

Spatio - Temporal Analysis of Climate in Kanakapura Taluk of Ramanagr District (Karnataka)

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Abstract - Study on the spatio-temporal variability and trends of mean major factors of temperature and rainfall is essential for efficient management of natural resource and agriculture. We have analyzed the factors of climatic data of the Kanakapur taluk region of Ramanagar district. A larger area of Nilagiri Hills in southern Karnataka which plays a significant role in primary activities like agriculture.

INTRODUCTION

A Country will be poor if it has an inaccessible location, an environment that is prone to disease, an extreme climate and fragile soil. Butcher (2007) suggests that 'The logic of functionalism' is 'culture makes man, rather than man makes culture'. The climate of any locality or a region is not determined by a single factor/element but rather by the combination of climatic elements and of weather types - prevailing there. The Taluk falls under eastern dry agro-climatic zones of the state and it has salubrious climate and free from extremes and very agreeable. It is classified as seasonally dry tropical Savanna climate with four main seasons.

The Cold Weather Season (December-February): Is a period of generally fine cool weather with mainly clear blue skies. It is a period of little or no rainfall.

The Hot Weather Season (March-April): Is a period of dry months with low humidity. May month is considerable thunderstorm activity.

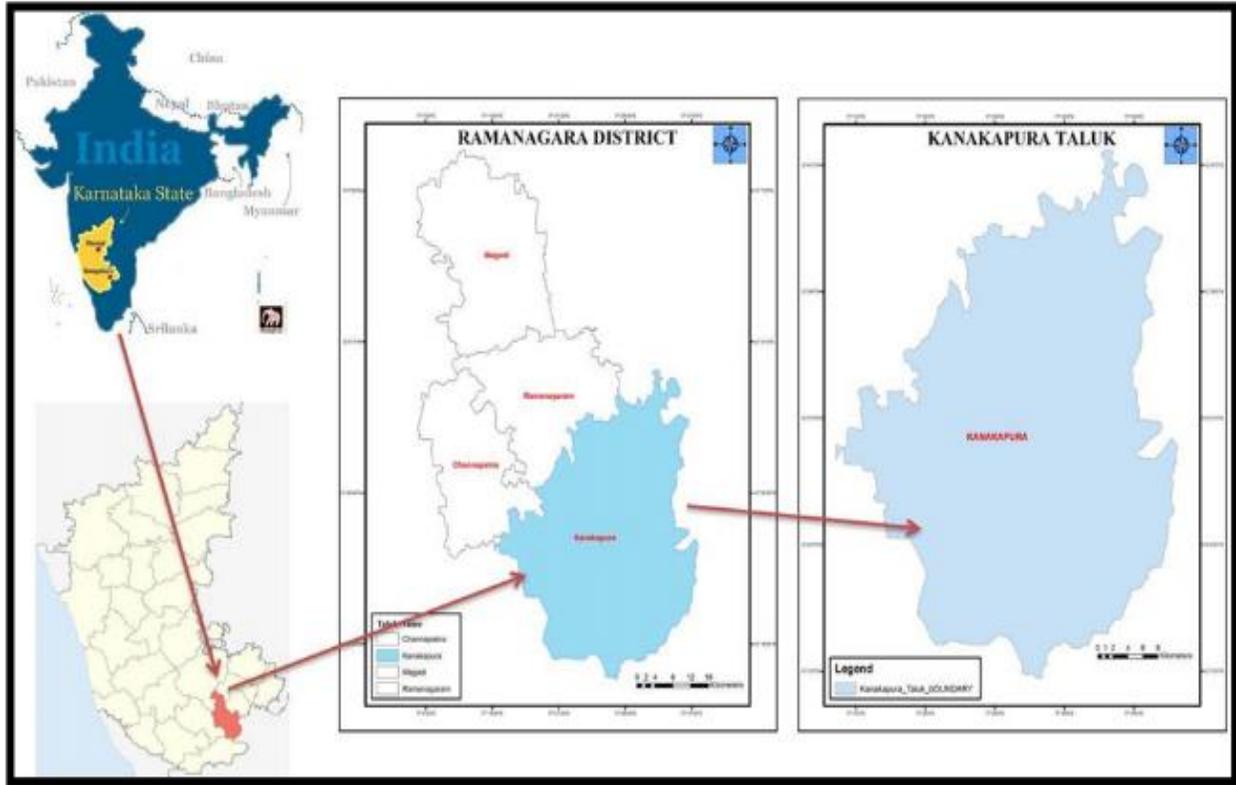
The South-West Monsoon Season (June-September): Is a moist, cloudy and rainy period. It is also a period

of fairly strong and steady winds, blowing from the south-west to west direction.

The North-East Monsoon season (October-November): The north-east monsoon season is also a moist and rainy period but with slightly less clouding.

LOCATION AND EXTENT OF THE STUDY AREA

Kanakapura taluk is one of the forth taluk in Ramanagara district, situated in southeastern part of the district. Kanakapura is located at 12o 33' to 12o 55' North latitudes and 77° 25' east 77o 42' East longitudes . It has an average elevation of 638 meters from MSL. Kanakapura is situated 56 km south to Bangalore and 26 kms from Ramanagara on the Arkavathi riverbank. Kanakapura taluk takes its name from Kānikāranhalli, Kanakanahalli finally Kanakapura. Kanakapura is a part of the Southern Karnataka Plateau and is located in the South-eastern corner of Karnataka State. It has the greatest extent of 137 Kms from North to South and 97 kms from East to West, covering a total geographical area of 1594.00 Sq. km. It is the largest taluk, while Channapatna is the smallest with an area of 543 sq. km. in Ramanagara district. Kanakapura is the largest Loksabha Constituency in India and largest taluk in Karnataka state in the area, now it is named as Bangalore rural Loksabha constituency. The most conspicuous areas of very high and very low area of the taluk are located at 600 and 900 metres of contour lines above the mean sea level respectively.



OBJECTIVES OF THE STUDY

The main purpose of the present study is to understand the local past and present scenario of climate for the future sustainable development of economic activity in the region.

The specific objectives of the present study are as follows:

- To identify the micro-level climatic zones in the study area.
- To Making a critical review of the regional climate in the region.
- To study the spatial and temporal aspects of climatical condition in the study area.
- To suggest a spatio-temporal locational climatic condition for the development of economical activities of Kanakapura taluk.

It is researcher's hope that the study in the above-mentioned objectives will be of great significance for the formulation of a model of area development. The researcher is very much conscious of the limitations of the data in certain sections of the study. The study has been designed for the entire taluk, hobli-wise done

instead of case studies to maintain the integrity of the entire area.

SELECTION OF THE STUDY AREA

The present work is based on a study of Kanakapura taluk in Ramanagara district of Karnataka state. Selection of the study area has been influenced by several criteria as follows:

In the study area the natural resources which are limit as compared to the need of the population, and the existing resources are not being properly utilized. Agriculture being the backbone of the economy in the study area is very much a prominent base. The study area is also facing problems of weak infrastructure. Irrigation facilities are also not sufficient. The cultivated land depends upon the gamble of monsoon rainfall. Similar is in the case of social facilities which are not only inadequate but also unequally distributed, which shows the poor awareness and poor consciousness of the people towards socio-economic innovations, in spite of its nearness to the Bangalore. Because of all these reasons the area is socially remained backward even today.

The above-mentioned factors and conditions have influenced the researcher to select the Kanakapura taluk for study purpose.

METHODOLOGY

It is truism that no research results are very better than methods by which they are obtained. The study is attempted at two levels i.e., at the taluk level, and within that hobli-level has been selected for a detailed analysis. In order to analyze the physical personality of the condition of climate, the entire area has been considered as a unit. This provides larger regional setting in which the relative importance of phenomena of climate could be both the area levels with suitable statistical methods. The secondary and primary data have been cartographically represented to show the spatio-temporal relations. The secondary data are to be treated as a important references but also eloquent evidences of field work by the researcher. Study has to be restricted only to a selected climate aspects and in such a selection there can always be a difference of opinion.

CLIMATIC FACTORS IN THE STUDY AREA

Temperature:

In recent years the weather pattern has been erratic, with a reduction of the cool, dry season. This could be temporary phenomenon, or it may be the beginning of the long-term changes due to global warming caused by Greenhouse gases. Generally April is the hottest month and December is the coldest month. During the Cold and Hot weather seasons the mean monthly temperatures are remarkably stable with the mean value of 26.9 degree Celsius during April - May and 20.3 degree Celsius during December - January.

The mean daily maximum temperature recorded during the hottest month is 33.4 degree Celsius and the mean daily minimum temperature is 21.2 degree Celsius, and the mean daily minimum temperature is 15.3 degree Celsius. During the coldest month, the mean daily maximum temperature observed is 25.7 degree Celsius. The main features about the climate in the taluk are the agreeable range of temperature and the two rainy seasons from June to September and October to November with opposite wind regimes corresponding to the south-west and north-east monsoons. Two other important features are the

predominant low clouding and the more or less steady temperatures during the whole monsoon season, June-October and early morning dew and moist or fog during the months of October to February. Depressions in Bay of Bengal are also reflected in this region. Other most important weather phenomena affecting the climate of the taluk are the thunderstorm and associated squall in April-May and September - October and early morning mister fog.

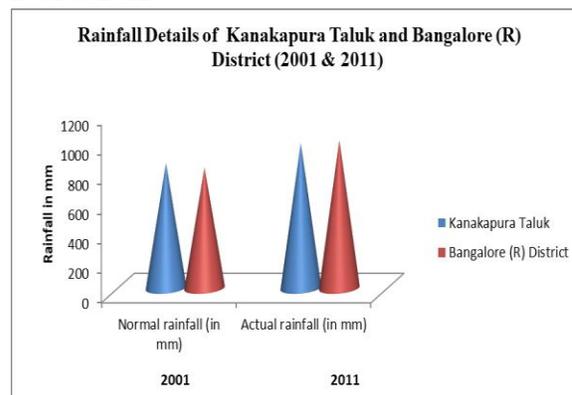
Rainfall Pattern:

Kanakapura taluk has been grouped under Dry Zone and this zone is suitable for mixed cropping. Khariff cropping is being practiced to a greater extent. Rainfall is meager, and as no major river flows in the taluk and irrigation facilities are also limited. This taluk too had aftened suffered from deficit and capricious rainfall conditions and the resultant phenomenon of crop failure. It receives rainfall from southwest monsoon from June to September, the northeast monsoon from October to November. Normal rainfall in the Taluk is 847 mm, whereas actual rainfall was 983 mm, which is above normal rainfalland the actual rainy days were 53 during 2011. The taluks contributes 19 to 25 per cent of the pre-monsoon rainfall to annual rainfall of the district, southwest monsoon contributes 46 to 54 per cent and northeast monsoon contributes 27 to 30 per cent of the annual rainfall.

Rainfall Details

| Description | Kanakapura Taluk | Bangalore (R) District |
|---------------------------------------|------------------|------------------------|
| No. of Rain gauge Stations | 5 | 44 |
| Normal rainfall (in mm) | 847 | 817 |
| Actual rainfall (in mm) | 983 | 1003 |
| Actual Rainy days -2004 (No. of days) | 53 | 50 |

Source: District at a Glance, Bangalore(R) District, 2001 & 2011

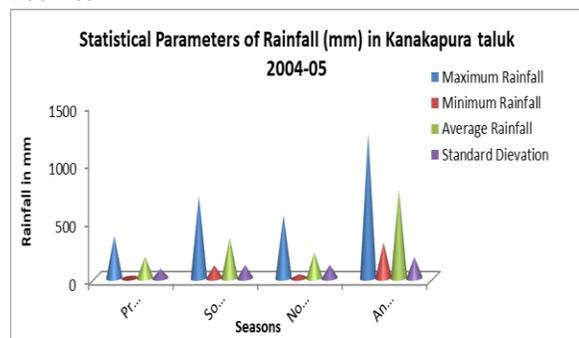


The rainfall pattern in the taluk annually 1245 mm rainfall, the highest rainfall receives in south-western monsoon (710 mm), north-east monsoon (543 mm) and pre-monsoon (364 mm). The average rainfall is 762 mm and minimum annual rainfall is about 308 mm in the taluk.

Statistical Parameters of Rainfall (mm) in Kanakapura taluk-2004-05

| Rainfall (mm) | Pre-Monsoon | South-West Monsoon | North-East Monsoon | Annual Rainfall |
|---------------------|-------------|--------------------|--------------------|-----------------|
| Maximum Rainfall | 364 | 710 | 543 | 1245 |
| Minimum Rainfall | 0 | 113 | 35 | 308 |
| Average Rainfall | 188 | 350 | 224 | 762 |
| Standard Dieviation | 82 | 114 | 115 | 182 |
| C.V. (%) | 44 | 33 | 51 | 24 |

Source: District at a Glance, Bangalore(R) District, 2004-05



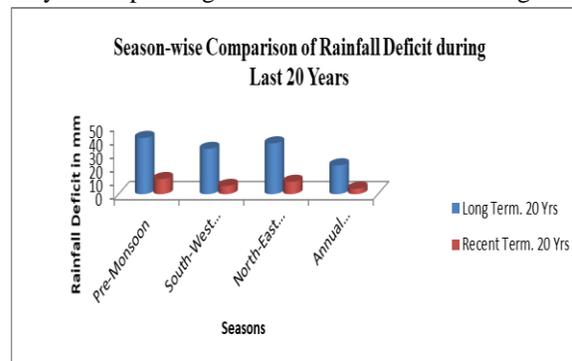
A study of the rainfall deficit pattern during the last 20 years compared with the long-term data for different seasons indicate increase in rainfall deficiency in the recent past during the pre-monsoon and northeast monsoon period. Rainfall deficit during last 20 years has been compared with that of long-term data in different seasons.

Season-wise Comparison of Rainfall Deficit during Last 20 Years with 99 Years Data

| Monsoon | Pre-Monsoon | South-West Monsoon | North-East Monsoon | Annual Rainfall |
|---------------------|-------------|--------------------|--------------------|-----------------|
| Long Term. 20 Yrs | 41 (40) | 33 (34) | 37 (38) | 21(21) |
| Recent Term. 20 Yrs | 11 (55) | 6 (30) | 9 (45) | 4 (20) |

Source: District at a Glance, Bangalore(R) District, 2004-05

Note: Figures in bracket indicate values as percentage of number of years for which data is available or for 20 years depending on the column in which it is given.



The following inferences could be made

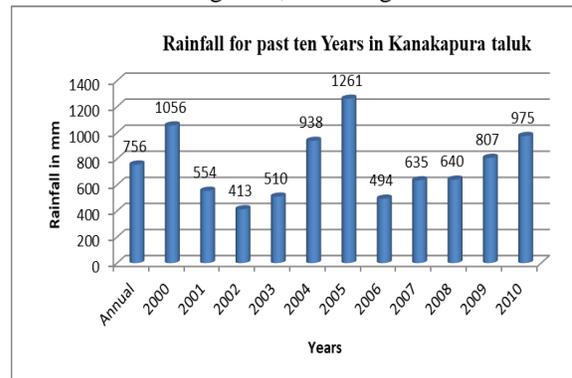
- The Pre-monsoon rainfall in the recent 20 years is more deficits compared to the long term data.
- South-west monsoon is fewer deficits in the recent 20 years compared to the long term data.
- The rainfall deficit during north-east monsoon is increasing during recent 20 years compared to the long-term data.
- The annual rainfall trend analysis in Kanakapura shows no significant change in the rainfall pattern.

Annual Actual Average Rainfall from 2000 to 2010 in Kanakapura Taluk

(Rainfall in mm)

| Normal rainfall | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|-----------------|------|------|------|------|------|------|------|------|------|------|------|
| 756 | 1056 | 554 | 413 | 510 | 938 | 1261 | 494 | 635 | 640 | 807 | 975 |

Source: District at glance, Ramanagara



Actual Rainfall for past ten Years compared to Normal in Kanakapura taluk. The highest average rainfall has been declared in the year 2005 i.e., 1261 mm, lowest average rainfall has been found in 2002 413 mm.

HUMIDITY

Relative humidity in and around the study area is moderate. Only on certain days when the hot wind blows strongly, does the relative humidity drop quite low.

The Kanakapura taluk has on the whole, a dry climate, the summer, and the cold season, being the driest part of the year when relative humidity are 45 to 65 percent in the morning and 20 to 25 percent in the afternoons in the months of February to April. While in the months of June to October the relative humidity is high between 80-85 percent on the average.

WIND

The surface winds over the taluk have a fairly clear-cut seasonal character, with westerly components in one period and easterly winds on the other. The daytime variation in the wind direction is not prominent neither during the period May to September, the winds are south-west to East, while during the period November to March; it blows in the direction of north-east to east south. April and October are the transition months when the change over from the easterly to the westerly wind regime and vice-versa takes place. The westerly winds are prominent, with mean speed of about 17 km per hour, in the month of July. Easterly winds are prominent, with a mean wind speed of about 10.km.ph, in the month of January. In the two transition months, April, and October, when the mean velocity is about 8 to 9 km per hour. During the rainy periods from April-June and September - October heavy spells associated with thunderstorms are also observed in the taluk.

OTHER WEATHER CONDITIONS

During the period from May to November, skies are moderately and heavily clouded. In the rest of the year, skies are clear or lightly clouded generally. The economy and food supply are also closely linked to climate, significant variations in climate events have profound effects on society. Thunderstorms occur

during the periods from April to May and September to October.

Monthly Average Major Climatic Elements -2011

| Months | Temperature °c | Humidity % | Rainfall mm | Rainfall mm-2011 | |
|-----------|----------------|------------|-------------|------------------|--------|
| | | | | Normal | Actual |
| June | 32.1 | 48.9 | 24.5 | 22.4 | 51.0 |
| July | 30.8 | 50.7 | 26.3 | 87.0 | 67.0 |
| August | 30.6 | 50.5 | 59.3 | 116.0 | 77.0 |
| September | 29.2 | 57.1 | 130.1 | 27.0 | 151.0 |
| October | 27.5 | 72.0 | 146.5 | 174.2 | 149.0 |
| November | 26.6 | 75.4 | 98.3 | 30.0 | 48.0 |
| December | 23.8 | 67.6 | 20.9 | 5.6 | 17.0 |
| January | 22.3 | 58.9 | 2.5 | 0.0 | 1.0 |
| February | 25.6 | 56.1 | 5.7 | 32.0 | 7.0 |
| March | 30.0 | 60.0 | 10.0 | 14.0 | 12.0 |
| April | 30.8 | 61.3 | 86.9 | 126.0 | 48.0 |
| May | 31.9 | 59.7 | 110.5 | 166.0 | 128.0 |
| Annual | - | - | - | 800.2 | 756.0 |

Source: District at Glance, Ramanagara and Meteorological Department at Bangalore 2011.

Dust-raising winds occur in April and May. In the last week of May the study area gets heavy rainfall. In October and November, storms originating in the Bay of Bengal sometimes cross the east of India moving towards west to north-west direction across the peninsula, affect the taluk and its neighborhood causing wide-spread rain and high winds.

CONCLUSION

Analysis of the trends, variability, and distribution of climatic data of more or less 20 years over the study area. The Taluk falls under eastern dry agro-climatic zones of the state, and it has salubrious climate and free from extremes and very agreeable. It is classified as seasonally dry tropical Savanna climate with four main seasons.

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