums and minimums. The primary maximum wind speed during June and July recorded are 9.50 kmph and 9.57 kmph and are caused by the southwest monsoon where the south-westerly winds dominate. The remaining months had the average wind speed of 5 kmph. Figure 5.3 also indicates the average annual wind speed ranging from 5.17 kmph to 8.20 kmph, the highest wind speed recorded in 1987 was 8.20 kmph and the lowest wind spread recorded in 2010 was 5.17 kmph.

The trend line shows a decreasing trend from 1987 to 2013 and it may be due to the barriers in the wind direction. From 1980 to 2013, a lot of new constructions, apartments, educational centres and hospitals were identified as barriers reducing the wind speeds.

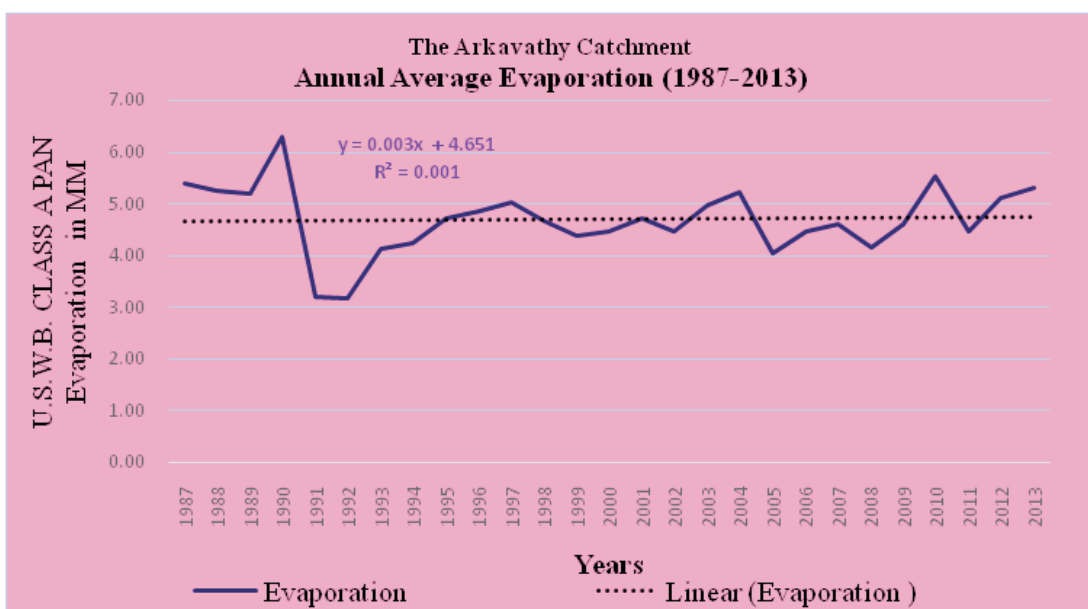




**Evaporation**

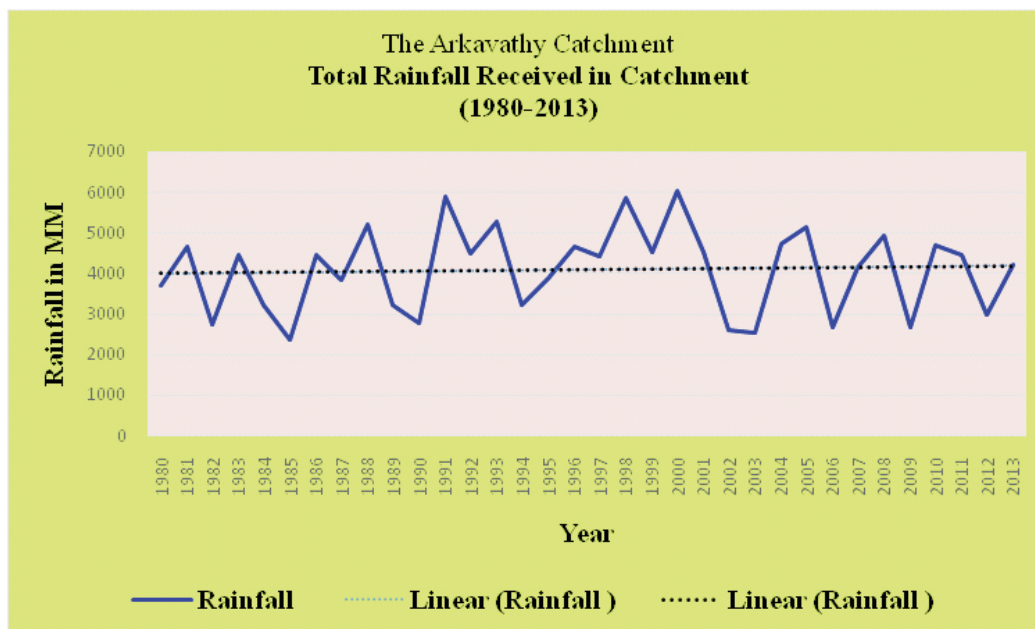
It is the evaporation that takes place when the ground surface is completely covered by actively growing vegetation and when there is no limitation of soil moisture. This parameter is closely related to mean monthly temperature and daylight hours. Other meteorological parameters influencing the evapotranspiration are humidity and wind speed. Thus, evapotranspiration is a complex phenomenon governed or controlled by a number of meteorological parameters. Figure shown below reveals that maximum evaporation is recorded in the month of April (6.57 mm), followed by May (6.43 mm), July (6.31 mm) and June (6.16 mm).

Annual average evaporation has been studied from the year 1987 to 2013, the results shown in Figure. As per the result, there are no changes in the average trend, but during 1990 the maximum annual average evaporation recorded was 6.30 mm and the minimum annual average evaporation recorded in 1991 was 3.20 mm. Apart from this, there are not much variations in the annual average evaporation over the years.



### Total Rainfall Received In the Catchment

Total rainfall has been calculated using all the five taluks of the study area to know the total rainfall in the catchment. It ranges from 2,369.4 mm (in 1985) to 6,019.52 mm (in 2000). But the trend line of the total rainfall shows an increasing trend from 1980 to 2013, as shown in Figure.



### CONCLUSIONS

The study concludes that the hydrometeorological conditions of the Arkavathy catchment area remains same with slight differences from the last 34 years. Minimum and Maximum temperature remains same, relative humidity reduced 80% to 70%, Wind speed reduced from 70 to 60 Km/per Hour, evaporation remains same and finally rainfall increased to 42000 mm from 4000 mm annually of five taluks.

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